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**Note:** Revised pages in the Design and Construction Manual shall be indicated with blue headers and footers with revised text in blue. Revision # will be associated with the revision.

Whole Sections/Divisions, when added, will have the section noted on the “List of Revisions” sheet as “New” and will be black text with blue header and footer. Revision # will be on the first page of added Section/Division.
INTRODUCTION

Introduction to UNC Charlotte’s Design and Construction Manual

This manual, consisting of two separate documents – design guidelines and construction guidelines – are intended to guide future design and construction projects at UNC Charlotte. The manual is structured to be of use to all members of the design team. The first section sets design guidelines for University buildings and open space, paying careful consideration to the means in which an individual project can be woven into the campus fabric. The second section of this manual, consisting of construction guidelines, follows the organization of a typical specification manual in order to provide detailed guidance for campus construction projects.

Together, the design guidelines and construction guidelines offer a universal starting point for all UNC Charlotte projects. This document is intended as a resource; the University fully expects the design team to employ their professional expertise and analysis on campus projects. As well, the design team should consult applicable state requirements (including the State Construction Manual). For successful projects, designers are encouraged to review the contents of the manual and discuss implementation and alternatives with the University Project Manager (UPM). Should any variance from these documents occur, the designer is expected to bring this to the attention of the University Project Manager (UPM). The University’s approval of design submittals does not constitute authorization of any variance from this manual. Ultimately, compliance with this manual is the Designer’s responsibility.
SECTION 1:
DESIGN GUIDELINES
SECTION 1

DIVISION 01

GENERAL PRINCIPLES
PART 1 - GENERAL PRINCIPLES

ARCHITECTURAL GUIDELINES
The design guidelines that follow provide a cohesive set of standards applicable to the UNC Charlotte campus. The guidelines are not intended to prescribe solutions nor limit creativity but rather to establish a flexible framework that respects UNC Charlotte’s past, adequately addresses its present needs, and retains innovation for future projects.

The guidelines present design principles common to all buildings and sites within the University, addressing topics such as building typologies, massing, materials, and fenestration. The guidelines also specify treatments for open space connections. All new buildings and site improvements should be consistent with these principles or carry the burden of showing how they improve upon the proposed recommendations. The guidelines also address specific functional design considerations applicable to building projects. These considerations include topics such as building access, crime prevention, service and loading access, and sustainability.

A related document to this manual is the UNC Charlotte Campus Master Plan, completed in 2010. Designers are expected to adhere to the intent of the current UNC Charlotte Campus Master Plan and this Design Manual.

The Master Plan can be found at: http://facilities.uncc.edu/

CAMPUS IDENTITY
While accommodating program needs, new construction should respect the scale of its context to establish a campus of related building forms that is welcoming and highly identifiable. The design of new buildings should take into account the campus vernacular, especially of those buildings adjacent to the site. By incorporating the architectural character of the existing campus into the design of new buildings, the University will build an interesting and varied collection of visually related buildings, as opposed to a collection of “carbon-copied” buildings.

BUILT ENVIRONMENT
Respect for the carrying capacity of the land is critical. As often as possible, new construction should be infill projects, promoting the best and highest use of the land. In multiple locations, the Master Plan indicates that UNC Charlotte should continue consolidating surface parking into parking structures around the campus perimeter. The Plan recommends new campus buildings, recreation fields, or general open space for the existing parking lots closer to the interior of campus.

Decisions about how campus land is used will have direct implications for the University's transportation networks. Access to a site, via road, foot, or bike will be considered when determining a building site. Certain land uses will create a reciprocal need for additional roads and parking. The Master Plan tested multiple scenarios to ensure that proposed uses created a minimal burden to the University’s transportation system. The University can further minimize the impact by incorporating creative, alternative means of access to the campus, which will reduce the need for personal vehicles. New construction will include improvements to the sidewalks surrounding the building. As well, buildings will connect to the existing circulation network of paths, bike lanes, and roads. Appropriate bicycle parking, as outlined by LEED, will be provided in new projects. New buildings will also be mindful of orientation, shading, and the effect on adjacent buildings and spaces.
ECOLOGY AND HYDROLOGY

UNCC Charlotte will act to connect habitat, stream, and river corridors within its campus grounds. Habitat fragmentation will be evaluated by the University during new construction projects. The University will not disturb steep slopes, and new construction will utilize buildings as retaining walls to work with the natural topography of campus. Disruption to wooded areas will be kept to a minimum. The University will also support connections to the larger region through greenway trails and waterway protection of Toby and Mallard Creeks.

The massing of new buildings will allow daylight to reach active outdoor spaces, as well as natural daylight into indoor areas to the extent possible. New landscape projects on campus will work with a palette of native species. Over time, labor- and resource-intensive lawns will be supplanted with native grasses that require less irrigation, chemical-inputs, and general maintenance. This will occur in areas identified by the Master Plan.

Toby Creek, Mallard Creek, and two unnamed tributaries run through parts of campus. Toby Creek is most prominent, as it bisects the campus into eastern and western halves. Therefore, the University is invested in the health of its waterways on campus, as well as aware of the ways in which its treatment of these resources affects those further downstream. As part of the Campus Master Plan, a campus-wide onsite storm water management plan addresses both the quantity and quality of run-off. This plan identifies opportunities to cleanse, calm, and treat storm water. The University will look inward to supply some of its water needs by collecting rainwater for reuse in buildings and irrigation. Ultimately, the University would like to use landscape design to create healthy and ecologically appropriate spaces, provide pleasant outdoor environments, minimize storm water runoff, and reduce the “heat island” effect.

LANDSCAPE AND OPEN SPACE DESIGN CONSIDERATIONS

The Master Plan recommends several treatments to enhance existing open spaces, develop future spaces, and better connect the two. Strong axial sight lines, appropriate brick paving, benches, distinctive lighting, seat walls, and architecturally integrated handicap ramps will all contribute to an inviting campus setting. The sighting of buildings to frame quadrangles, courtyards, and other pedestrian spaces will keep new construction projects consistent with the design intent of the Campus Master Plan and the 1997 Sidewalk Master Plan (Section 2).

The UNCC Charlotte campus is nearly 1000 acres; yet, it maintains a highly identifiable campus core. Future construction projects should respect the pedestrian scale of the campus core and create intimate, memorable spaces such as courtyards, pocket parks, and small plazas. The introduction of plantings, seat walls, water elements, and public artwork to frame these areas will enhance their sense of intimacy. Seating, so that members of the campus community can enjoy, study, and congregate in these areas, should be included in the plans.

To further enrich the quality and interest of the University’s open spaces, the design guidelines and Master Plan identify three types of open spaces on the campus to be cultivated throughout campus: manicured open spaces, working landscapes, and natural landscapes.

*Manicured open spaces* are the formal quads used to organize the campus’s buildings. Manicured open spaces may consist of formalized landscaping that includes plantings, shrubs, trees, and turf grass; or, they may consist of formal “hardscaping,” that includes materials such as brick, wood, and pre-cast pavers. Formal plantings are often incorporated into the hardscaping design.
In certain settings, the University may choose to implement “working landscapes”: landscaped settings that perform dual purposes of visual interest and stormwater management function. Please consult the appendix of the Master Plan for a full description of opportunities for working landscapes.

Natural landscapes on campus are open space areas in which native species grow “freely.” Native grasses and flowers replace non-native turf grass areas along the campus’s edges and streams. Natural landscapes require less maintenance and chemical inputs for their care and upkeep. Again, the Master Plan identifies areas for natural landscapes to be cultivated, as they are not appropriate for all areas of campus. Natural landscapes will create greater bio-diversity on campus and strengthen UNC Charlotte’s connection to its unique region, climate, and ecology.

ENERGY
Energy can be the single greatest operating expense for a university and the single greatest source of carbon emissions. Reducing energy consumption provides benefits on both fronts. UNC Charlotte will explore the use of natural resources such as solar (for heating and hot water), wind (for ventilation and cooling), and geothermal (for heating), and will not prohibit the incorporation of these features into a building’s design. However, the University retains final approval to ensure life cycle cost savings.

The University will also reduce energy requirements of buildings through design, equipment selection, and use/operations guidelines. Building systems will strive to be closed loop, so that waste heat and other process byproducts can be recycled for other building functions. As new technologies become available and affordable, the University will evaluate and, as appropriate, implement these practices.

Building design will minimize maintenance and operating costs by employing whole-systems lifecycle evaluation and by integrating innovative building engineering solutions at project inception. Building design should also adopt monitoring, measuring, and feedback systems to establish baselines of energy usage and building performance, against which the University can evaluate improvements and set goals for future projects.

SUSTAINABILITY
To create a campus that improves the quality of life and environment for its students, faculty, and staff, the University addresses issues of sustainability as a continuous process affecting environmental and fiscal concerns. The design guidelines encourage sustainability at the “campus scale” by addressing goals within four broad categories: ecology and hydrology, energy, built environments, and public education through learning landscapes.

The University is committed to environmental sustainability and stewardship of the physical environment and is committed to procedures and products that both sustain the environment and produce savings for the University over time.

It is the goal of the University of North Carolina at Charlotte that new buildings be designed to meet a minimum standard of "LEED\(^1\) Certified" criteria. For additional information about these criteria, please consult Annex A. The University Project Manager (UPM) will advise the designer whether s/he should pursue Green Building Council certification on a project-by-project basis.

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\(^1\) LEED: Leadership in Energy and Environmental Design
BUILDING TYPOLOGIES
A building can be described by its program, size, form, location on campus, and the way it is used to define an exterior space. Campuses are composed of collections of buildings with similar programs representing academic, residential, athletic, and student life uses. The program contained in a building often dictates the building’s size and location. Groupings of similar uses frequently occur because of the desire to maximize functional adjacencies and congregate similar typologies.

Intuitively, a building should portray its use with characteristics embodied in the building envelope, mass, and detailing. For example, numerous windows, well-detailed entries, a relatively narrow width to length footprint, and connections to pedestrian pathways and open space will characterize residence halls. The Master Plan identifies areas suitable for new residential housing in the South, East, and North Villages.

Large expanses of glass, tall floor-to-floor heights to accommodate interstitial utility distribution, roof treatments to conceal fume hood exhaust stacks, and wide width to length proportions to satisfy classrooms, lecture halls, and lab module requirements will characterize academic buildings.

BUILDING PLACEMENT
Campus buildings generally define two types of areas: streets and open spaces. In some cases, buildings will define both. On UNC Charlotte’s core campus, like other traditional campus cores, buildings most frequently define open spaces, forming the edges of campus quads. Regardless of the space a building frames, it should be designed as “edge definer,” actively shaping the spaces around it with public interfaces at the street level that relate to existing adjacent buildings.

To define outdoor space, build-to lines are established as part of the guidelines. These build-to lines are not set-back requirements, but space-making edges that the buildings should adhere to.

- Buildings shall remain parallel and perpendicular to adjoining streets and spaces. This geometry reinforces view corridors, street edges, wayfinding, and entry locations.
- Buildings shall retain a minimum of 60 percent of their frontage along the build-to line. This recognizes that buildings are designed with setbacks and variations in mass and height to balance proportions and create visual interest.
- Buildings shall meet build-to lines on more than one façade when sited on a corner condition. The intent is for a building in this condition to present a strong visual presence in multiple directions when facing a street, quad, or major pedestrian path.

Each project should take responsibility for improving adjacent streets and pedestrian ways by including funds in its budget to bring these areas up to campus standards. Siting and design of new structures should result in areas that are lively and secure through twenty-four hour use. Designers are encouraged to use the campus palette of building and landscape materials, walkways, lighting, signage, and street furniture to create both active gathering and contemplative spaces. These types of spaces should reinforce linkages and gateways within the campus and at its edge.

DEFINED QUADS AND HIERARCHY
Due to prominent locations and/or specialized civic uses, certain buildings on campus will need to be designed as iconic, or “hero” buildings. Robinson Hall is an example of building with a civic programming component and high visibility from University City Boulevard. Its design and presence is iconic and elegant, befitting of the functions it contains. However, not all buildings on campus need to have iconic status. Several buildings on UNC Charlotte’s existing campus serve successfully as “soldier” or
background buildings. The design of “soldier” buildings should still be exceptional, but toned down so as not to compete for attention with the hero buildings, like the Fretwell Building. This approach establishes a hierarchy among campus buildings that allows visitors to intuitively understand the arrangement and function of the buildings.

Campus Axes and Landmarks

Landmarks or Heroes should be determined by location (such as terminating an axis, creating a gateway, or anchoring an entrance) or uses (library, art museum, performing arts, administration) which develop a legible hierarchy on campus.

Soldier Buildings are well crafted unique buildings which form the edges of spaces, maintain rhythm and massing of the context, and allow the hero buildings to act as landmarks.

BUILDING MASSING

The massing of a building is defined by several key elements including: building height, geometry of plan (length and width), and roof form. Most of the older buildings on campus are one to two stories in height and rectangular in plan geometry. Newer buildings are typically three to four stories.

Architectural scale is important because it helps to define the overall character of a campus. This is accomplished by how the features of buildings, particularly at the ground level, relate to the scale of the human body. It is further reinforced by how buildings relate to each other and the surrounding open space.

Much like the campus, buildings are composed of many different elements such as door treatments, window types, columns, arches, cupolas, chimneys, and cornices. How these elements are applied often gives intuitive visual clues as to the programmatic use of the building. Future buildings must reflect the intimacy of the existing campus’s scale in their details. This respect will allow a wide range of architectural styles to coexist in an elegant and cohesive manner.

Wings, setbacks, and porticos will also reduce the overall size and scale of a building. It is imperative that future buildings maintain these characteristics so that the campus aesthetic remains consistent. The potential mass of a new building will be dictated by topography, site area, build-to setbacks, and the height of adjacent buildings.

The difference in scale between the main campus and the CRI campus is visually evident. This difference is not necessary contradictory; it represents the difference in place and function between the two campuses. Future projects on each campus should be responsive to its individual context and be relatable to the human user of the building.

Buildings placed along streets and paths should be spaced at a regular rhythm.

- Buildings should be no longer than 125-250ft in length
- Longer buildings should have massing that reduces their scale
- Pedestrian portals should be created to allow for functional campus circulation

Building heights should maintain consistency along the entire connection.

- Building height should match that of existing buildings along the connection
- Building height for new connections should be consistent
Taller buildings should be recessed at the limit line
Stories above the limit line should be distinct from the façade below
Material, color, and pattern of upper stories should help to reduce their visual impact

**FAÇADE RHYTHM**
There are several features comprising a building’s façade that, when employed correctly, will reduce a large scale into a more human scale. Arranging a façade into three major vertical pieces is a principal approach to accomplishing this. The three vertical pieces include:

- A base of cast stone or brick. The height of the base will be proportional to the height of the building.
- A middle portion of brick generally with pre-cast accents.
- A top or roof that caps the project rather than a condition in which there is no defined top edge to the building.

**Base**
Cast stone bases are encouraged for all buildings fronting quads, principal streets, or major pedestrian spines in order to distinguish the building at street level. The stone should be predominately light in color and should be of a height proportionate to the overall building size. Articulation of the surface is encouraged. Brick is also an acceptable material for bases, particularly when detailed to differentiate the base from the upper levels.

**Middle**
The primary material of the walls above the base should consist of standard sized Boren “Special Morrocroft” #02-79-1 (Now Hanson Brick) brick, traditionally associated with UNC Charlotte’s architecture. Other brick sizes may be used for decorative purposes and/or on secondary walls internal to the site. Consideration should be given to the compatibility of brick and stone colors of adjacent and opposite buildings. This should not, however, discourage visual richness on the campus. Window frames and mullions, sun screens, metal elements, and railings may be used to introduce color into building façades when appropriate.

**Top**
The manner in which a building ‘meets the sky’ also contributes to its sense of scale. Articulating a building’s roofline provides visual termination to a façade and further minimizes one’s perception of its scale. Future buildings should incorporate treatments into their design that will accomplish this goal. A change in plane and/or a change in material will create shadow, texture, and visual interest. Unless incorporated into a building’s design, mechanical equipment should be screened from view and placed away from main pedestrian circulation paths.

The standard for vertical division is to maintain symmetry with respect to the primary entry and to express a sense of order and repose elsewhere along the same façade. Expression of rhythm via cast stone banding, brick reveals, brick projections, or other elements is desirable.

Consistent vertical expression and rhythm of facades

**MATERIALS AND COLORS**
UNC Charlotte has already established a detailed materials palette for the campus, as outlined below. By
respecting this palette, new building designs will foster a sense of architectural continuity with existing buildings across the campus. Other approved materials may be employed to highlight particular features of the façade, and the University encourages architects and designers to use these accent materials in a way that explores and expands upon the basic vocabulary of the campus building. The interplay of materials and textures with the traditional campus building palette is one way to respect the campus’ historic building styles while creating an aesthetic that is modern.

Standard materials and colors should generally reflect those of Robinson Hall: (For more specific information, refer to the Design and Construction manual, Section 2,):

ENTRANCES
Articulation of the main public entry on the façade of a building is crucial for promoting clear visual and intuitive access to campus buildings. The primary building entrance should be articulated through architectural elements that instill a sense of hierarchical importance. Canopies, loggias, change in vertical plane, change in grade, change in material, and placement of signage can all help to highlight and distinguish a building entry. Vestibules, to limit heat and cooling loss, should be predominately glass to provide unobstructed visual access into the interior of buildings.

Secondary entrances should also be clearly defined using a combination of brick and pre-cast stone material. All entries should be covered to protect building users from inclement weather. Secondary entrances should be recessed from the building face or covered using a canopy.

Building entrances should contribute to the life and activity of the streets and walks surrounding the building. Well-lit and glass entries will enhance security in the areas adjacent to the building. Building entrances are frequently the meeting and gathering places of those using the buildings, and they should be designed to encourage interaction.

Main entrances should be accessible for individuals with disabilities. Accessible pathways to buildings within the immediate vicinity as well as major walkways to other parts of campus shall be integrated into the design of the building.

Entries should be clear and pronounced.
- Entries should be distinct in massing, scale, and material from other façade elements
- Entries should have exterior and interior spaces that reinforce arrival and interaction

WINDOW EXPRESSION
Window openings should be vertically oriented (or articulated as such by use of frames and mullions), and should generally consist of masonry or stone heads and sills. Ample fenestration at the base of a building will maximize visual connections between the building’s ‘public’ ground level and the street or open space on which it is located.

Recessed window openings which emphasize depth and shadow lines are recommended. A minimum depth of two inches is recommended from the face of the facade to the face of the window frame. Design of “curtain walls” is not desired except in special circumstance where they are subordinated to the solidity and massing of the facade.
The academic activities of the University, so far as they are compatible, should be visible to passers-by. Windows should be placed to light and provide views to internal spaces, and also to give walks and streets the security and richness that derives from the visibility of adjacent activity.

**ROOFSCAPES**
Rooftop terraces, garden areas, or other designed roofscape elements are desirable. The topography of campus is such that one often has a view looking down upon the roofs of buildings at lower elevations. Roofscape should be designed with this in mind. No highly reflective materials, such as metallic materials or mirrors, may be used on the surfaces of roofs. By painting or using materials light in color, roofs can deflect heat from the sun and lessen cooling costs for the building. Sustainable green roofs are encouraged when appropriate as the “fifth façade” of buildings.

Mechanical equipment located on building roofs shall be adequately screened with structures integrated into the building design so as not to be visible from the ground level or from windows of adjacent buildings.

Glazing, such as clerestories or skylights, should appear as recessed openings.

**PARKING DECKS**
The designer should apply the University’s architectural guidelines to new decks, specifically those regarding setbacks, massing, façade rhythm, and scale. New decks will define streets and open spaces on campus. They should align with streets, courtyards, and view corridors. Additionally, decks should have at least one façade that addresses the street and respond to the character and organization of the space it faces.

Decks should be designed to have a clear distinction of vehicular and pedestrian entrances. Most visitors to campus go directly to a parking deck, as their first destination on campus. Therefore, the design of should attempt to make the transfer to foot, shuttle, or bike as efficient and safe as possible. Special consideration should be given to pedestrian paths when they intersect with vehicular routes. Using specialized pavers or simply changing the paving material from asphalt will visually enforce pedestrian crossing. The design should also consider opportunities that facilitate bus and bicycle usage, such as sheltered shuttle stops and bicycle storage on site.

The University would like to encourage a mix of functions within its parking decks, when possible. Parking deck ‘wrappers’ literally wrap around the exterior of decks and house multiple uses such as commercial, residential, office, or a combination of the three. This creates a true mixed-use space that enhances pedestrian movements and encourages activity on the street well beyond parking hours. The Master Plan recommends deck wrappers at certain locations, and these should be designed following the University’s architectural design guidelines.

The University expects that new parking decks will respect the UNC Charlotte’s commitment to environmental sustainability. Although LEED certification for parking garages is not applicable, the garages shall be designed to minimize impact on the ecology and environment of the campus.

**CAMPUS SIGNAGE**
With the Campus Master Plan and these design guidelines, the University strives to strengthen its identity and brand. This is accomplished through many means, from the cohesiveness of the campus’s architectural character to the scale and intimacy of its open spaces, from its presence on abutting city
roadways to the use of native, regional plant species. The most obvious, and perhaps basic, means of accomplishing a strong campus identity is through campus signage, particularly signage that appears on campus buildings. The University has created and adopted Campus Signage Standards that should be followed by all construction projects.

Specifically, the name of all buildings must be permanently attached to, or architecturally integrated into, the facade of the building. As a general guide, the building name should be integrated in the design of the primary entrances. The font and size shall conform to the Campus Signage Standards (Section 2, Annex D). If a formal name has not been designated, the design should include an integrated position of pre-cast stone for future building name signage. Such position should be designated in the construction documents for future installation.

The University may decide to supply/install the building signage by separate contract. The UPM should be consulted to determine the delivery method.

FUNCTIONAL DESIGN CONSIDERATIONS

Whereas the architectural guidelines of the previous section provide a set of practices to affect the physical appearance of the campus, its buildings, and its open spaces, the functional design considerations outlined within this section are intended to ensure that the campus operates in a seamless, safe, and secure manner.

CRIME PREVENTION

Of primary importance to the University is the health and safety of its students. Crime prevention is one factor contributing to the safety of students. As designers approach new projects, they should consider the implications a new building or open space will have on safety and security. Construction projects should include plans for well-lit pedestrian paths, particularly in areas on the edge of campus. Designers should ensure that potential problem areas in general are well-lit; examples of such areas include stairwells, entrances and exits of buildings, parking areas, ATMs, public telephones (including security phones), bus stops, recreation fields and courts, storage areas, and recycling areas. Building windows should provide views of activities occurring outside the building, including views of parking lots. Entrances and edges of campus should have multiple surveillance points from adjacent buildings. Where appropriate, campus police sub-stations may be included in the building design. Features that may allow criminal activity to go unnoticed – fencing that obscures views, heavy foliage or shrubbery along pathways or building entrances, spaces that cannot be seen from adjacent buildings and pathways – should be avoided. In general, the University prefers ATMs to be located in the interior of buildings.

During construction, the Electrical Contractor must provide adequate temporary security lighting within the limits of construction site.
PART 2 - PROJECT DEVELOPMENT PROCESS

2.1 GENERAL

A. INFORMATION AVAILABLE FROM THE UNIVERSITY
   1. Campus Map in AutoCAD format
   2. Master Plan
   3. Signage Standards (Section 2, Annex D)
   4. Designer access to University Facilities Drawings & Records File

2.2 UNIVERSITY PROJECT MANAGER (UPM)

A. Design contracts are with the State of North Carolina through the University of North Carolina at Charlotte, to be administered by the Facilities Management Department. The University will appoint a single University Project Manager (UPM) for each design effort. The UPM is the primary contact for the Designer. The University Project Manager may rely on other University personnel for support. The University may change the project manager during any phase of a project.

B. All official correspondence and coordination will be with the UPM. Direct communication with other University officials may be necessary to execute design and construction responsibilities; however, such involvement shall be orchestrated by the UPM. During the construction phase a construction manager will also be assigned by the University to monitor the quality and schedule of the project.

C. All invoices are to be mailed to the attention of the UPM. Failure to do so will unnecessarily delay the processing of an invoice. All matters pertaining to the Designer’s Contract shall be directed to the UPM as well.

2.3 DESIGNER’S PROJECT MANAGER AND CONSTRUCTION ADMINISTRATOR

The Designer shall designate in writing a Design Project Manager and a Construction Administrator for all formal communications with the University.

2.4 DRAWING REQUIREMENTS

Designers shall follow the drawing requirements as detailed in Section 3, Annex G.

2.5 PREPARATION OF MEETING MINUTES

Minutes of each design and construction meeting shall be prepared by the Designer. Copies of the minutes will be made available for all officials at the meetings. The Designer can deliver copies to each official’s office or deliver a set to the University Project Manager who will then distribute them on campus. Minutes should be provided to the UPM for review within five working days after the meeting.

2.6 NORTH CAROLINA CONSTRUCTION MANUAL

All design work shall comply with the procedures outlined in the North Carolina State Construction Manual prepared by the North Carolina Department of Administration’s State Construction Office (NCDOA/SCO). Designers should familiarize themselves with the NC State Construction Office’s policies. The intent of the UNC Charlotte manual is to help designers understand the particular needs and desires of the University. This manual does not supersede any requirement in the North Carolina State Construction Manual.
PART 3 - PROJECT DEVELOPMENT SEQUENCE

3.1 PRECONSTRUCTION CONFERENCE
The Designer shall conduct a preconstruction conference according to SCO requirements. A standard agenda is provided at the NC State Construction Website: http://www.nc-sco.com/forms.aspx

3.2 MONTHLY PROGRESS MEETINGS
A. The Designer shall conduct monthly progress meetings as described in the NCDOA/SCO Blue Book. The meetings shall be conducted by the Designer’s Project Manager.

B. The agenda shall include the following elements (at a minimum):
1. Distribution of a written agenda
2. Recognition of new personnel assigned to project
3. Confirm attendance by all contractors (circulate attendance sheet)
4. Review minutes of previous meeting for corrections or omissions
5. Changes in Project personnel telephone numbers or pager numbers
6. Short Term Schedule Projections (by each contractor)
7. Progress Report (percentage complete by each contractor)
8. Report on HUB percentage participation on the project; calculated by dividing the contractor’s HUB commitment (value) by the contractor’s total contract
9. Long Term Schedule Projections (by each contractor)
10. Review of weather-related delays for previous month
11. RFI’s in progress
12. Review of Bulletin Drawing Log
13. Change Orders in Progress (Execution)
14. Potential Change Orders
15. Accidents
16. UNC Charlotte Project Manager’s Comments
17. State Construction Office Representative’s Comments
18. Schedule Next Monthly Progress Meeting

3.3 BIDDING/CONTRACTING
The Designer will administer the bidding and construction phase unless specified otherwise in the Design Contract.

3.4 REQUIRED BID ALTERNATES
If the following types of materials are specified for the project, the product brands listed below shall be included in the bid document as bid alternates as authorized by NC General Statute 133-3. A public meeting is required for submission of proprietary materials:
19. Schlage Locksets (see UNCC Std. Spec S08710)
20. Simplex Fire Detection Systems
21. Lenel Card Access System
22. Boren Brick “Special Morrocroft” #02-79-1
23. Brick Pavers – English Edge by Pinehall Brick
24. Door Hardware (see Section 2.8)
   a. Interior cylinders are to be Schlage 6 Pin Everest D
   b. Exterior cylinders are to be Schlage Primus
   c. Locks are to be Schlage Lever D Series RHO 626; Best; or Sargent Lever 10 Line LNL 260.
d. Exit/Panic devices are to be Von Duprin 99-98-55-STC; Sargent 80 Series; or Precision.
e. Smoke Activated Closers are to be LCN; Morton; Corbin-Ruswin; or Rixson Firemark.
f. Overhead Closers are to be LCN 4011, Sargent 281; or Corbin-Ruswin

3.5 CHANGE ORDERS (C.O.)
All change orders will use the change order form obtained from the NC State Construction Website. The change order “Requesting Party” will be determined by the State Construction Office Representative or UPM (for informal projects). The change order “Title” should be six words or less.

3.6 24 HOUR EMERGENCY CELL PHONE
The Designer shall provide the University Project Manager (or his/her designee) with a continuously operable cell phone which may be called by the University at any time there is an emergency at the Project. The person carrying the cell phone shall be knowledgeable of the Project and have the ability to immediately contact the contractor’s key personnel. The University may occasionally make test calls to ensure the cell phone is operational.

3.7 CONSTRUCTION SIGNS
Construction signs are required on all capital construction projects unless exempted by the University Project Manager. No other signs or contractor logos are authorized on construction sites at UNC Charlotte.

3.8 SCHEDULING OF SERVICE OUTAGES
Required outages of existing service shall be scheduled by the University at dates and times least disruptive to the University community. Requests shall be submitted in writing to the Designer’s Project Manager and the UPM at least thirty days prior to the planned outage. The Designer shall review the outage plan to assist in determining the plan with the least disruption to the University.
SECTION 2:
CONSTRUCTION GUIDELINES
SECTION 2

DIVISION 01

GENERAL REQUIREMENTS
DIVISION 1 – GENERAL REQUIREMENTS

A Capital (formal) Project is any project above $500,000.

A Design Services (informal) project is any project below $500,000.

For further definitions, please reference the State Construction Manual at [http://www.nc-sco.com](http://www.nc-sco.com)
SECTION 2

DIVISION 01A

CAPITAL PROJECT GUIDELINES (FORMAL)
PART 1 - SITE ACCESS AND USE OF PREMISES

1.1 CONTRACTOR USE OF PREMISES

A. THE CONTRACTOR shall use only the following roads on campus: Toby Creek Road from W.T. Harris Boulevard to Cameron Blvd. to Craver Rd., Cameron Blvd. from University City Blvd. to Craver Road, Craver Road from Cameron Blvd. to the construction entrance. (Modify for specific project.)

1. Each Contractor must coordinate materials deliveries to the project site without recourse to University staff assistance. Shipping documents must contain complete delivery instructions to include a site location, Contractor name, and telephone number for the delivery truck driver's use. In case of fire, medical, ambulance or safety concern dial 911.

2. Each Contractor using a yard hydrant, wall hydrant or hose bib must use the proper key or handle. A key or handle may be borrowed from Facilities Management. Damage from misuse or abuse will be billed to the offending Contractor. Fire hydrants will not be used for water supply (case-by-case exceptions may be made by Facilities Management if no other water is available).

3. The Contractor shall take reasonable effort to protect existing surfaces, roadways/haul routes, parking lots, finishes, and adjacent facilities from damage during construction. Prior to construction, the Contractor may initiate a Pre-Construction meeting with the Designated Representative to perform an inspection to record damaged existing conditions. Each Contractor will ensure that vehicles and equipment are not loaded beyond their rated Gross Vehicle Weight, or other load restrictions. Vehicles operating on the Campus must comply with all State weight and axle restrictions. Contractors will be held responsible for repair of damage caused by their vehicles. When hauling material consisting of any form of stone, rock, dirt, debris or concrete the material shall not be piled or placed any higher than the sides of the hauling vehicle without written authorization of the University Project Manager.

4. If a Contractor intends to install a physical security alarm system, prior coordination must be accomplished with Public Safety.

5. Explosive blasting generally is not allowed. In extreme rock conditions the blasting alternative may be considered. If blasting is approved, a comprehensive plan will be coordinated with UNC Charlotte staff prior to execution.

6. All equipment must be secured when Contractor staff is not on-site. Each contractor must accept responsibility for physical security of tools, equipment, materials and other property on-site. The construction fence must be maintained and signed to prevent casual entry into the site.

7. Contractors are allowed to work 24 hrs per day, 7 days per week, except on Saturday during spring and winter commencements, provided the general contractor’s superintendent is on site. Other restrictions apply near housing areas.

8. Each Contractor is responsible for employee conduct and behavior on Campus. Harassment, verbal abuse, and other such behavior toward students, faculty, staff, or the
general public will not be tolerated. Radios and other sound sources are not allowed on the project. All employees are required to wear shirts.

9. Each Contractor (and all Contractor employees) must comply with University Traffic Regulations and Emergency Procedures Manual. All North Carolina motor vehicle laws apply on Campus, including registration and inspection requirements. The University reserves the right to direct the route of all hauling on University property. There shall be no additional payment related to the route being selected or modified by the University. Factors such as traffic disruption, soiling of street, and detriment of pavement will be considered.

10. All materials, equipment, vehicles and employee vehicles must be contained within the limits of construction. Parking is extremely limited on Campus. Vehicles shall be parked in assigned areas to be arranged with the UPM. Vehicles must display temporary parking permits which will be provided by the UPM. Vehicle operators shall comply with all traffic and parking signs. Parking on sidewalks or lawns for loading and unloading may be arranged on an individual basis, but only after coordination with the UPM or University Construction Manager.

11. Prior to initial occupation of the site, coordinate with Facilities Management and check in at the Facilities Management office.

12. Weapons are prohibited on Campus.

13. Prior to any excavation at any location by any Contractor, the Contractor must coordinate with Facilities Management to establish utilities locations. A University representative in company with the Contractor's representative will locate and mark location of utilities on the ground. The Contractor remains responsible for protecting existing utilities from damage.

14. Contractors will maintain safe pedestrian ways around the project site. Walkways and roads will not be blocked.

15. To the extent herein described there is no charge to Contractors for University provided utilities except telephone service. Current telephone charges will be provided upon request. The University will provide power at no cost for office trailer and small tools. The University will identify utility sources and the contractor will be responsible for all costs associated with tie-in, metering, and distribution. Hot and cold water for HVAC equipment, if available, shall be metered by the contractor. Contractor will be invoiced monthly at the current rate.

16. Utilities outages must be coordinated with Facilities Management at least 30 days prior to the period of the outage. For some critical circuits, longer lead times may be necessary.

17. All Contractors must provide all labor, materials, tools and equipment required to accomplish the work. The University will not furnish or loan anything except where contract documents so indicate. No Contractor shall use any facility beyond the limits of construction.

18. Attachment: Contractor's Safety Guide

19. Added items to be provided to the Contractors by the University:
   a. Campus Telephone List
   b. Facilities Management Telephone List
   c. Campus Map
   d. UNCC Emergency Procedures Manual
   e. UNCC Traffic Regulations

20. The Contract Documents may specifically identify certain existing materials and items which are to be delivered to the Owner. For any other materials removed in the course of the Work, the Contractor shall first offer them to the Owner; if not accepted, the Contractor shall remove them from the Project. Any materials which are paid for under the Contract, but not incorporated into the Work due to Change Orders or for other reasons, shall be similarly offered to the Owner.
PART 2 - SAFETY

2.1 CONTRACTOR’S SAFETY GUIDE

A. General: It is University policy to provide a working, teaching, and learning environment as free as possible of recognized hazards to the safety and health of students, faculty, staff and visitors. All Contractors are required to comply with that policy. All safety, health, and fire protection rules, regulations, policies and procedures that apply to UNC Charlotte personnel shall also apply to Contractors and their employees. Prior to initiating any contractual operations, the Contractor's on-site supervisors shall become thoroughly familiar with UNC Charlotte safety rules, procedures, emergency and disaster instructions plus all applicable state and federal safety and health regulations. Contractor shall establish and maintain a functioning safety program including safety meetings and site inspections for the purpose of controlling unsafe acts and conditions at the work site.

B. Please refer to webpage for contract safety program: http://safety.uncc.edu/contractors

2.2 UNIVERSITY SAFETY OFFICE REQUIREMENTS

A. The following requirements have been established by the University Safety Officer:
   1. In case of fire, medical, ambulance, or safety concern dial 911 (off campus line 704-687-2200).
   2. Hazard Communication notifications will be made to extension 2200.
   3. Notify UNC Charlotte of any hazardous or unusual operation.
   5. Barricades must be erected a safe distance (at least 6 feet) from perimeter of construction areas.
   6. A chemical spill prevention plan must be in effect.
   8. All welding, cutting, or hot work must comply with appropriate safety standards.
   9. No parking on sidewalks except as necessary during a specific task.
   10. Designate a safety and health coordinator for the project, or assign that responsibility to the on-site superintendent.

2.3 FACILITIES MANAGEMENT DEPARTMENT SAFETY REQUIREMENTS

A. Care shall be taken to protect all persons in the vicinity from injury and undue inconvenience. Contractor shall provide & maintain pedestrian and vehicular barricades as necessary for the situation.

B. Pedestrian barricades shall be constructed of continuous temporary fencing completely containing the work area.

C. Fencing shall be erected with sturdy bracing and shall extend from the ground to a minimum of 48" high and shall meet all ADA requirements for barricading for the visually impaired.

D. Continuous, plastic mesh, orange safety fencing is acceptable. If the barricade blocks an existing pedestrian sidewalk, the contractor shall properly mark an alternate route by installing and maintaining neat legible signs. “Alternate Route” signs may be required at locations outside the Construction Limits

E. All workers and traffic control personnel shall wear “safety orange” vests or shirts while performing work in streets, parking lots, or other areas where there may be vehicular traffic.
2.4 QUANTITY OF GENERAL SITE ROCK EXCAVATION:
   A. The following quantity of rock excavation shall be included in the Base Bid and considered as part of the Contract as follows:
      1. General Construction Contract: ___?___ cubic yards
      2. THE UNIT PRICE QUOTED ON THE FORM OF PROPOSAL shall apply for adding to and deducting from the above quantity in accordance with the method used.

2.5 QUANTITY OF TRENCH ROCK EXCAVATION:
   A. The following quantity of rock excavation shall be included in the Base Bid and considered as part of the Contract as follows:
      1. General Construction: __________
      2. Plumbing: _____ cubic yards
      3. HVAC: _______ cubic yards
      4. Electrical: _______ cubic yards
   2. THE UNIT PRICE QUOTED ON THE FORM OF PROPOSAL shall apply for adding to and deducting from the above quantity in accordance with the method used.

2.7 QUANTITY OF GENERAL UNSUITABLE SOILS EXCAVATION:
   A. The following quantity of unsuitable soils excavation and removal offsite and replacement shall be included in the base bid and considered as part of the contract as follows:
      1. General Construction Contract: _______ cubic yards
   2. THE UNIT PRICE QUOTED ON THE FORM OF PROPOSAL shall apply for adding to and deduction from the above quantity in accordance with the method used.

2.9 QUANTITY OF GENERAL SOILS EXCAVATION AND RECOMPACTION:
   A. The following quantity of soil excavation and re-compaction shall be included in the base bid and considered as part of the contract as follows:

PART 3 - ALLOWANCES (NOT USED)

PART 4 - ALTERNATES

4.1 The contractor shall review all addenda, drawings, and specifications to fully appraise the extent of each alternate.

PART 5 - MODIFICATION PROCEDURES

5.1 CUTTING, PATCHING, AND FINISHING:
   A. See General Conditions, Article 39. The repair of all damages made by cutting shall include restoring those surfaces to a state of finish equal to that when construction began, including such things as surface texture, design, and color, unless in remodeled work new finishes are called for. All such repairs shall be performed by persons trained and proficient in the particular trades involved; for example, plaster repairs by plasterers, masonry repairs by masons, tile
repairs by tile setters, painting by painters, and the like. It is the intent of the Contract Documents that all areas requiring repairs shall be restored to a completely finished condition acceptable to the Architect and the Owner.

5.2  CUTTING AND PATCHING:
   A. All cutting required to perform the work, and install the products specified under a particular Contract or Subcontract, shall be performed under that particular Contract or Subcontract, and all patching work resulting from this cutting shall be performed under that particular Contract or Subcontract unless completely new products have been scheduled or called for. All patching work shall be by craftsmen skilled in the required work and who may already be engaged on the Project. Cutting shall be held to the minimum.

5.3  PAINTING FOR PATCHING:
   A. All patching work within previously painted areas shall be painted by that Contract or Subcontract, which caused the need for this painting, unless completely new finish or finishes have been scheduled or called for. All painting shall be by skilled painters who may already be engaged on the Project.

5.4  CUTTING OF STRUCTURAL MEMBERS:
   A. Shall not be performed without review by the Architect.

PART 6 - ELECTRICAL AND MECHANICAL WORK AND CONNECTIONS

6.1  GENERAL
   A. ALL ELECTRICAL WORK shall be in accordance with Division 16 and applicable codes.
   B. ALL HEATING, VENTILATING, AND AIR-CONDITIONING WORK shall be in accordance with the HVAC Sections of Division 15 and applicable codes.
   C. ALL PLUMBING WORK shall be in accordance with the Plumbing Sections of Division 22 and applicable codes.
   D. PLUMBING WORK also includes work of Div. 2 specification Section ___________.

PART 7 - TESTING LABORATORIES LISTING

7.1  A. ALL CUSTOM FABRICATED ASSEMBLIES of electrically operated equipment provided under this Contract shall be listed by a nationally recognized testing laboratory, such as Underwriters' Laboratories, Inc. This requirement shall apply in every case where such listings have been established for the particular type of materials or devices in question.
   B. ALL STANDARD MANUFACTURED ITEMS of electrically operated equipment shall be listed by a nationally recognized testing laboratory such as Underwriters' Laboratories, Inc. This requirement shall apply in every case where such listings have been established for the particular item in question.
PART 8 - OVERALL PROJECT COORDINATION

8.1  GENERAL

A. The contractor shall coordinate all work of his contract to produce the required finished project in accordance with the contract documents. Special attention shall be given to the submission of shop drawings, product data, samples, color charts, and requests for substitution within the specified time; furnishing the proper shop drawings to subcontractors, products suppliers, and separate prime contractors for divided contracts, whose work and equipment is affected by and related thereto; and the furnishing of all information concerning locations, type, and size of built-in equipment and products and equipment utilities. This coordination is in addition to all other coordination requirements called for in the technical sections of the project manual and on the drawings.

B. COORDINATION DRAWINGS are required for all portions of the project. These drawings shall be developed by the HVAC Mechanical Contractor and shall show the sizes, elevations, and locations of all duct work, mechanical piping larger than 1-1/2" diameter, motors, pumps, and other mechanical equipment, in relation to the structure, walls and ceilings.

1. Drawings shall be of minimum scale of 1/4" equal; 1'-0", contain a block in the upper right corner for sign off by the Contractors and Subcontractors, and be forwarded to the Plumbing Contractor through the General Contractor and shall be in the form of reproducible mylars or other acceptable medium.

2. The Plumbing Contractor shall receive these drawings and show in the color red, the sizes, elevations, and locations of all equipment and piping larger than 1-1/2" diameter, except that fire protection piping and equipment shall be shown in the color green.

3. The Plumbing Contractor shall sign each drawing thus indicating coordination, or if coordination has not been attained, shall notify the General Contractor of the need for effective coordination efforts to resolve. Issues and items requiring further coordination shall then be resolved between the Contractors, the results shall be included on the coordination drawings, and the Plumbing Contractor shall sign each drawing thus indicating coordination. Signed coordination drawings shall then be forwarded to the Electrical Contractor through the General Contractor.

4. The Electrical Contractor shall receive and similarly mark in the color blue; equipment, conduit larger than 1-1/2" diameter, panels, and any light fixtures which may conflict with work of other Contractors or Subcontractors.

5. Upon completion of this process, these drawings shall then be circulated through the General Contractor for General Contractor coordination. The General Contractor shall distribute to each of the Contractors sepia of final coordination drawings that each can make prints as necessary for field use.

6. Copies of completed coordination drawings shall be forwarded to the Architect, for information only, and not as shop drawings, prior to the installation of the work.

C. WORK INSTALLED in advance of the completion of the process required by Paragraph 4.09.01, which must be relocated to effect coordination, shall be relocated as part of the work. Such relocation shall not be basis of entitlement for additional time or money.

THE PROCESS of coordination may require the addition of sleeves and reinforced penetrations not specifically shown by the documents. Such sleeves and reinforced penetrations of the structure are a part of the work and shall be provided by the Contractor needing the sleeve or penetration. Penetrations through concrete shall be effected by forms or sleeves. Penetrations shall not be cored, drilled or chopped through structural elements unless specifically engineered by the Contractor and submitted for review in accordance with procedures for submittal of shop drawings. Penetrations through structural steel members shall be reinforced with pipe sleeves full penetration welded to the webs or flanges of the members or shall be fully reinforced with plates, shapes, and angles. Reinforcement details for penetrations through structural steel will be provided by the structural engineer upon request by the Contractor.
8.2 THE GENERAL CONTRACTOR shall conduct all necessary coordination meetings with the contractors to fully and effectively attain this coordination and to develop these coordination drawings.

8.3 COORDINATION DRAWINGS shall be revised, to reflect as-build conditions, by the general contractor, and reproducible mylars of these shall be given to the architect at the time of request for certificate of substantial completion.

8.4 COORDINATION OF GRADES: tops of access points to underground systems in unpaved area shall be adjusted as necessary to be 2” higher than surrounding finish elevations.

8.5 GENERAL INSTALLATION REQUIREMENTS

A. INSPECTION OF CONDITIONS: The Contractor shall require the installer of each component to inspect both the substrate to which it is to be installed and the conditions under which the work is to be performed. Do not proceed with the installation until unsatisfactory conditions have been corrected to meet the requirements of the component and its manufacturer.

B. INSTALLATION INSTRUCTIONS: The Contractor shall perform the installation work in accordance with the Contract Documents and the manufacturer’s installation instructions and recommendations, the more explicit or more stringent requirements governing.

C. THE CONTRACTOR shall inspect materials and equipment immediately upon delivery and again prior to installation. Damaged and defective items shall be rejected and removed from the Project.

D. THE CONTRACTOR shall provide attachment and connection devices and methods necessary for installing the work in a secure condition. Install work true to required line and levelness. Allow for expansion and building movement.

E. VISUAL EFFECTS: The Contractor shall provide uniform joint widths in exposed work of the same material. Joints shall be arranged in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for a final decision.

F. CONTRACTOR shall recheck measurements and dimensions before starting each installation.

G. THE CONTRACTOR shall install each component during weather conditions and Project status that will insure the best possible results. Isolate each part of the completed construction from incompatible material to prevent deterioration.

H. THE CONTRACTOR shall coordinate the installation of temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction work for inspection and testing.

8.6 MOUNTING HEIGHTS: Where mounting heights are not indicated or specified, install individual components at the standard mounting heights recognized within the industry and governing code for the particular application. Refer questionable mounting height decisions to the architect for a final decision.

8.7 CLEANING AND PROTECTION: See supplementary general conditions. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply a
non-damaging protective covering where required to insure protection of work from damage or deterioration until owner's acceptance of project.

8.8 MAINTENANCE OF EXISTING SERVICES: Conduct construction operations so that heat, air conditioning, ventilation, electrical, telephone, gas, water, sanitary, storm sewer, and any other service required for the building operations, to the existing building are maintained at all times during normal working hours. Any shutdowns or interruptions shall be coordinated with and approved by the owner.

8.9 PROTECTION OF INSTALLED WATERPROOFING MATERIALS

A. ALL TRADES REQUIRING WORK to be done on installed waterproofing materials shall provide means for protecting the waterproofing materials and the General Contractor shall act as coordinator to insure that the protection is provided. Protection for storage of materials, walking areas, and working areas shall be by sheets of 19 mm (3/4") thick plywood or an equal approved by the Architect. Protection from solvents, petroleum products, and other substances detrimental to the waterproofing membrane as listed by the membrane manufacturer shall be by drain buckets, properly wrapped unbroken containers, drop cloths, and plywood. Protection shall be afforded to all work areas and materials transportation and workmen access lanes to the work areas. In no case shall equipment, materials, and substances detrimental to the waterproofing membrane be stored on or allowed to come in contact with the installed waterproofing materials.

B. THIS PROTECTION shall be provided for:
   1. Roofing
   2. Waterproofing

C. To assure proper and accurate fit, all dimensions of existing facilities are to be considered approximate and installation dimensions shall be taken by the Contractor prior to ordering materials or initiating work.
PART 9 - PROTECTION OF EXISTING WORK

9.1 SEE GENERAL CONDITIONS, ARTICLE 11.

9.2 ALL CONTRACTORS are hereby reminded and cautioned that extreme care shall be exercised to protect the existing facilities from damage during the progress of the work. Any damage that occurs shall be repaired or damaged areas removed and replaced with new materials equal to the existing and to the owner's satisfaction without additional cost.

9.3 The lawn in the material storage areas and elsewhere as affected by the contract shall be protected from unnecessary digging, trenching and rutting, and after completion of the work all holes, trenches, ruts, and other damage shall be filled in, graded, and made ready to receive new grassing. If grassing is included in the project, these areas shall be grassed in accordance with the requirements of section 02930. If grassing is not included in the project, these areas shall be grassed to match existing as close as possible.

PART 10 - OTHER REQUIREMENTS

10.1 PROVIDE dielectronic isolation between dissimilar metals, such as, but not limited to, between mild steel and aluminum.

10.2 ALL WELDING to the structure shall be performed to the same requirements as are described by specification sections 05120 and 05121.

10.3 VARIOUS ITEMS will be mounted within rated assemblies such as walls and floors. The contractor providing any such items shall also provide the work necessary to maintain the rating of the assembly.

10.4 CEILING SUSPENSION SYSTEMS: Each piece of equipment supported by the ceiling suspension system, particularly in acoustical ceilings, shall have at least 2 safety wires attached to each piece of equipment.

A. Each piece of equipment in a "narrow face" acoustical ceiling suspension system shall be fully independently supported by wires or straps and NOT supported by the suspension system. "Narrow face" suspension systems have flanges too narrow to effectively support equipment, particularly should there be some movement in the system

B. All safety wires and all fully supporting wires and straps shall be provided by the installer of the equipment.
10.5 CONTRACTOR QUESTIONS: Questions contractors may have of the architect shall be submitted through the project expediter using the "request for information" form which is attached to the beginning of this division. Answers shall be returned from the architect through the project expediter. The project expediter shall assign a number to each question and shall assure that question which is forwarded to the architect includes related inquiries of all contractors. The project expediter shall assure that answers to questions are included in the work of all contractors. The project expediter shall maintain a log including the number of each question, a brief description of each question, the dates forwarded to and returned from the architect, and other pertinent information. A current copy of this log shall be given to the on-site representative of the architect 7 calendar days prior to each monthly progress conference.

10.6 UTILITY STANDARDS: All underground piping and utilities (both metallic and non-metallic), except copper pipe, shall have a separate copper tracer wire and non-metallic warning tape installed above the utility line.

A. The tracer wire shall be traced for continuity prior to backfill, immediately upon completion of backfill and compaction and once again during final utility location/as-built at the end of the project. This also will include landscape irrigation mains to the points of the valves. All above ground utility features such as vaults, manholes, valves, handholds, etc to be properly labeled. Contractor shall provide an inventory of all installed outdoor utility features including type and model.

B. IDENTIFICATION TAPE: The 1st stage of identification shall be a buried warning tape. This tape shall provide an early warning at shallow depth excavation. The tape shall be 6" wide, and buried approximately 18" to 30" above the service pipe, but a minimum of 10" below finished grade. It shall consist of multiple layers of polyethylene with an overall thickness of 3 to 5 mils. It shall be installed continuous from valve box to valve box or manhole to manhole, and shall terminate just outside of valve box or manhole wall. The black colored lettering on the warning tape shall be abrasion resistant and be imprinted on a color-coded background that conforms to APWA color code standards. The lettering on the tape should name the utility it is protecting (i.e. Caution buried sewer line below).

C. TRACER WIRE: The 2nd stage of identification shall be a buried tracer wire. This tracer wire shall provide pipeline identification, be fully detectable from above grade utility locators, and be able to provide a depth reference point to top of pipe.

D. All pipe, including lawn irrigation lines, and metallic pipe with compression gasket fittings installed underground shall have a tracer wire installed along the length of the pipe. The wire shall be taped to the top of the pipe at a maximum of 10' intervals and not allowed to "float freely" within the backfill.

E. Tracer wire shall be single-conductor, 12 gauge minimum, copper single-conductor wire with type "UF" (Underground Feeder) insulation, and shall be continuous along the pipeline passing through the inside of each valve box. A #12 AWG or heavier (smaller AWG number), solid, insulated (RHW, THW, or polyethylene insulation is recommended); copper wire shall be taped to pipe at 10 foot intervals. Do not wrap wire around pipe. The wire must be one continuous, unbroken length. Coil tracer wire at meter location and street end with enough wire to extend a minimum of two feet above grade.

F. TRACER Wire boxes
   1. Plastic gas and water longer than 1000 feet in length from curb valve to meter riser must have tracer wire boxes installed in accordance with UNC Charlotte standards.

10.7 FINAL AS-BUILT SURVEY: Prior to project completion the Design Engineer shall have the as-built survey finalized by a licensed land surveyor and locating company satisfactory to the
University. The locator will locate all utilities using approved methods, where the locator shall connect to the trace wire. Any problems found in the survey shall be documented to the owner and designer. The final as-built survey shall locate and inventory all utilities and also survey the existing conditions. The survey of the site shall also include 1’ contours, pipe size, and depth of utility, manhole elevations, inverts, building footprint, and all aspects of the site.

A. The surveyor will identify any untraceable utilities and relay missing information to designer and contractor in order to coordinate repairs. Surveyor shall relocate and resurvey missing data after repair. Survey will begin where utility tie in occurs in order to tie to existing campus utility plans. Any abandoned utilities should be fully documented in the drawings. Digital (CAD) and stamped survey (1 PDF and 1 Mylar) to be delivered to UNC Charlotte within 20 business days of project acceptance. Drawings shall be prepared to University standard.

B. If required by the University Project Manager the utilities may be surveyed before they are buried. If this is the case the trace wire and locator tape must still be installed to University standard. The trace wire shall be tested prior to project punch list.

10.8 FIELD ENGINEERING

A. OWNER’S SURVEY: Based on the Owner's Survey, the Contractor shall verify all existing grades and conditions, and verify dimensions of existing construction and report any errors and inconsistencies in writing to the Architect before work is performed in the areas where errors and inconsistencies exist.

10.9 PROJECT MEETINGS (ALSO SEE GENERAL AND SUPPLEMENTAL CONDITIONS)

A. The Contractor and each of his Prime Subcontractors or each Prime Contractor, as the case may be, shall present a written progress report for his contract work and shall recommend any constructive measures as may be appropriate.

B. Pre-Roofing Conference - See roofing specification Section

C. The Designer shall conduct a preconstruction conference according to SCO requirements. A standard agenda is provided at the NC State Construction Website: http://www.nc-sco.com/forms.aspx

D. The Designer shall conduct Monthly Progress Meetings as described in Section 111 of the NCDOA/SCO Blue Book. The meetings shall be conducted by the Designer's Project Manager. The agenda shall include the following elements (at a minimum):
   1. Distribution of a written agenda
   2. Recognition of new personnel assigned to project
   3. Confirm attendance by all contractors (circulate attendance sheet)
   4. Review minutes of previous meeting for corrections or omissions
   5. Changes in Project personnel telephone numbers or pager numbers
   6. Short Term Schedule Projections (by each contractor)
   7. Progress Report (percentage complete by each contractor)
   8. Report on HUB percentage participation on the project; calculated by dividing the contractor’s HUB commitment (value) by the contractor’s total contract
   9. Long Term Schedule Projections (by each contractor)
   10. Review of weather-related delays for previous month
   11. RFI’s in progress
   12. Review of Bulletin Drawing Log
   13. Change Orders in Progress (Execution)
   14. Potential Change Orders
   15. Accidents
   16. UNC Charlotte Project Manager’s Comments
17. State Construction Office Representative’s Comments
18. Schedule Next Monthly Progress Meeting

E. The Designer shall distribute written minutes of the monthly meetings within one week of the meeting. In general, the format of the minutes should include the topics listed in the agenda. Any revisions reported to the Designer, shall be entered and copies redistributed by the Designer no later than the following monthly meeting.

F. Copies of the minutes will be made for all officials at the meetings. The Designer can deliver copies to each official’s office or deliver a set to the University Project Manager who will then distribute them on campus. Minutes should be provided to the UPM for review within five working days after the meeting.

G. Waste management goals and reporting will be discussed at:
   1. Pre Bid Meeting
   2. Pre Bid Meeting
   3. Pre-Construction Meeting
   4. Regular Job site Meetings
   5. See Section 3, Annex B for other supporting documentation in relation to the above.

10.10 SUBMITTALS
   A. SEE GENERAL CONDITIONS and SUPPLEMENTS THERETO, the Specification Sections, and TABULATION OF SPECIFICATION SUBMITTALS AND SPECIAL REQUIREMENTS for required submittals
   B. PHOTOGRAPHS OF THE SITE: The General Contractor shall make photographs of the site showing site conditions as existing prior to the starting of any work. Two prints of each photograph shall be made, I for the Architect and I for the Contractor. Prints shall be 203 mm by 254 mm (8” by 10”) in size, glossy prints. A minimum of 2 photographs shall be made of the overall site and additional photographs shall be made of any unusual site conditions that will affect the work. Photographs shall clearly show the existing site condition.

10.11 QUALITY CONTROL (ALSO SEE ARTICLE 8 OF THE GENERAL CONDITIONS)
   A. TESTING LABORATORY SERVICES: A TESTING LABORATORY will be employed and paid directly by the Owner. Whenever any retesting and re-monitoring is made necessary because work performed by the Contractor is not in accordance with the requirements of the Contract Documents, the Contractor shall reimburse the Owner for the cost of this retesting and re-monitoring. Testing and monitoring shall be required for:
      1. Verification of foundation subsoil conditions in accordance with Division 2.
      2. Testing of soil compaction as specified in Division 2.
      3. Testing of concrete cylinders as specified in Division 3.
      4. Inspection of structural steel as specified in Section 5.
      5. Mortar testing required by Division 4.
      6. Floor finishes tolerance measurements required by Division 3.

10.12 QUALITY CONTROL PLAN
   A. The Contractor is responsible for quality control and shall establish and maintain an effective quality control system. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The site project superintendent will be held responsible for the quality of work on the job and is subject to removal for non-compliance
with the quality requirements specified in the contract. The site project superintendent in this context shall be the highest level manager responsible for the overall construction activities at the site, including quality and production. The site project superintendent shall maintain a physical presence at the site at all times, except as otherwise acceptable to the owner, and shall be responsible for all construction and construction related activities at the site.

B. The Contractor shall furnish for review by the designer, not later than 20 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract. The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The owner will consider an interim plan for the first 20 days of operation. The first application for payment will be processed only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. The second application for payment will not be processed until acceptance of the contractor's CQC Plan.

C. The Contractor shall have a Qualified and Competent Supervisor present whenever workers are performing work. The Supervisor shall notify the Designated Designer’s Representative of the work schedule for each day prior to initiating work.

10.13 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS (SEE GENERAL CONDITIONS AND SUPPLEMENTS THERETO, ARTICLE 40.)

A. FIRE PROTECTION: The General Contractor and each Prime Contractor or Prime Subcontractor shall establish and maintain a Project fire protection program and procedure to be followed in the event of fire.

B. TEMPORARY SANITARY FACILITIES: The General Contractor shall provide and maintain self-contained, chemically-treated, temporary toilets adequate for the accommodation of all persons engaged on the work. Temporary toilets shall be enclosed and weatherproof and shall be kept in sanitary condition at all times. As soon as conditions of work will allow, a temporary toilet within building shall be provided. This toilet shall be equipped with a temporary water closet fixture and connections to sewer. All temporary toilets shall be in accordance with the regulations of the authorities having jurisdiction.

C. TEMPORARY TELEPHONE SERVICE: All long-distance and toll calls shall be paid for by party making call. Telephone service is available from the Owner. Each Contractor may arrange for connection to this service, as part of the work.

D. BARRIERS: Shall be provided by the General Contractor.

E. TEMPORARY CONSTRUCTION FENCE: A metal 2438 mm (8') high fence with locked vehicle gates and locked pedestrian gates shall be erected as indicated and maintained. Vehicle gates shall be located as close as possible to any required permanent vehicle entry to the area. Before Project final review, this temporary fence and its foundations and appurtenances shall be removed from the site, and all resulting post holes and damage and disfiguration to the site repaired to the satisfaction of the Owner and any other parties involved.

1. Fencing shall be chain link fabric with posts and top rails of pipe sections and a bottom wire. Fabric shall contain a dark green mesh for screening.

F. TREE AND PLANT PROTECTION: Contractors are hereby reminded and cautioned that care shall be exercised to protect trees and plants which are to remain during the progress of the Project. Suitable barriers shall be provided around all trees and plants that are to remain and which are in the construction area and product handling area. All damage to such trees and plants shall be repaired; broken limbs properly and neatly pruned and painted with pruning paint; all trunk damage neatly dressed and painted with pruning paint. Any trees and plants
which are excessively damaged shall be replaced in like, kind, size, and species by the Contractor at no additional cost. All work shall be by a recognized and approved nursery.

1. All grading around trees and plants to remain shall be such that the root system shall not be disturbed. Earth shall not be temporarily piled around trees and plants, nor shall earth be graded to the trees and plants above the natural root depth for that particular species.

2. Established trees and plants, which are in the way of construction and which are in the material handling areas, shall be removed and stored for future replanting. The services of a recognized and approved nursery shall be employed to remove the trees and plants and prepare them for storage. Removed trees and plants shall be properly balled and burlapped in accordance with their size. During the time of storage, they shall be properly watered and cared for in accordance with the instructions from the nursery. After the construction work is completed, the stored trees and plants shall be replanted, and those trees and plants not replanted shall be disposed of as directed by the Owner.

G. PROVIDE AND MAINTAIN SUITABLE TEMPORARY sidewalks, closed passageways, fences, or other structures required by law so as not to obstruct or interfere with traffic in public streets, alley ways, or private right-of-way. Leave an unobstructed way along public and private places for pedestrians and vehicles.

H. PROVIDE WALKS over and around all obstructions in public places. Maintain from the beginning of twilight, through the whole of every night, sufficient light and guards to protect persons from injury.

I. LEAVE ACCESS TO FIRE HYDRANTS. Should these hydrants be susceptible to damage caused by the operations of this Contract, they shall be protected by means approved by the governing authority.

J. TEMPORARY PARTITIONS: Provide temporary partitions between occupies areas and the work. Locate as required to facilitate Owner's continued occupancy. Construct of minimum 25 ga. metal stud with 5/8 inch gypsum board panel each side tight to adjoining construction. Provide sound and thermal insulation. Construct temporary partition in accordance with applicable fire-separation requirements of authorities having jurisdiction. Where required, provide acceptable lockable doors in temporary partitions.

K. TEMPORARY EGRESS: Provide emergency egress from existing occupied areas at all times as required by authorities having jurisdiction. Maintain egress path in compliance with requirements of North Carolina State Building Code requirements.

10.14 SECURITY:

A. Each contractor shall be responsible for security and protection to his equipment and the site-stored and installed products under his jurisdiction, at all times whether paid for by the owner or not, until the owner accepts the project.

B. CONDUCT CONSTRUCTION WORK so that the owner's existing building can be locked securely at all times when it is not normally opened. All temporary outside walls and barriers shall be constructed so they will be reasonably tamperproof.

C. CONTRACTORS shall provide identification for their vehicles and all employees on this project. Identification methods shall be approved by the owner. The contractor shall be held responsible for each of his employees wearing the identification while on the project.

D. THE GENERAL CONTRACTOR, AS COORDINATOR FOR THE PROJECT, shall establish a color code for the hard hats to differentiate between the various trades and visitors. Twelve (12) hard hats for Owner's and Architect's representatives shall be furnished by the Contractor and kept in clean condition.

E. Except for communication devices, no radios or other sound-emitting devices not directly associated with the work will be operated by the workers at the job site. All workers will behave
in a polite manner and all workers will wear shirts and shoes when on campus. Workers are not to make any comments or gestures to any University personnel, students or guests. Workers are permitted to smoke in designated smoking areas. Workers not complying with these requirements will not be allowed to work and may be instructed to vacate the work site. If workers are restricted from working, such restriction(s) shall not alter the terms of the contract.

10.15 ACCESS ROADS AND PARKING AREAS:
A. THE GENERAL CONTRACTOR shall provide and maintain for the duration of the Contract, a graded and graveled site access road for the use of himself, his Subcontractors, his product suppliers, and Prime Contractors as the case may be. Additional access ways shall be furnished and maintained to the product storage areas and the work itself. All access roads and ways shall be properly maintained for passage during all weather conditions while work is being performed.
B. ADDITIONAL ACCESS ROADS AND PARKING AREAS shall be furnished and maintained during all weather conditions for the use of the Owner, Owner's visitors, and other persons and services having proper business at the Project until permanent roads and parking areas are provided.
C. SHOULD ACCESS ROADS not be located for permanent roads, they shall be removed, prepared for grassing, and grassed. Otherwise, they shall be prepared for permanent roads.

10.16 TEMPORARY CONTROLS:
A. WATER CONTROL: THE CONTRACTOR OR EACH PRIME CONTRACTOR, AS THE CASE MAY BE, SHALL PROVIDE THIS WATER CONTROL FOR ALL WORK PERFORMED UNDER THE CONTRACT OF THE CONTRACTOR OR EACH PRIME CONTRACTOR. Furnish all labor and necessary equipment and provide all necessary products for the temporary control of surface water and seepage water during construction. Furnish and operate pumps and other equipment required to keep all excavations, pits, and trenches free from water at all times. Dikes and ditches shall be constructed around excavations and elsewhere as necessary to prevent surface water from flooding the excavations or standing in areas adjacent to excavations, in work areas or in product storage areas. The Contractor shall take all necessary precautions to protect adjacent areas and properties from damage. He shall not divert water onto adjacent areas and properties at points other than that which would be considered the natural flow, prior to construction, without the expressed consent of the Owner in writing with a copy to Architect. He shall take steps to prevent the erosion of soil, earth and other material and the conduction of the eroded materials onto adjacent properties, and shall be responsible for the removal of such materials, the restoration of adjacent areas to their original condition, and at the proper time, the removal of all water control means and methods.

10.17 EROSION CONTROL:
A. Temporary erosion control is specified in Division 2 and on the drawings.

10.18 FIELD OFFICES AND SHEDS:
A. LOCATION of all temporary offices and storage sheds shall be approved by the Architect and owner.
B. STORAGE SHEDS shall be provided and maintained by the Contractor in accordance with the requirements of the Contract Documents.
10.19 CONFERENCE AREA:
A. The General Contractor shall provide and maintain, as part of the Contract, in a weather tight condition a separate conference area for his use and for the use of periodic Project conferences and other related conferences for the duration of the Project. This area shall be at least 22 square meters (230 square feet) in size, insulated, heated in cold weather, air conditioned in hot weather, and ventilated during other times when heat and air conditioning is not required. Conference area shall be illuminated by at least four 610 mm by 1219 mm (2' by 4') light fixtures each containing four 40 watt fluorescent lamps. Conference area shall contain four 762 mm by 1524 mm (30" by 60") tables and 30 stacking side chairs. Adjacent to the conference area shall be an illuminated and ventilated toilet room containing 1 water closet, 1 lavatory with mirror, 1 waste basket, and a supply of toilet tissue, paper towels, and liquid hand soap. All utilities, supplies, cleaning, and maintenance shall be by the Contractor as part of the Work and at no additional cost.

10.20 CONTRACTOR'S FIELD OFFICE:
A. The General Contractor shall provide and maintain, as part of the Contract, a weather tight office for his daily use and the use of the Architect and his representatives when a separate office for the Architect's representative is not called for. Office shall be properly illuminated, heated during cold weather, and shall have operating windows with locks, doors with locks, tables, chairs, and drawing racks. Office shall have an illuminated and ventilated toilet room containing 1 water closet, 1 lavatory with mirror and a supply of toilet tissue, paper towels and liquid hand soap. All utilities, supplies, cleaning, and maintenance shall be by the Contractor as part of the Work and at no additional cost. Provide telephone service as called for hereinbefore. All temporary offices and conference areas shall be smoke free.

10.21 CONSTRUCTION CLEANING:
A. This requirement shall be strictly enforced. The site in general and all areas in and around the Project construction shall be clear of waste at all times in order to present a clean and orderly appearance and prevent hazards to safety and health.

10.22 WASTE: The general contractor shall be responsible for the collection and removal of waste on a daily basis and in a lawful manner. Burying and burning of waste on the property shall not be permitted. Washing waste down sewers or into waterways shall not be permitted. Waste shall not be allowed to accumulate and shall not be allowed to become hazards to safety and health.

A. The General Contractor shall furnish rodent proof containers in each construction area for the workmen to deposit their garbage and similar waste. This waste shall be kept separate from all other waste and shall be so identified in order that it can be disposed of as required by local regulations. Upon evidence of pest infestation, the General Contractor shall provide extermination services as a part of the work.

B. Hazardous and dangerous waste, as listed by the EPA, shall be kept separate from all other waste. The trade responsible for this waste shall be solely responsible for the handling, removal, and disposing, in accordance with the regulations pertaining to such waste, on a daily basis.

C. The General Contractor shall be responsible for furnishing means and methods for preventing mud being brought into the building or onto the construction by workmen.

10.23 PUBLIC STREETS AND PRIVATE WAYS:
A. All public streets adjacent to the site and all private ways at the site shall be kept clear of waste, spilled materials and products, and wet and dry earth at all times and shall be cleaned at the
end of each working day. When wet earth is encountered, it shall be cleaned from the vehicles before they leave the site and enter the streets and private ways. All by the general contractor

B. THE REQUIREMENTS of this Article 9 do not prevent the General Contractor from entering into an agreement between him and the other Prime Contractors for the General Contractor to remove their waste.

10.24 CLEANING PRIOR TO INSTALLING FINISHES:
A. The General Contractor shall remove all debris and soot, smudges, dust, and other deposits from the walls, ceilings, floors, and other exposed surfaces prior to installing finishes. Do not perform any finishing work until such surfaces are properly clean.

10.25 FIRST AID KITS:
A. Each Prime Contractor and each Prime Subcontractor shall provide adequate provisioned first aid kits on the Project site for personnel employed by him and for the convenience of workmen employed by their Sub-subcontractors.

10.26 MATERIAL AND EQUIPMENT (SEE GENERAL CONDITIONS, ARTICLE 8).
A. NEITHER THE OWNER NOR THE ARCHITECT WILL BE RESPONSIBLE FOR ANY ORAL INSTRUCTIONS BY OR ANY WRITTEN CONFIRMATIONS OF ANY ORAL INSTRUCTIONS FROM THE CONTRACTOR, SUBCONTRACTOR, PRODUCT SUPPLIERS, ETC.

10.27 PRODUCT SUBSTITUTIONS:
A. Products and systems specified are the absolute minimum quality standard and substitutions of lesser quality are not acceptable.
B. REQUEST FOR SUBSTITUTION will not be considered verbally nor will approval be issued verbally. All requests for substitution shall be in written form as hereinafter stated and shall be transmitted through the bidding contractor with his concurrence.
C. REQUESTS FOR SUBSTITUTION of products by, manufacturers other than those listed in or performance requirements specified in the sections of the specifications, addenda, and on the drawings, will be considered by the architect if received not later than 10 working days prior to the date for receipt of bids, not including any bid date extension, so as to allow a reasonable time for the evaluation of requests for substitution and the notification, by addendum, of all bidding contractors as to the approved and accepted substitutions.
D. REQUEST FOR SUBSTITUTION:
   1. After Contract(s) is (are) signed, no substitutions will be evaluated by the Architect without compensation from the requesting Contractor to the Owner for cost of evaluation charged the Owner by the Architect.
E. ANY REQUEST FOR SUBSTITUTION which does not clearly show equality, to the architect's satisfaction, will be rejected. The burden of proof that the proposed substitution is equal to and meets the requirements specified and shown in the project documents including type, design, quality, operation, function, use, size, appearance, capability, electrical requirements, mechanical requirements, and manufacture shall be solely the responsibility of the bidding contractor through which the substitution was transmitted and thereby concurred with the substitution.
F. REQUEST FOR SUBSTITUTION for a system and for each separate product item shall include: reason for substitution request; cost of both specified item and proposed substitution item; laboratory test reports; catalogs and drawings showing capacities, operations, functions,
dimensions, construction details and methods of assembly; connections; and installation to the work. If a proposed substitution of products, equipment, or systems have different dimensions or configuration than that which is specified and required, then the contractor proposing the substitution shall furnish full drawings and details verifying the suitability of the proposed substitution with respect to space provided, functional operation (including maintenance accessibility), and aesthetic values, as a condition precedent to acceptance of the substitution. If the proposed substitution is accepted by the owner, after architect's review, the contract sum will be adjusted by change order reflecting extras or credits involved. Should the request for a substitution be accepted, shop drawings and samples shall be submitted in accordance with the general conditions and supplements thereto. Substitutions of a minor nature not involving a change in the contract sum or the contract time may be approved by the architect, without referral to the owner, in accordance with general conditions of the contract, form oc-15, North Carolina Department of Administration; article 21.

G. MANUFACTURER'S LITERATURE which is readily available to the architect will not be acceptable for establishing proof of equality. Laboratory test reports shall have been performed by a nationally recognized independent testing laboratory which is known for its testing expertise. The laboratory test shall include type of materials used in the product including their thickness and strength, and a direct comparison to that specified for capacities, capabilities, coating, functions, life cycle usage, and operations. Where products will be exposed, and where systems will be used, no change in the architect's design and engineering intent will be allowed.

H. IF PROPOSED SUBSTITUTIONS are accepted by the Owner, after Architect's review, the bidding Contractor's price may include prices reflected by the substitutions so indicated by Addendum.

I. AFTER THE TIME FOR REQUESTING SUBSTITUTIONS has expired, requests for substitutions will be reconsidered, after signing of Contract, should circumstances arise that will be detrimental to the Project with respect to the time of completion and quality of performance as required by the Contract Documents. These circumstances shall be limited to strikes and other conditions beyond the Contractor's control. Request for reconsideration will be judged on the merit of each individual request.

J. PRODUCTS PROPOSED FOR USE IN PROJECT: Within 20 consecutive calendar days after the Notice to Proceed, the Contractor shall furnish to the Architect for review, a complete list of products with manufacturers and suppliers of each that the Contractor will provide in the Project. This list shall be broken down into the Sections of the Project Manual. If an item is to be substituted, it shall be so noted and the request for substitution shall be submitted as hereinbefore called for. If an item is not listed and a request for substitution is not offered, then the Architect for expedience will select colors and finishes when preparing the color schedule and the Contractor shall match these colors. All materials installed by the Contractor shall be new. All materials shall meet NC State Building Codes and should there be any discrepancies between design and code, the more stringent requirement shall apply. All materials shall be in compliance with standards (or approved products) of the NC State Construction Office. Unless specified otherwise, NO PRODUCT CONTAINING ANY AMOUNT OF ANY FORM OF ASBESTOS SHALL BE INSTALLED AT UNC CHARLOTTE. ASBESTOS MEANS ASBESTIFORM VARIETIES OF CHRYSOTILE, CROCIDOLITE, AMOSITE, ANTHOPLYLLITE, TREMOLITE OR ACTINOLITE. BY DEFINITION, INSTALLATION OF ASBESTOS MATERIALS WILL BE CONSIDERED CONTRACTOR'S NEGLIGENCE AND THE CONTRACTOR SHALL PERFORM ALL NECESSARY WORK TO REMOVE THE ASBESTOS AND RESTORE THE SITE TO THE "POST-CONTRACT" CONDITION.

K. ALL REVISIONS resulting directly or indirectly from equipment, products, and systems to be provided, which have different characteristics from that which the Project was designed for, shall be the financial responsibility of the Contractor or Subcontractor providing the equipment, products, and system which caused the revision. For example: Should a unit of equipment
require a utility supply of larger capacity, such increase required in the supply system and its related components, back to a point where an increase will not be required, shall be paid for by the Contractor or Subcontractor providing that unit of equipment.

10.28 STORAGE AND PROTECTION:

A. All products both stored and installed, shall be properly stored and protected from damage in accordance with the type of product and its manufacturer’s recommendations. See Specification Sections for any special storage and protection requirements.

B. PRODUCTS THAT CAN BE DAMAGED by weather, dampness and sunlight shall be stored in a weatherproof building or similar enclosure. On-site yard storage on pallets under a canvas or plastic sheet or the like is NOT a substitution for a weatherproof building or similar enclosure. Products that will not be damaged by weather, dampness, and sunlight and that can be stored outside a weatherproof building or similar enclosure shall be stored off the ground and shall be protected from dirt, grime, mud, etc., with particular attention being given to those products that will be exposed to view in the finished work. Products that can also be damaged by high and/or low temperatures shall be stored in weatherproof building or similar enclosure where the proper storage temperature can be maintained as required by the product being stored. Stored products, when installed, shall be in a new, undamaged, and factory finished condition.

C. NO FINISHING PRODUCT OR FINISHED PRODUCT shall be stored in the Project or installed in the Project until the Project is fully enclosed; is heated to the minimum temperature required by the product; and the humidity can be controlled to that required by the product. Coordinate with all finishing trades involved, in order that the required environmental conditions can be furnished and maintained prior to, during, and after the time of storage or installation of finishing products and finished products.

PART 11 - FACILITY START UP/COMMISSIONING

11.1 STARTING OF SYSTEMS: SEE SPECIFICATION SECTIONS for requirements to be performed under each particular section.

11.2 TESTING, ADJUSTING, AND BALANCING OF SYSTEMS: SEE SPECIFICATION SECTIONS for requirements to be performed under each particular section.

PART 12 - CONTRACT CLOSEOUT

12.1 See general conditions and supplements thereto and specification sections for document submittals, demonstrations, written instructions, personnel instructions, and any other special requirements.

A. PROJECT RECORD DRAWINGS: Shall be furnished to the Architect with each application for payment and at time of closeout. Project record drawings shall meet North Carolina Department of Administration Standards of the most current North Carolina Construction Manual.

B. THE GENERAL CONTRACTOR shall file one (1) complete set of Contract Drawings in his field office. Each Prime Contractor and each Prime Subcontractor, as the case may be, shall fully and accurately note in red on this set any and all changes and deviations in the Project from that originally indicated on the drawings, as required by change orders, bulletin drawings, addenda, alternates, products, equipment, and methods of construction. All utility services and other concealed work which are built into walls, floor slabs, roof slabs, below slabs on grade, and in general unexposed shall be accurately located to avoid damage to them in case a
change or renovation takes place at some future date. All changes in dimensions, elevations, location of building components and equipment, and the location of any existing work which are different from that originally shown shall be indicated on these drawings. A copy of these, showing the work for which payment is requested shall be provided with each application for payment.

C. **UPON COMPLETION** of construction, the Contractors shall each furnish a copy of surveys by a N.C. Registered Land Surveyor showing the final and accurate location of all new underground utilities each has installed giving spot elevations of the utilities at 30'-0" intervals maximum. All encountered existing underground utilities shall also be noted on the site plan if their location, type, or elevation is different from that indicated on the Contract Drawings or if the utility is not indicated on the Contract Drawings. Further, the survey provided by the General Contractor shall accurately locate the building and shall give as built contours of the site.

D. **AT THE CONCLUSION OF THE PROJECT**, the Contractors shall turn over to the University all equipment, files, logs, drawings or submittals, etc., belonging to the Owner.

E. **AT THE CONCLUSION OF THE PROJECT**, Contractors shall provide receipts signed by the Owner for all required items of the attic stock. The Project Expeditor shall submit a listing (specification section, type of material, and quantity) of all required attic stock items for review by the owner and designer prior to the preliminary final inspection.

F. **AT THE CONCLUSION OF THE PROJECT** Contractors shall provide one copy of all packing slips, instruction sheets, Owner's guides, etc., that were packed with items of equipment and materials incorporated into the project.

G. **AT THE CONCLUSION OF THE PROJECT** each Contractor shall provide a comprehensive listing of subcontractors and suppliers showing the generic name of materials, work or equipment provided, trade or brand name, name, address, telephone number and contract person, and a reference to the drawings or specification.

H. **AT THE CONCLUSION OF THE PROJECT Shop Drawings, Fire Sprinkler and Fire Alarm Drawings shall be sent in AutoCAD and PDF formats. Other General shop drawings, not specific to UNC Charlotte may be sent in PDF format.**

I. **AT THE CONCLUSION OF THE PROJECT Design manuals, warranty information, and paper documentation provided to the owner be in a digital format to facilitate storage. Acceptable file types are pdf, doc, xls, tiff, jpg, and dwg.**

**PART 13 - FINAL CLEANING UP**

13.1 **SEE GENERAL CONDITIONS, ARTICLE 41.**

A. **BEFORE THE DATE OF THE PRELIMINARY REVIEW**, the Work and the site shall be cleaned of all debris, boxes, cartons, crates, wrappings, etc. Only such cleaning materials and equipment absolutely required shall be allowed on the Project at this time. If approved beforehand by the Architect, other materials may be stored on the Site in designated areas in a neat and orderly manner. Clean up shall include removal of all dirt and construction debris from the roof structure.

B. **BEFORE THE DATE THE FINAL REVIEW** is made to determine completion of the Project, in accordance with the Contract Documents, all of the Contractor's products and equipment shall be removed from the site, the Project given a thorough cleaning, such as: Glass cleaning, carpets vacuumed, building surfaces and equipment washed as required, resilient tile waxed and buffed as required, paint splatter removed, general dusting, debris removed, resilient wall bases buffed, etc., and the Project made 100 percent complete and ready for the Owner's occupancy and use as intended. All other cleaning and preparation shall be in accordance with the specification sections.
C. **PERMANENT BUILDING POWER AND UTILITIES:** These services shall remain the responsibility of the Contractors during all reviews up to and including the day of Project acceptance.

D. **ASBESTOS AND POLYCHLORINATED BIPHENYL (PCB) REQUIREMENTS** (See GENERAL CONDITIONS, Article 48.)

E. **DURING THE WORK PROCESS,** should the Contractor encounter any material identified as asbestos and/or PCB, or be suspect of containing asbestos and/or PCB, he shall immediately initiate the required procedures of the Environmental Protection Agency (EPA), and/or state or local agencies having jurisdiction, which include, but are not necessarily limited to, the following:

1. **INITIATE PROCEDURES** for the protection of any and all persons exposed to the affected areas or adjacent areas affected thereby.

2. **ON BEHALF OF THE OWNER** the Contractor shall: Secure quotations for the Owner's approval to engage the services of a licensed industrial hygienist to perform an asbestos and PCB identification survey, the purpose of which is to
   a. verify presence of asbestos and PCB
   b. determine the type of asbestos and PCB
   c. make asbestos and PCB exposure assessments
   d. make any other tests required to comply with EPA requirements not specifically noted herein
   e. determine the scope of the Project required to be corrected
   f. make recommendations with respect to possible corrective actions which the Owner may take, i.e., encapsulation and/or removal and disposal, as may be required

3. Upon consultation with the Owner and the Architect, and upon determination of corrective actions to be taken, instruct the hygienist to prepare a specification in sufficient detail to outline the procedures required by EPA, for encapsulation, and/or removal and disposal, as the case may be, so as to furnish the Contractor with sufficient information to bid competitively the remedial work by specialty Contractors engaged in the encapsulation or elimination of asbestos and PCB material, based on an identified scope of work.

4. During the corrective process, require the hygienist to review the Contractor's procedures for compliance with EPA, state and local requirements, make such test as may be required and, at the conclusion of the work, certify that the area is free and clear of asbestos and/or PCB materials and particles in the air.

5. Secure quotations, for approval by the Owner, from specialty Contractors to perform the corrective work determined by the hygienist. The quotations shall include both time required and cost. In addition to the above, the Contractor shall submit itemized quotations for the replacement of any insulation or other asbestos and/or PCB containing materials removed, with insulation or other materials selected by the Architect, together with any other associated cost for replacement of materials and finishes necessarily removed to accommodate removal of asbestos and/or PCB materials, and time extensions allowed by the specifications.

F. **OWNER-APPROVED QUOTATIONS** for the hygienist and for corrective work to be performed will be incorporated into the Contract by Change Order.

G. **NORTH CAROLINA AND FEDERAL ASBESTOS REGULATIONS INFORMATION:**

1. The Environmental Protection Agency's (EPA's) National Emission Standards for Hazardous Air Pollutants (NESHAP) require an asbestos inspection and a ten (10) working day notification prior to demolition and renovation of all commercial, institutional, or industrial facilities. This excludes residential buildings with four (4) or fewer dwelling units. NESHAP also applies to the demolition of all residences which are being demolished for commercial, institutional, or industrial purposes. Notification of all demolitions is required whether or not the structures are found to contain asbestos.
2. If an inspection, conducted by a North Carolina accredited asbestos inspector, confirms that a facility contains at least 160 square feet, 260 linear feet, or 35 cubic feet, of Regulated Asbestos Containing Materials (RACM), then these materials are to be removed prior to starting the renovation or demolition activity. When removal of RACM is required, a notification and a removal fee shall be submitted as part of the notification process. The notification and the removal fee, when applicable, shall be submitted to the Asbestos Hazard Management Branch. The removal of RACM shall be conducted by North Carolina asbestos accredited individuals.

3. Please note that Forsyth, Buncombe/Haywood, and Mecklenburg Counties have local NESHAP programs and should be contacted directly for local requirements.

END OF DIVISION
SECTION 2, DIVISION 1B
CAPITAL PROJECTS SUPPLEMENTAL GENERAL CONDITIONS
SUPPLEMENTAL GENERAL CONDITIONS

The following modify the January 2002, 23rd Edition (revised March 2002) of the GENERAL CONDITIONS OF THE CONTRACT, STATE OF NORTH CAROLINA FORM OC-15 and supersedes them only whenever they are in conflict. Unaltered provisions of the General Conditions shall remain in effect. These modifications shall be incorporated into all Contract Forms.

1.1 ARTICLE 1 - DEFINITIONS

A. Add to the end of the paragraph "The Geotechnical Technical Report does not constitute a part of the Contract Documents, but is included for reference."

B. The “Owner” is the State of North Carolina through the University of North Carolina at Charlotte.

C. The “Designer” referred to herein, shall mean (designer to insert design firm name and address).

D. “Equal To” or “Approved Equal” Add: “substitute products by manufacturers other than those specified in the Project Manual, Addenda, and on the drawings and which may be incorporated in the Work after review and concurrence by the Architect and acceptance by the Owner. This review shall be in accordance with the General Requirements”.

E. “Provide.” Shall mean furnish and install complete in place, and ready for use.

F. “Indicated” and “Shown.” Shall mean as detailed, scheduled, or called for in the Contract Documents.

G. “Latest Edition.” Shall mean the current printed document issued up to 30 calendar days prior to date of receipt of bids, unless specified otherwise.

H. “Quality.” Shall mean the meticulous attention to the detail of installation and workmanship necessary to the assemblage of products in the highest grade of excellence by skilled craftsmen of the trade.

I. “Drawings” or “Plans” mean the drawings enumerated in the Contract (including all information in the Detail Manual).

J. “Specifications” mean this Project Manual and Addenda thereto, and this term shall include such pages as are enumerated in the Contract as applicable to the work involved.

K. “Supplementary Conditions”, as referred to in other parts of the Project Manual, shall be the same as “Supplementary General Conditions.”

L. Project Identification: All correspondence, reports, schedules, applications for payment, fax items, etc., shall contain formal title of project, code and item numbers, and SCO ID numbers.

1.2 ARTICLE 2 - INTENT AND EXECUTION OF DOCUMENTS

A. ADD to paragraph a:

All work shall be in accordance with the Contract Documents. No change therefrom shall be made without a review by the Designer. Where more detailed information is needed, or when an interpretation of the Contract Documents is needed, the Contractor, before proceeding with the work, shall refer the matter to the Designer who will furnish information or interpretation in
the form of a Field Order or other written forms or drawings. If any errors, inconsistencies, or omissions in the Contract Documents are recognized by the Contractor or any member of his organization, the Contractor shall notify the Designer in writing of such error, inconsistency, or omission before proceeding with the work.

Where compliance with two or more requirements, material or equipment, are specified and the requirements, materials or equipment, establish conflicting specifications or quality levels, the contractor is to comply with the most stringent or higher quality specification. The Designer shall be the authority for determining the highest quality specification.

Should the specifications and drawings fail to particularly describe the material or kind of goods to be used in any place, then it shall be the duty of the Contractor to make inquiry of the Designer for what is best suited. The material that would normally be used in this place to produce first quality finished work shall be considered a part of the Contract.

Shop drawings shall be legible and suitable for producing legible reproductions.

1.3 ARTICLE 3 - CLARIFICATION AND DETAIL DRAWINGS

A. ADD to paragraph a:

If, in the opinion of the Contractor work is indicated or is specified in such manner as will make it impossible to produce a first-class piece of work, or should discrepancies appear within the Contract Documents, he shall refer same to the Designer for interpretation before proceeding with work. If the Contractor fails to make such reference, no excuse will thereafter be entertained for failure to carry out work in satisfactory manner. Where only part of the work is indicated, similar parts shall be considered repetition. Where any detail is shown and the components therefore are fully described, similar details shall be construed to require equal materials and construction.

1.4 ARTICLE 4 - COPIES OF DRAWINGS AND SPECIFICATIONS

A. ADD to paragraph:

e. Cost of additional drawings and specification shall be as follows:

Drawings: The Designer shall offer printing of additional copies of documents at direct material cost plus 25% for handling.

1.5 ARTICLE 5 - SHOP DRAWINGS, SUBMITTALS, SAMPLES, DATA

A. ADD to paragraph a:

This schedule shall be an excerpt from the CPM schedule described by the Supplementary General Conditions. This Schedule shall indicate the items, relevant specification sections, other related submittals, the date when such item will be furnished to the Architect, and the date by which Architect's review is necessary to maintain Construction Schedule. This schedule shall take into consideration the resubmission of shop drawings required to achieve acceptance of the Designer and Owner.

B. ADD to paragraph c:

The following shop drawings will take longer than 20 calendar days for review and return to the Contractor:
1. Structural Steel
2. Mechanical Systems

C. ADD to paragraph e:

All shop drawings, submittals, samples, and data shall be submitted to the Designer for review according to accepted CPM schedule from Article 5 (a). After these items have been reviewed
by the Designer they will be returned to the Contractor or Project Expediter. Samples and shop drawings required for evaluation of a substitution shall be submitted with the request for substitution. Shop drawings, submittals, samples, and data will not be considered by the Designer unless the submission clearly indicates that they have been checked, coordinated between Prime Subcontractors, and stamped approved by the Contractor and Fabricator or Contractor, Subcontractor, and Fabricator as the case may be. All shop drawings and catalog cuts submitted shall each receive the following stamp completed and dated by the Contractor or submitting Prime Contractor. Samples shall have the stamp affixed to a tag attached to each sample.

**Submitted in accordance with Section No. ___________________________ and paragraph No. ___________________________ of the specification**

FOR SINGLE CONTRACT, AS FOLLOWS

We have checked and approved this submittal. We find it to be in accordance with the Contract Documents.

<table>
<thead>
<tr>
<th>Subcontractor</th>
<th>Signature</th>
<th>Date</th>
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We have reviewed this submittal and find it is coordinated with the other parts of the Project.

<table>
<thead>
<tr>
<th>Subcontractor</th>
<th>Signature</th>
<th>Date</th>
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D. **ADD paragraph f:**

No extension of construction time will be allowed for delay in checking shop drawings, submittals, samples or data because of the Contractor's, Subcontractor's, or Fabricator's failure to check shop drawings before submitting them to the Designer. All shop drawings shall be prepared to show how the material relates specifically to the conditions of the Project. Standard manufacturer's drawings that do not show how and where the material is to be used will not be considered. Shop drawings shall not be reproductions or portions of reproductions of the Contract documents. Coordinated shop drawings at the same scale indicating all mechanical, electrical, and plumbing shall be required between all trades. The Prime Subcontractor in a given area, as determined by the Contractor, shall submit their drawings to the other involved Subcontractors through the Prime Contractor.

E. **ADD paragraph g:**

The Contractor will furnish and deliver to the Owner 1 copy of each shop drawing, submittal, sample, and data which has been reviewed by the Designer and which has received a "NO EXCEPTIONS TAKEN" or a "TO BE CORRECTED AS NOTED" evaluation. The Contractor or each Prime Contractor shall deliver these to the Owner within 14 calendar days of receiving each reviewed item from the Contractor following review by the Designer, or in the case where 1 copy of a sample was submitted, within 14 calendar days of receiving advice that the sample is "NO EXCEPTIONS TAKEN" or "TO BE CORRECTED AS NOTED." Coordinate delivery with the owner's project manager. The owner shall have the option of accepting submittal copies during construction or at closeout in which case the project expediter shall neatly store all items by division in "banker type" storage boxes or a separate file cabinet in the contractor's office facility. All stored submittals and samples shall be accessible to owner at any time during normal working hours.

F. **ADD paragraph h:**
After the Plumbing, HVAC, and Electrical shop drawing submittals have received a favorable review, the Contractor shall submit to the Designer for the Owner, complete operating and maintenance manuals as called for in Divisions 22, 23, and 26. These manuals shall be submitted not later than 14 calendar days before occupancy.

1. Only Contract Documents, approved Change Orders, approved Contractor submittals to the extent they are in accordance with the Contract Documents, Designer bulletin drawings, and references specifically incorporated into Contract Documents constitute authoritative description of the Work. No other documents, including Contractor generated drawings, shall be considered authoritative.

1.6 ARTICLE 6 - WORKING DRAWINGS AND SPECIFICATIONS AT THE JOB SITE
A. Change “Designer” to “Designer, State, and Owner”

1.7 ARTICLE 8 - MATERIALS, EQUIPMENT, EMPLOYEES
A. ADD
Also see - GENERAL REQUIREMENTS.
B. ADD to paragraph d:
These substitutions shall be made only by the Contractor and not by subcontractors or material suppliers. Necessary or required substitutions can be made after contract award per usual procedure, but only under unusual or extenuating circumstances.

1.8 ARTICLE 10 - PERMITS, INSPECTIONS, FEES, REGULATIONS
A. ADD to paragraph e:
The Contractor shall perform the Work in accordance with University North Carolina, Charlotte regulations and the Preconstruction Conference Checklist (if such checklist is furnished).

1.9 ARTICLE 11 - PROTECTION OF WORK, PROPERTY AND THE PUBLIC
A. ADD:
Also see - GENERAL REQUIREMENTS.

1.10 ARTICLE 13 - INSPECTION OF THE WORK
A. ADD to paragraph a:
The Contractor shall also serve the same notice to the Owner for all such inspections or testing.

1.11 ARTICLE 14 - CONSTRUCTION SUPERVISION AND SCHEDULE
A. ADD to paragraph a:
The Contractor and each of his Prime Subcontractors shall keep a Superintendent on the Project during the progress of the Work, for purposes of coordination with other Prime Subcontractors, and if required by the Owner, regardless of whether said Contractor or Prime
Subcontractor has work currently in progress. Contractors are allowed to work any day of the year, except at times when the Owner may have special events which would be disrupted by Contractor's activities.

B. ADD to paragraph f:

"Unless designated otherwise, The General Contractor shall be the 'Project Expeditor'."

The Project Expeditor shall prepare daily and have available for inspection by the Designer, State, and Owner daily project reports. Project daily reports shall be prepared for every day of the project beginning with the date of the notice to proceed and terminating with project completion. Daily reports must also be completed for all weekends and holidays. The daily reports are to include the following items (at a minimum): Superintendents name and signature; day and date; morning and afternoon temperature; weather (clear, cloudy, rain and duration of rain); site conditions; other applicable weather conditions; crew sizes for all contractors and subcontractors on site; and major work accomplished for that day.

C. ADD to paragraph g:

Provide CPM CONSTRUCTION SCHEDULE as stated below:

1. The Construction Schedule shall show the date when the work of each Specification Section is to begin and is to be completed, its total dollar value percent to be completed each month, and total dollar value to be completed each month. The initial schedule and subsequent updates shall be signed by the general contractor.

2. The Construction Schedule shall be a schedule in time scaled logic network in the Critical Path Method and shall depict sequence of operations mutually agreeable to the Owner, designer, and each of the Prime Sub-Contractors.

3. The dates of commencement and completion of each of the various stages of the work (including lead time activities, drawing and sample submissions, bidding, awarding subcontracts, manufacturing and shipping); delivery dates for material and equipment by separate contract in detail satisfactory to the Designer. Such Schedule shall show a complete itemized breakdown of the work, and shall include networks for all phases of the work including networks for all work to be performed by the Contractor or all Prime Sub-Contractors.

4. The schedule and all other constructions schedules shall include 1 and only 1 critical path and this critical path shall be clearly identified. The Construction Schedule shall include the early and late start dates and early and late finish dates of all activities.

5. The Contractor shall also submit a separate progress schedule listing all submittals required under the contract and when it is anticipated that each submittal will be submitted allowing 20 days for the designer's review. The separate progress schedule shall be an excerpt from the above described construction schedule.

6. The schedule shall not indicate any on-site construction activity longer than 21 consecutive calendar days or any other activity longer than 28 consecutive calendar days. Any activity with an anticipated longer duration must therefore be broken into component activities, each of which has duration of no longer than 28 calendar days. The initial schedule and subsequent updates shall be submitted in 24" X 36" color plots using a font size acceptable to the owner. Additionally, one 11" X 17" copy shall be submitted with each color plot.

7. The Construction Schedule shall anticipate all weather delays which may be predicted from analysis of weather reports for the last 5 years and allowances for rock and unsuitable soil removal. The schedule shall also include all major milestones and all anticipated inspection, shutdowns/outrages for electrical, water, natural gas, and steam tie-ins if applicable.
As a separate document, the Contractor shall submit progress report, with each Application for Payment, which shall consist of a checklist showing the date of commencement of each activity on the Construction Schedule then commenced the date of completion of those activities completed, and the approximate percentage of completion of each activity.

The Contractor shall receive the permission of the Owner to make changes to the schedule. Notwithstanding any other provisions here of to the contrary, the time of completion may be extended only by a written change order.

Whenever the Schedule of Work changes, the Construction Schedule, which is a different document from the progress report, shall be revised by the Contractor to include the Schedule revisions of all the Prime Sub-Contractors and other sub-contractors and submitted with the next Application for Payment. This revised schedule shall include all information required of the schedule prior to revisions and shall provide for completion on the Contact Completion Date.

The Contractor shall advise in advance, at least 24 hours on a weekday and at least 48 hours on weekends and legal holidays, of all schedule changes, so that any Owner inspections can be arranged. If no revised Construction Schedule is included with an Application for Payment, this lack of inclusion shall constitute a certification by each and all the Contractors that no changes in the Construction Schedule have occurred.

Ownership of float and purpose of Schedule

1. All schedule float, slacktime, or contingency within the schedule jointly belongs to the Owner and Contractor. The Owner shall be entitled to require early completion and clean up of certain portions of the Work. (i.e. the difference in time between the projects early completion and the required completion date and total float within the overall schedule, is not the exclusive use of either the owner or the Contractor, but is jointly owned by each and is a resource available to and shared by each of the parties as needed to meet contract milestones and the contract completion dates with the owner receiving initial benefit. The Contractor shall not sequester shared float through such strategies as extending activity duration estimates to consume available float, using preferential logic or using extensive crew/resource sequencing etc. since float time written the schedule is jointly owned, no time extensions will be granted until a delay occurs which extends the work beyond the contract completion date. Since float time within the construction schedule is jointly owned, it is acknowledged that owner caused delays on the project may be offset by Owner caused time savings (i.e., critical path submittals returned in less time than allowed by the contract, approval of substitution requests which result in a savings of time to the Contractor. In such an event, the Contractor shall not be entitled to receive a time extension until all owner caused time savings are exceeded and the contract completion date is also exceeded.

The submittal of a fully revised and acceptable construction schedule shall be a condition precedent to the processing of the second monthly payment application. As such, each of the prime Sub-Contractors have a specific obligation to each of the other Prime-Sub Contractors and to the owner to provide all necessary information and to fully cooperate with the Contractor in the development of this and all other construction schedules, including monthly updated construction schedules. All updated construction schedules shall include an updated submittal process schedule excerpted from the construction schedule.

Regardless of which submittal method the Contractor elects to use in formulating the construction schedule, an updated schedule shall be submitted to the owner 5 days prior to submittal of any monthly payment request. The submittal of the updated construction schedule, which satisfies the requirement of this article accurately reflects the status of the work, and incorporates all changes into the schedule, shall be a condition precedent to the processing of the monthly payment application. Updated schedules shall also be submitted at such other times as the Owner may direct. Upon approval of a change order or issuance of a directive to proceed with a change the approved change order shall be reflected in the next schedule update submitted by the Contractor or other update submittal approved by the Owner.
If completion of any part of the work, the delivery of equipment or materials, or submittal of any of the submittals is behind the updated construction schedule and will impact the end date of the work past the contract completion date, the Contractor, shall submit in writing, a plan acceptable to the owner for completing the work on or before the current completion date.

No extensions of time shall be granted unless the delay can be clearly demonstrated by the Contractor, on the basis of the updated construction schedule current as of the month the change is issued on the delay occurred and which delay cannot be mitigated, offset, or eliminated through such actions as revising the intended sequence of work or other means. It is recognized that any such delay which is the direct result of, and only the direct result of an owner directed change may entitle the Contractor to added compensation for efforts to maintain the schedule or for costs related to extending the schedule as a result of the owner directed change which cannot be accommodated by owner caused time savings.

As a precedent to the release of retained funds, the Contractor shall, after completion of the work has been achieved, submit a final construction schedule which accurately reflects the manner in which the project was constructed and includes actual start and completion dates for all work activities on the construction schedule.

Should the Contractor fail or refuse to complete any portion of the work in accordance with the Construction Schedule, the Owner may perform or cause to be performed the work necessary to cause such completion, and all costs incurred by Owner and Designer shall be deducted from any monies which otherwise may become due the Contractor. Should such costs exceed monies due, the Contractor shall reimburse the Owner within 30 days of the Owner documenting the costs to the Contractor. Schedule shall be prepared by a third party scheduling consultant.

The Contractor shall anticipate that the Owner may require various changes to the work. Only those changes which also change the duration of the critical path shall entitle the Contractor to present a claim for schedule impact, acceleration, or deceleration, only to the extent of the change in the duration of the critical path. Beyond compensation given in resolution of such a claim for acceleration or deceleration.

The purpose of the Construction Schedule, and monthly updates as hereinbefore described, or as may be otherwise submitted and approved, shall be to furnish the Owner and Designer with information to indicate that the Contractor has planned the Project in sufficient detail for the Contractor to insure that its construction can be accomplished in an orderly manner and on the Contract completion date. The dollar value estimates to be included on the schedule are to assist the Owner in cash flow planning so that funds will be readily available to pay the Applications for Payment. Monthly progress reports and updates are to furnish the Owner with current status of any changes required in the original schedule which will assist the Owner in scheduling delivery and installation of any products, furnishings, etc., necessary for the operation of the facility for its intended purpose. The responsibility for construction planning and the effective efficient implementation of such, or the converse, to meet the Contract completion date, or authorized appropriate extensions therefore, are the total responsibility of the Contractor, and such responsibility shall not transfer to the Owner/Designer. Preview of the original Construction Schedule, and subsequent modifications thereto, by the Owner and/or the Designer shall be limited to the general purposes set out above. Such approval shall not operate to imply the agreement of the Owner/Designer to the Contractor's planned procedures, coordination, critical path scheduling, etc., as being appropriate or reasonable.

Contractor shall assign manpower loading for each activity of the schedule by applying the total man-hours required to complete each activity to a resource identified as “man-hours” on each activity."

If the Contractor submits an early completion baseline schedule that shows contract completion in less than 85 percent of the working days specified in these special provisions, the baseline schedule shall be supplemented with resource allocations for every task activity and include time-scaled resource histograms. The resource allocations shall be shown to a level of detail
that facilitates report generation based on labor crafts and equipment classes for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. The Contractor shall optimize and level labor to reflect a reasonable plan for accomplishing the work of the contract and to assure that resources are not duplicated in concurrent activities. The time-scaled resource histograms shall show labor crafts and equipment classes to be utilized on the contract. The Engineer may review the baseline schedule activity resource allocations using Means Productivity Standards or equivalent to determine if the schedule is practicable."

D. ADD paragraph m:

Prior to and during the execution of the Work, the Contractor shall immediately report any error, discrepancies, conflicts, and omissions found therein to the Designer in writing and shall have the same explained or corrected by the Designer before proceeding with the Work. Any necessary changes shall be adjusted as required thereinafter by Article 19 - Changes in the Work. Any work done by the Contractor or after these Conditions have been discovered, and before the Designer has either explained or made corrections, shall be corrected at the Contractor's expense. The Contractor shall coordinate all work of his Contract to produce the required finished Project in accordance with the Contract Documents. Special attention shall be given to the submission of shop drawings, samples, color charts, and requests for substitution within the specified time; furnishing the proper shop drawings to Subcontractors, and material suppliers, whose work and equipment is affected by and related thereto; and the furnishing of all information concerning location, type, and size of built-in equipment and materials and equipment utilities. This coordination is in addition to all other coordination requirements called for in the technical sections of the Project Manual.

E. ADD paragraph n:

The Contractor shall post a sign indicating firearms are prohibited on the job site.

1.12 ARTICLE 15 - SEPARATE CONTRACTS AND CONTRACTOR RELATIONSHIPS
A. ADD:

Also see DIVISION 1 - GENERAL REQUIREMENTS

B. ADD to paragraph g:

The Contractor shall provide all required Site Utilities Work, including but not limited to: Site Storm Sewer, Site Sanitary Sewer, Water and Steam Lines, Natural Gas, and Electrical. Final connection from building to site utilities shall be by the Contractor.

1.13 ARTICLE 17 - CONTRACTORS AND SUBCONTRACTOR RELATIONSHIPS
A. ADD:

The Contractor has the responsibility to insure that all product suppliers, and Prime Subcontractors, their agents and employees, adhere to the Contract Documents and that they provide all products on time.

1.14 ARTICLE 19 - CHANGE IN THE WORK
A. ADD to paragraph c.1:

Unit prices include all time, costs, and overhead of each unit.

B. ADD to paragraph d:

Overhead shall include all Conditions of the Contract and all general requirements such as Project management, scheduling, home office expense, layout, reproduction of Drawings and Specifications, testing and inspection, shop drawings and sample coordination, shop drawing
preparation, proposal request estimating, supervision (including general and nonworking foremen) small tools and expendable items, taxes, temporary facilities and services, including access and safety provisions, "as-built" drawings, estimating general and administrative overhead, and profit. Pricing of proposal requests need to be accomplished within 20 calendar days minimum following receipt by the contractor. Upon request, the contractor shall provide the designer with documentation to substantiate labor rates.

In the event of additions and deletions of items of direct labor and/or material, the item quantities shall be algebraically summed prior to the incorporation of applicable prices, Unit Prices, and/or the overhead and profit percentage applicable.

1.15 ARTICLE 21 - MINOR CHANGES IN THE WORK.
   A. Revise the first sentence by adding after “The Designer…” “with consultation with the Owner.”

1.16 ARTICLE 23 - TIME OF COMPLETION, DELAYS, EXTENSIONS OF TIME
   A. ADD to subparagraph c:

   After the contract completion date, the Designer shall deduct from all contractor pay applications, the liquidated damages in the amount of the daily liquidated damage rate times the number of calendar days after the contract completion date minus any previously assessed liquidated damages.

   B. Add to subparagraph d:

   The “5-year average of precipitation” shall be determined only by applying daily amounts greater than one-tenth (0.10) of an inch. Only amounts exceeding 0.10 inch shall be applied in determining the actual number of "rain days" for a given month.

   The Contractor shall maintain, on site, a hard bound log book to record daily precipitation data from the UNC Charlotte Weather Center alongside daily NOAA readings from the Charlotte Douglas International Airport. The Log shall also record any corresponding impacts to activities on the critical path. The Log shall be maintained on a daily basis and made available for inspection by the Designer or Owner at any time. If for some reason the UNC Charlotte Weather Center is out of service, NOAA data shall be applied for that time period, but only if the UNC Charlotte Weather data is not available.

   Saturdays, Sundays, and holidays are available to recover lost time due to weather. Time extensions for weather related delays which affect the critical path and exceed the NOAA 5-year average for a particular month, will only be granted provided the contractor makes an effort to make-up work on weekends or holidays following the rain event. Exceptions to this requirement may be granted in cases where rain occurs on a make-up day.

   The effect of “rain days” may impact Critical Path work activities for a period more than the average rain days for any period, such as dewatering, cleanup, etc. which would follow a rain event. The Contractor shall include in the Project Schedule, sufficient days to accommodate weather related delays which will result from the 5-year average precipitation for each month. It is the responsibility of the Contractor to maintain such a log and to obtain the verification and initials of the Designer's representative on a monthly routine basis. The Contractor shall transmit logs and 5 year weather data averages to the Designer monthly. The Designer shall make weather delay determinations by comparing verified Contractor's logs with the 5 year averages over the duration of the Project. All approved weather delays shall be reported to the Contractor or Project Expediter and to the Owner and shall be accumulated and granted in 1 or more Change Orders. Contract time shall not be shortened by weather conditions which are more advantageous than had been predicted.

   C. ADD paragraph h:
Time:
1. The Contractor shall commence work to be performed under this agreement on a date to be specified in a written order from the designer and shall fully complete all work within (designer to insert appropriate project construction time) consecutive calendar days from, and including said date. For each day in excess of the above number of days, the Contractor shall pay to the Owner the sum of (designer to insert liquidated damages [words and numbers] as established by the University) as liquidated damages reasonably estimated in advance to cover the losses to be incurred by the Owner by reason of failure of said Contractor to complete the work within the time specified, such time being in the essence of this contract and a material consideration thereof.
2. The Contractor agrees that said work shall be prosecuted regularly, diligently, and uninterruptedly at such rate or progress as will insure full completion thereof within the time specified.

1.17 ARTICLE 24 - PARTIAL UTILIZATION: BENEFICIAL OCCUPANCY.
A. ADD to paragraph e:

Unless training requirements are included in the specifications, prior to issuance of Date of Acceptance, the Contractor shall have his/her authorized representatives visit the Project and give full instructions to the Owner's designated operating and maintenance, care, and adjustment of all equipment and special construction elements."

Also GENERAL REQUIREMENTS for construction time.

1.18 ARTICLE 31 - REQUEST FOR PAYMENT
A. ADD:

After the award of the Contract, the contractor shall promptly submit to the Designer for review and Owner approval a complete schedule of values of the various parts of the work listed in the numerical order of the specifications. The schedule shall be dated and signed by the Contractor and shall include a description of the work, quantities, labor, materials, and total Contract amount for each item. Upon Owner approval of this schedule of values, the schedule shall be used as the basis for determining monthly payments and, therefore, is needed in advance of the Contractor submitting the first application and certification for payment. Plumbing, Electrical, and HVAC Prime Sub-Contracts shall be broken down in accordance with the Table of Contents for each such work. Values shall generally be of the same order of magnitude and generally shall be between $10,000.00 and $100,000.00. Should the schedule of values include any value for mobilization, the schedule of values shall include an equal value for demobilization.

The Request for Payment shall be on forms described by North Carolina State Construction Manual Section 323 and similar to AIA Document G703, latest edition. The Request for Payment shall list materials and labor separately for each Section of the Project Manual. When Request for Payment includes (1) materials stored other than on the Owner's property, or, (2) if allowed by the Owner, other than within the boundaries of the State of North Carolina, request for Payment will not be considered and another Request for Payment shall be made. Contractor or each Prime Contractor shall also attach to the application all receipts and vouchers required to verify the requested payments for stored materials. No payment made to the Contractor by the Owner shall constitute acceptance of any work or materials not in accordance with the true intent of the Contract.

The Contractor shall additionally include on each monthly Application for Payment the following statement: "We certify that the Surety for this Project has been duly notified of the amount of this request." Unless exception to pay is made by the Surety to the Designer within 4 calendar days following the date of request, it will be assumed that the Surety concurs in the payment of this application.
American Institute of Architects Document G703, if used, may generally be obtained at office supply firms or directly from the American Institute of Architects, 1735 New York Avenue, Washington, D. C. 20036.

1.19 ARTICLE 32 – CERTIFICATES OF PAYMENT AND FINAL PAYMENT
   A. ADD to paragraph f:
   B. THE FINAL PAYMENT of retained amount due to the Contractor on account of the Contract shall not become due until the Contractor has furnished to the Owner, through the Designer, Guarantees as set forth in the General and Supplementary General Conditions including other Guarantees required by specific Sections of the Project Manual. In addition to the above, all other submissions required by other Articles and Sections of the Project Manual must be in the hands of the Designer before approval of final payment.

1.20 ARTICLE 34 - MINIMUM INSURANCE REQUIREMENTS
   A. ADD paragraph f:
   The Designer shall be named as additional insured party on all insurance policies supplied by the Contractor. Final payment will not be made until these “As-Built Drawings” are turned over to the Designer of record and reviewed and deemed complete in writing by the Designer.

1.21 ARTICLE 38 - USE OF PREMISES.
   A. Add to paragraph e:
   Should the Owner allow material storage outside the construction limits, the following conditions shall apply:
   1. Staging of the Contractors: Site office trailer, equipment, materials, etc. shall be inside the construction fence or where there is no fence, inside the construction limits. No open trailers or flat beds are permitted, unless otherwise authorized. All material shall be stored in an enclosed and securable vehicle. Put name of project, company name, and company phone number on all storage vehicles stored off construction site.
   2. As space is available, the Owner may allow parking of construction workers’ vehicles on its property at no cost to the contractor. Vehicles found parked outside the designated area will be towed away at the contractor's expense.
   3. Contractor personnel must wear ID badges at all times when they are working at UNC Charlotte. The ID badge can either be the Contractor’s ID badge or clothing indicating which contractor or subcontractor they are directly employed by.

1.22 ARTICLE 39  -  CUTTING, PATCHING, AND DIGGING
   A. ADD:
   Also see DIVISION 1 - GENERAL REQUIREMENTS

1.23 ARTICLE 40  -  UTILITIES, STRUCTURES, SIGNS
   A. ADD to paragraph j:
   The University will provide the Contractor with access to electrical power for operating small tools, for construction lighting, for elevator testing, and for field office operations. The University
will not charge the Contractor for power so consumed. The Contractor will bear all costs related
to connecting to, transforming, and distributing power from the connection point. The
Contractor will bear all costs related to connecting to, transforming, distributing and maintaining
temporary power from the connection point.

The Contractor shall allocate power equitably. Welding equipment and other high power users
must have self-contained power sources. Power outages shall be coordinated by the
Contractor with the University 30 days in advance.

B. ADD to item l:

A shop drawing of the project identification sign must be approved by the University prior to
fabrication. No directional signs will be permitted without the University’s permission.
Contractors are not permitted to install any sign, anywhere on the site, off the site on University
property, or on any equipment on the site, without explicit written approval of the Owner. See
enclosed University project sign detail.

Location of any sign shall be approved by the Owner. Should any sign be moved from its initial
location, the new location shall be approved by the Owner. All signs shall be maintained by the
project expeditor in first class condition throughout the Contract by repainting, repairing, and re-
erecting as necessary and as required. Sign shall be fabricated as indicated on the Drawings.

1.24 ARTICLE 41 - CLEANING UP

A. ADD:

Also see DIVISION 1 - GENERAL REQUIREMENTS

1.25 ARTICLE 42 - GUARANTEE

A. ADD paragraph e:

ALL GUARANTEES SHALL INCLUDE LABOR AND PRODUCTS AND SHALL BE SIGNED BY
THE MANUFACTURER OR SUBCONTRACTOR, AS THE CASE MAY BE, AND
COUNTERSIGNED BY THE CONTRACTOR. ALL GUARANTEES SHALL BE IN ADDITION
TO, AND NOT IN LIEU OF, ALL LEGISLATED GUARANTEES. ALL GUARANTEES SHALL
BE ADDRESSED TO THE OWNER AND DELIVERED TO THE DESIGNER UPON
COMPLETION OF THE PROJECT AND BEFORE OR WITH THE SUBMISSION OF
REQUEST FOR FINAL PAYMENT.

B. ADD to paragraph f:

In the event that the Owner considers it impractical, because of unsuitable test conditions, or
some other factors, to execute simultaneous final acceptance of all equipment, portions of the
installation may be certified by the Designer for the Owner's final acceptance when that portion
of the system is complete and ready for operation. The decision to accept only portions of the
Project rests entirely with the Owner and may only be executed by the Owner.

C. ADD to paragraph g:

The Contractor shall also guarantee for a period of 24 months, unless a longer guarantee time
is specifically called for in the Specification Sections, that the work covered by this Contract will
be watertight and leak-proof at every point and in every area affected by this Contract, except
where leaks can be attributed to damage by forces beyond his control. He shall, immediately
upon notification by the Owner of water penetration, determine the source of water penetration
and, at his own expense, do any work necessary to make the work covered by this Contract
watertight. He shall also, at his own expense, repair or replace any other damaged material,
finishes, equipment, and furnishings, damaged as a result of this water penetration to return the
building to its original accepted condition.
D. ADD paragraph h:

The Contractor signing a Contract with the Owner, shall obtain and forward to the Owner any and all guarantees issued by the manufacturers specifically for certain products and systems covered under his Contract. In the event the manufacturer does not have a suitable "preprinted" warranty form" to fully cover the guarantee requirements as set forth in the Specification Section, he shall produce a warranty form patterned after those contained hereinafter which shall fully document the guarantee as set forth in the Specification Section.

E. ADD paragraph i:

In addition to the foregoing stipulations, the Contractor shall comply with all other guarantees referred to in any portion of the Contract Documents, the more stringent requirements governing.

F. ADD paragraph j:

If for any reason the Contractor cannot guarantee any part of his work using materials or construction methods which have been specified or indicated he shall notify the Designer in typewritten form before Contracts are signed, giving reasons together with the names of products and data or substitution he can guarantee. Should the Contractor fail to so notify the Designer prior to the Signing of Contract, he will he held to have agreed to guarantee all work specified or indicated.

1.26 ARTICLE 45 - TAXES.

A. ADD to paragraph e:

Contractors shall submit monthly with their request for payment, a signed statement containing the amount of sales and use tax paid by the Contractor for that particular billing period."

1.27 ARTICLE 48 – ASBESTOS CONTAINING MATERIALS (ACM).

A. ADD the following:

No asbestos containing material may be installed in this facility, including but not limited to, sprayed-on insulation, pipe insulation, floor tile, mastic adhesive, patch materials, wiring insulation, or acoustical treatment.

END OF SECTION 01 – 02 SUPPLAMENTAL GENERAL CONDITIONS
SECTION 2

DIVISION 01C

DESIGN SERVICES PROJECT GUIDELINES (INFORMAL)
PART 1 - PROJECT TITLE PAGE

May 24, 2012
Project No.

PROJECT NAME
PART 2 - PROJECT GUIDELINES

2.1 BIDDERS/CONTRACTORS SHOULD CHECK THEIR CONTRACT DOCUMENT SET TO VERIFY THAT THE FOLLOWING INFORMATION IS INCLUDED.

A. PART
   1. Project Title Page
   2. Project Guidelines
   3. List of Drawings
   4. List of Standard Details
   5. Instructions to Bidders
   6. General Requirements
   7. General Safety Requirements
   8. General Guarantee Requirements
   9. Summary

B. These are the required list of specifications that shall be included as part of the project. Delete sections that are not required and add others that may be required.

1. SPECIFICATIONS
   01730 Moving Services
   02001 Asbestos Floor Mastic Removal
   02220 Earthwork
   02510 Concrete Sidewalk
   02511 Structural Concrete Repair
   02515 Brick Pavers
   02522 Asphalt Surfacing
   02830 Fence
   02930 Lawns & Grasses
   08400 Hollow Metal Doors & Frames
   08710 Finish Hardware
   08720 Pneumatic Door Openers
   08721 Electro-Mechanical Door Openers
   08810 Glass & Glazing
   08811 Mirrors
   08820 Storefront System
   09110 GWB Ceiling & Soffits
   09120 Fiberglass Reinforced GWB Column

2. COVERS
   02950 Landscape Planting
   03200 Concrete Reinforcing
   03300 Cast-In-Place Concrete
   04210 Brick Masonry
   04220 Concrete Masonry Unit Construction
   04270 Glass Masonry Unit
   05400 Metal Stud Framing
   05550 Aluminum Metal Fabrication
   05500 Metal Fabrication
   05505 Aluminum Metal Fabrication
   07310 Fiberglass Shingle Roof
   07410 Metal Roofing
   07420 Architectural Panels
   07460 Vinyl & Aluminum Siding
   07500 Roofing System
   07610 Flashing & Sheet Metal
   07720 Roof Scuttles
   08110 Steel Doors & Metal Frames
   08120 Hollow Metal Storefront
   08210 Wood Doors
   08330 Rolling Counter Fire Door
   09260 Gypsum Drywall
   09300 Ceramic Tile
   09545 Suspended Ceiling
   09550 Wood Floor Refinishing
   09650 Vinyl Composition Tile Flooring
   09651 Resilient Rubber Tile Floor
   09680 Carpet
   09700 Epoxy Floor Reseal
   09701 Quality Composition Flooring
   09900 Painting
   09901 Pavement Marking
   09950 Wall Covering
   10190 Drapery
   10200 Architectural Louvers
   10505 Lockers & Benches
   10536 Exterior Awning
   13125 Aluminum Benches
   16010 Electrical
   16720 Fire Detection System
   16725 Security System
   16740 Telecommunications
SECTION 02 00015 – LIST OF DRAWINGS

PART 3 - LIST OF DRAWINGS

3.1 The following drawings are included in these specifications:

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>TITLE</th>
<th>DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKETCH</td>
<td>VICINITY LOCATION PLAN</td>
<td>01/12/00</td>
</tr>
</tbody>
</table>

SECTION 02 00016 – LIST OF STANDARD DETAILS

PART 4 - LIST OF STANDARD DETAILS

4.1 Bidders/contractors should check the list of details in the index at the front of the document to ensure all details are included in this set.

A. NONE INCLUDED IN THIS SPECIFICATION

SECTION 02 00200 – INSTRUCTIONS TO BIDDERS

PART 5 - INSTRUCTIONS TO BIDDERS

5.1 INSTRUCTIONS TO BIDDERS

A. All bidders are encouraged to personally inspect the job site to assure themselves of the entire job conditions and requirements. The UNC Charlotte Purchasing Department will provide further instructions in the "Request for Proposal". Questions concerning bid procedures should be addressed to the Purchasing Department (704.687.2227). When calling with questions, be prepared to give the Quotation Number shown on the Bid Document.

B. Any requested material or process exceptions or substitutions to these specifications shall be submitted in writing. When several products or manufacturers are specified as being equally acceptable, the Contractor has the option of using any product and manufacturer combination listed. HOWEVER, THE CONTRACTOR SHALL BE AWARE THAT THE CITED EXAMPLES ARE USED ONLY TO DENOTE THE QUALITY STANDARD OF PRODUCT DESIRED AND THAT THEY DO NOT RESTRICT BIDDERS TO A SPECIFIC BRAND, MAKE, MANUFACTURER OR SPECIFIC NAME; THAT THEY ARE USED ONLY TO SET FORTH AND CONVEY TO BIDDERS THE GENERAL STYLE, TYPE, CHARACTER AND QUALITY OF PRODUCT DESIRED; AND THAT EQUIVALENT PRODUCTS WILL BE ACCEPTABLE. SUBSTITUTION OF MATERIALS, ITEMS OR EQUIPMENT OF EQUAL OR EQUIVALENT DESIGN SHALL BE SUBMITTED TO THE ARCHITECT OR ENGINEER FOR APPROVAL OR DISAPPROVAL (14 days prior to the bid opening date). SUCH APPROVAL OR DISAPPROVAL SHALL BE MADE BY THE ARCHITECT OR ENGINEER PRIOR TO THE OPENING OF BIDS.

Any work the bidder expects of the Owner which is not herein described shall also be noted in writing with the bid; otherwise the Contractor shall provide complete work as intended.

C. The Contractor shall be experienced in the specified type of work and during the bid review may be requested to furnish a list of similar work completed at other locations within the past two years. Such a list, if requested, is to include date of contract, name and address of Owner, telephone number and their representative who is familiar with the work provided.
D. All measurements shall be confirmed by the bidders to verify measurements shown on the drawings and listed in the specification.

E. All invoicing should be forwarded to the Facilities Management Project Coordinator for approval. Unless otherwise noted, payment will be made upon completion of all work described in this specification and the attached drawings. If partial payments are approved, the Owner reserves the right to hold retainage of an amount not to exceed 15% of the completed work value.

F. If these specifications or the drawings refer to Physical Plant Standard Details or other specification articles which are not presented in the Bid Documents, Bidders should immediately notify the Purchasing Department and request copies.

SECTION 02 00700-1 – GENERAL REQUIREMENTS

PART 6 - GENERAL REQUIREMENTS

6.1 GENERAL REQUIREMENTS

A. All COMMUNICATION CONCERNING DESIGN INTERPRETATION AND/OR SCHEDULING, OR CONTRACT SCOPE SHALL ONLY BE WITH THE OWNER'S DESIGNATED REPRESENTATIVES NAMED IN ARTICLE: SUMMARY, B3. Unless advised otherwise. The Contractor will cooperate with Campus Police and University Safety Officials as appropriate for impromptu situations.

B. The Contractor shall have a Qualified and Competent Supervisor present whenever workers are performing work. The supervisor shall notify a Designated Representative of the work schedule for each day prior to initiating work.

C. To assure proper and accurate fit, all dimensions of existing facilities are to be considered approximate and installation dimensions shall be taken by the Contractor prior to ordering materials or initiating work.

D. Unless otherwise noted, the Contractor shall furnish all material and labor required for the work outlined in these specifications. Unless authorized in writing by the Owner, the Contractor may not subcontract this work to any other company. All work shall be performed by workers who are employees of the Contractor.

E. All work shall be performed in a first-class professional manner and in every respect comply with all sections of the current North Carolina Building Code. If there is a discrepancy between specified work and the North Carolina Building Code, the more stringent requirement shall apply.

F. Except for communication devices, no radios or other sound emitting devices not directly associated with the work will be operated by the workers at the job site. All workers will behave in a polite manner and all workers will wear shirts and shoes when on campus. Workers are not to make any inflammatory comments or gestures to any University personnel, students or guests. Workers are not permitted to smoke in University buildings. Workers not complying with these requirements will not be allowed to work and may be instructed to vacate the work site. If workers are restricted from working, such restriction(s) shall not alter the terms of the contract.

G. Vehicles shall be parked in assigned areas to be arranged with the Physical Plant representative. Vehicles must display temporary parking permits which will be provided to the project supervisor by the Physical Plant representative. Vehicle operators shall comply with all traffic and parking signs. Parking on sidewalks or lawns for loading and unloading may be arranged on an individual basis, but only after coordination with one of the Designated Representatives.

H. CONSTRUCTION AND DEMOLITION DEBRIS

1. The contractors shall keep the building and surrounding area reasonably free from rubbish at all times, and shall remove debris from the site from time to time or when directed to do so by the designer. Before final inspection and acceptance of the building, each contractor shall clean his portion of the work, including glass, hardware, fixtures, masonry, tile and marble (using no acid), clean and wax all floors as specified, and completely prepare the building for use by the owner, with no cleaning required by the owner.
GENERAL

2. The Contractor is responsible for all construction and demolition debris resulting from the project.
3. The Contractor shall not dispose of any debris or trash in any University dumpster or receptacle.
4. The Contractor shall not allow debris or trash to collect overnight unless specifically authorized in writing after special written and specific request is formally received by the University Project Coordinator from the Contractor’s Project Manager.
5. The Contractor is encouraged to dispose of reusable and recyclable materials at an approved recycling facility. The Contractor shall dispose of all non-recyclable materials at a regulated Construction / Demolition Landfill; a municipal solid waste landfill shall not be used.
6. The Contractor shall meet with the University Waste Reduction and Recycling Representative to review and execute the Waste Removal Form included with the specifications.
   a. The University’s Office of Waste Reduction and Recycling requires information on the waste generated during this project. This requirement is for your company as well as all subcontractors working for you on this project. Please notify your subcontractors of this requirement.
   b. The Waste Removal Form indicates the materials you plan to dispose of and the method you plan to use for disposal.
   c. The Waste Removal Form shall be completed and signed as part of your agreement with the University to accept this project.
   d. If you have any questions or concerns about this agreement, please contact the Office of Waste Reduction and Recycling. Please visit our web site for waste haulers servicing the University area.
   e. The Contractor shall provide the University Waste Reduction and Recycling Representative with the weights and contents of specific recyclable materials disposed of at a recycling facility, or salvaged for donation or reuse by the contractor in significant quantities.
   f. Office of Waste Reduction and Recycling
      9201 University City Boulevard, Charlotte, NC 28223
      Phone (704) 687-3890
      http://facilities.uncc.edu/recycling
7. The Contractor shall provide the University Waste Reduction and Recycling Representative with the names and locations of recycling and reuse sites used.
8. Upon completion of the Project, the Contractor shall promptly remove all evidence of his occupation of the site (equipment, surplus materials, trash and debris) and shall clean the construction site.
9. Release of final payment is contingent on the above waste reporting requirements.

I. Upon completion of the contracted work, the Contractor shall promptly remove all evidence (equipment, surplus materials, and debris) of his occupation of the site, except completed work as specified.

J. All materials installed by the Contractor shall be new. All materials shall meet N.C. State Building Codes and should there be any discrepancies between design and code, the more stringent requirement shall apply. All materials shall be in compliance with standards (or approved products) of the N.C. Office of State Construction. Unless specified otherwise, NO PRODUCT CONTAINING ANY AMOUNT OF ANY FORM OF ASBESTOS SHALL BE INSTALLED WITHIN THIS PROJECT.
   ASPEROS MEANS ASBESTIFORM VARIETIES OF CHRYSOTILE, CROCIDOLITE, AMOSITE, ANTHOPYLLITE, TREMOLITE OR ACTINOLITE. BY DEFINITION, INSTALLATION OF ASBESTOS MATERIALS WILL BE CONSIDERED CONTRACTOR’S NEGLIGENCE AND THE CONTRACTOR SHALL PERFORM ALL NECESSARY WORK TO REMOVE THE ASBESTOS AND RESTORE THE SITE TO THE "POST-CONTRACT" CONDITION.

K. The Contractor shall take reasonable effort to protect existing surfaces, finishes, and adjacent facilities from damage during construction. Any damage shall be repaired by Contractor at the Contractor's expense prior to completion of the job. Prior to construction, the Contractor may initiate a Pre-Construction meeting with the Designated Representative to perform an inspection to record damaged existing conditions.

L. Throughout these specifications, the term "Drawings" is used to refer to the complete set of design drawings attached to the specifications. It is intended that the drawings and specifications be
technically consistent, however if discrepancies are noted, they should be brought to the attention of one of the Designated Representatives for resolution.

M. If, during the progress of the work or during the period of guarantee, the contractor fails to prosecute the work properly or to perform any provision of the contract, the owner, after fifteen (15) days' written notice sent by certified mail, return receipt requested, to the contractor from the owner, may perform or have performed that portion of the work. The cost of the work may be deducted from any amounts due or to become due to the contractor, such action and cost of same having been first approved by the owner. Should the cost of such action of the owner exceed the amount due or to become due the contractor, then the contractor or his surety, or both, shall be liable for and shall pay to the owner the amount of said excess.

SECTION 02 00700-2 – GENERAL SAFETY REQUIREMENTS

PART 7 - GENERAL SAFETY REQUIREMENTS

7.1 This information shall be provided to the competent supervisor by the contractor prior to initiating any work.

A. UNIVERSITY SAFETY OFFICE REQUIREMENTS

B. Please refer to webpage for contract safety program:  http://safety.uncc.edu/contractors
   1. No parking on sidewalks except as necessary during a specific task.
   2. Designate a safety and health coordinator for the project, or assign that responsibility to the on-site supervisor.

C. FACILITIES MANAGEMENT DEPARTMENT SAFETY REQUIREMENTS
   1. Care shall be taken to protect all persons in the vicinity from injury and undue inconvenience.
   2. Contractor shall provide & maintain pedestrian and vehicular barricades as necessary for the situation. Pedestrian barricades shall be constructed of continuous temporary fencing completely containing the work area. Fencing shall extend from the ground to a minimum of 8’ high with top rail and shall meet all ADA requirements for barricading for the visually impaired. Continuous, plastic mesh, orange safety fencing is acceptable. If the barricade blocks an existing pedestrian sidewalk, the Contractor shall properly mark an alternate route.
   3. All workers shall wear "safety orange" vests or shirts while performing work in streets, parking lots, or other areas where there may be vehicular traffic.

SECTION 02 00700-3 – GENERAL GUARANTEE

PART 8 - GENERAL GUARANTEE

8.1 Unless stated otherwise in the specific requirements section, the contractor shall guarantee all installed work and materials for one year as described below:

A. Upon completion of work, Contractor shall guarantee all work and materials against defects for a period of three hundred, sixty-five days following Owner's acceptance of work. Any and all material necessary to correct defects will be provided and executed promptly by the Contractor at the Contractor's expense. Such guarantee is a condition of this contract and will commence on the date of Owner's acceptance of all the completed work.

B. The required guarantee described in this article, or any article of the specification, does not exempt the Contractor from having to correct at any time any defective work installed which is not in compliance with the contract documents.
PART 9 - SUMMARY

This contract is for:

A. BASE BID

B. ALTERNATES

C. OWNER'S DESIGNATED REPRESENTATIVES
   1. The Owner's Designated Representatives referenced throughout these specifications
   2. Mac Fake
   3. Project Coordinator Name

D. SCHEDULE
   1. The Contractor shall complete the work within
   2. The work is to be sequenced with other construction work. Therefore, it will be necessary to coordinate the installation with the Designated Representative.
SECTION 2

DIVISION 02

EXISTING CONDITIONS
DIVISION 2 – EXISTING CONDITIONS

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

SECTION 02 4116 – BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Demolition and removal of buildings and site improvements
   2. Removing below-grade construction
   3. Disconnecting, capping or sealing, and site utilities
   4. Salvaging items for reuse by Owner

1.2 SUMMARY

A. Demolish: Completely remove and legally dispose of off-site.

B. Recycle: Recovery of demolition waster for subsequent processing in preparation for reuse.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Division 31 Section “Earth Moving.”

PART 3 - EXECUTION

3.1 STRUCTURE REMOVAL

A. In open areas, foundations of structures shall be removed entirely. Where new structures will replace existing structures, indicate extent of foundation removal on the drawings.

3.2 RELOCATED EQUIPMENT

A. Special concern shall be taken with equipment to be reused. Establish schedule for removal and reinstallation through the University. Relocation of existing equipment shall include: disconnection and moving, restoration and capping or utilities, recording existing piping arrangements to facilitate reinstallation, and replacing unsalvageable utilities/extensions required to complete reinstallation.
3.3 BLASTING
   A. Blasting is strongly discouraged. If blasting is authorized by the UPM, a blasting plan and schedule must be submitted by the Contractor to the Designer’s geotechnical engineer for approval. Blasting plan will include at a minimum: seismograph monitoring locations and dust, traffic, and noise control contingencies. Contractor is responsible for documenting conditions of adjacent structures when collateral damage is possible. Contractor is responsible for collateral damage to existing conditions.
   B. Contractor is required to obtain necessary permits and for hiring a UNC Charlotte approved inspector.

3.4 REUSE OF MATERIALS
   A. Efforts shall be made to reclaim and reuse materials resulting from demolition. Reclaimed materials shall be: reused in new construction, separated and sent to appropriate recycling centers, or sent to the local C & D landfill as appropriate. A minimum of 50% of all construction waste shall be diverted from landfill. (Refer to Section 3, Annex B for Construction Waste Plan.)

3.5 ASBESTOS ABATEMENT
   A. Demolition, renovation, or remodeling projects are likely to involve some asbestos abatement. Designers are required to have a qualified asbestos consultant on the Design Team. The University will provide available information on identified asbestos on any site, but the Designer may encounter questionable material which may contain asbestos. Designer will perform an on-site visual survey and will have testing conducted on questionable material involved with/interfere with the project. Designer will provide the UPM with a copy of the report.
   B. The Designer shall provide a design for asbestos removal, if required, as part of the Design Contract as per the State Construction Manual.
   C. The University requires the Designer to provide for asbestos abatement on structures on the site scheduled for demolition. All asbestos abatement work shall be done in compliance with the Mecklenburg County Department of Environment, Health, and Natural Resources, Asbestos Hazardous Management Branch.
   D. Certified hazardous material abatement contractors must be contracted with to remove the asbestos; certified hazardous materials transported must be used to transport material to a certified landfill. The limit of liability required by these contractors for Hazardous Materials is no less than $10,000,000 per occurrence. UNC Charlotte must be named as additional insured on all policies.
SECTION 2
DIVISION 03
CONCRETE
DIVISION 3 - CONCRETE

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

SECTION 03 3000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION
A. The work specified in this Section consists of furnishing the equipment, labor, materials, and incidentals required for the construction of all Portland Cement, cast-in-place, and precast concrete items.

1.2 REFERENCE DOCUMENTS
A. American Concrete Institute (ACI)
B. American Society for Testing and Materials (ASTM)
C. Portland Cement Association (PCA)
D. American Association of State Highway and Transportation Officials (AASHTO).

1.3 QUALITY ASSURANCE
A. Properties of Concrete:
   1. General Requirements
      a. Design mixes to produce concrete of proper workability, durability, compressive strength, maximum density, and minimum shrinkage and permeability.
      b. Design mixes to have a minimum water-cement ratio, the largest permissible maximum size specified coarse aggregate, and an optimum percentage of fine aggregate.
      c. Use maximum size of coarse aggregate in accordance with ACI Committee 613 Report, Recommended Practice for Selecting Proportions for Concrete.
   2. Durability: For durability purposes, use a water-cement ratio in accordance with either ACI Committee Report 613, Table 4 as determined by the type of structure and exposure conditions or 0.50 by weight whichever is the lesser.
   3. Workability: Use approved chemical or air-entraining admixtures, or suitable combinations thereof in accordance with ASTM C260 to improve workability, as well as to reduce water and cement contents, and minimize shrinkage and permeability of concrete, provided that these admixtures do not adversely affect other required properties of concrete.
   4. Strength:
      a. Design the mix for each class and type of concrete of a specified compressive strength based on the required overdesign factor according to ASTM C94.
      b. For working stress method of design each class of concrete shall be designed so that not more than 20 percent of the compressive strength tests will have values less than the specified compressive strength, and the average of six consecutive strength tests will be equal to or greater than the specified compressive strength.
5. Method of Proportioning:
   a. For proportioning mixes use methods as described in ACI Report 613.
   b. Do not vary the proportions of the ingredients of the approved mixes without the written approval of the Structural Engineer.

B. Mock up: A sample panel for exposed concrete may be required at the site prior to beginning production. The panel shall show all the various finishing techniques required in the structure, i.e. joints, texture, color, workmanship, sandblasting, etc. The concrete used shall be provided from the Project Supplier and shall represent the approved design mix in all aspects. Panel shall be protected from construction operations, but shall be left exposed to the elements and left in place until all architectural concrete has been approved. Special attention shall be given to areas that routinely have caused concern in concrete construction such as:
   1. Adequate cover over reinforcing steel
   2. Sealing and waterproofing
   3. Proper drainage
   4. Joints and connections
   5. Proper dimension and sizing for embedded items
   6. Coordination of the electrical and mechanical requirements for penetrations and across expansion joints
   7. Protection of in-place work during construction (against vandalism)

1.4 SUBMITTALS

A. Sample
   1. Membrane-forming curing compound: Two one-pint samples, each type.

B. Design Mixes:
   1. At least 30 days prior to start of placing concrete submit design mixes for each class and type of concrete, indicating that the concrete ingredients and proportions will result in a concrete mix meeting the requirements specified.
   2. Include for each class and type of concrete as many mix designs as there are combinations of different ingredients, or type of ingredients, anticipated to cover the requirements of the contract work.
   3. Compressive test cylinders for each design mix shall be made at the Contractor's expense by an independent testing laboratory approved by the Engineer and tested in accordance with the ACI Code and “Method of Test for Compressive Strength of Molded Concrete Cylinders (ASTM C39)” three cylinders will be required for each design mix.
   4. Furnish two (2) copies of each report to the Structural Engineer/Designer. Concrete mix design, which does not meet the Specifications, will be rejected.
   5. Establish the mix designs and have them tested through the laboratory.
   6. Submit cylinder test results for the various mix designs showing compressive strength at 2, 7, and 28 days

C. Proposed Method of Temperature Control

D. Certificates:
   1. Ingredients:
      a. Submit with the mix design laboratory test reports and mill or manufacturer's certificates attesting to the conformance of ingredients with these specifications. Use ingredients in the design mix, which are representative samples of the materials to be used in the contract work.
      b. In case the source, brand or characteristic properties of the ingredients need to be varied during the term of the contract, submit revised laboratory mix report, in conformance with the above procedures.
   2. For Certificate of Compliance:
      a. Certificates of compliance shall be submitted for the following items:
         1) Waterstops
2) Floor hardener  
3) Chemical curing compounds  
4) Admixtures  
5) Non-shrink grout  
6) Epoxy bonding compound  
7) Reinforcing steel

1.5 PACKAGE RELATED WORK
   A. Concrete Reinforcement, Section 03010.
   B. Forms and Formwork, Section 03030.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING
   A. Package Cement:
      1. Deliver to the project site in original sealed packages labeled with the weight, name of the manufacturer, brand, and type specified.
      2. Store packages in a watertight building.
      3. Do not use cement, which has been reclaimed by cleaning bags.
      4. Do not use cement, which has been damaged by exposure or over-stocking.
      5. Do not deliver packages varying more than three percent from the specified weight.
      6. Packaged cement will be subject to test at any time.
   B. Bulk Cement:
      1. Store bulk cement separately from other cement and protect from deterioration from exposure to moisture and intrusion of foreign matter.
      2. Provide facilities to maintain separation of cement meeting the requirements of these specifications from other cement.
      3. Provide in cement manufacturer's plant, facilities for sampling of cement at the weighing hopper or in the feed line immediately before entering the hopper.
      4. Do not use different brands of cement or the same brand of cement from different sources without approval.

1.7 CONCRETE ADMIXTURE
   A. Storage and handling
      1. Store materials protected from exposure to harmful weather conditions and at a temperature above 40° Fahrenheit.

1.8 GUARANTEE
   A. In addition to the 365-day warrantee specified in Article G3, the Contractor shall warranty the concrete surface against spalling or aggregate exposure for a period of two years following the date of acceptance. Any and all material necessary to correct defects will be provided and executed promptly by the Contractor at the Contractor's expense. Such guarantee is a condition of this Contract and will commence on the date of Owner’s acceptance of all the completed work.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Portland Cement: ASTM C150 Type I or II
B. Admixtures - Approved brands: Chlorides may be present in admixtures provided the total chloride in the proposed concrete mixture including chloride ions contributed by the admixture or admixtures, aggregates and mixing water is not in excess of 150 ppm.

C. Burlap Sheet shall comply with Engineer’s recommendations.

D. Water requirements:
   1. Containing no impurities, suspended particles, algae or dissolved natural salts in quantities that will cause:
      a. Corrosion of reinforcing steel.
      b. Volume change that will increase shrinkage cracking.
      c. Efflorescence.
      d. Excessive air entraining.
   2. The pH to be not less than 6.5 or greater than 7.5.
   3. When tested in accordance with AASHTO T26, standard mortar briquette tests to show no indication of unsoundness, change in time-of-setting not in excess of 30 minutes, or reduction in strength not more than ten percent.

E. Concrete Aggregate shall comply with Engineer’s recommendations.
   1. Aggregate shall be free from injurious amounts of organic impurities. Should material fail to pass test for organic impurities in sand for concrete, retest in accordance with Engineer’s recommendations. If the fine aggregate shows by the colorimetric test a darker color than that of the sample originally approved for work, stop using the aggregate until tests satisfactory to the University Project Manager have been made to determine whether the change in color is indicative of an injurious amount of deleterious

F. Waterstops:
   1. Elastomer Waterstops:
      a. Elastomer waterstops shall be made of natural or synthetic rubber or polyvinyl chloride shall be dense, homogeneous, free from porosity and other imperfections, and symmetrical in shape. Materials shall be resistant to chemical action with portland cement, acids and alkalies, and not affected by fungi. They shall show no effect when immersed for 10 days at room temperature in 10 percent solutions of sulphuric acid, hydrochloric acid, and sodium chloride, and a saturated lime solution. Resistance to fungi shall be determined by Engineer’s recommendations. Material shall not be adversely affected when subjected to tests for low temperature brittleness (-35 degrees F), in accordance with ASTM D 1329, and for water absorption (maximum 5 percent by weight). Waterstops not indicated otherwise shall be 6 inches by 3/8-inch.

G. Materials for Curing Concrete:
   1. Polyethylene Sheeting:
      a. Polyethylene sheeting shall be natural color and shall have a normal thickness of 0.004 inch. The loss of moisture when determined in accordance with Engineer’s recommendations and shall not exceed 0.055 gram per square centimeter of surface.
   2. Polyethylene-Coated Burlap:
      a. Polyethylene-coated burlap shall be 4 mils thick white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard and shall conform to Fed. Spec. CCC-C-467. The loss of moisture when determined in accordance with ASTM C 156 shall not exceed 0.055 gram per square centimeter of surface.
   3. Liquid Chemical Compound Curing:
      a. Liquid chemical compound curing shall be accomplished by the application of a suitable sealer-hardener designed for sealing and hardening in addition to curing of the concrete, applied by the method and at the rate recommended by the manufacturer. It shall not reduce the adhesion of paint, waterproofing or other material to be applied to the concrete. The chemical compound shall be free of
petroleum resins or waxes. The loss of moisture when determined in accordance with Engineer’s recommendations shall not exceed 0.055 gram per square centimeter of surface. The abrasion loss shall not exceed 80 percent of that of the same concrete, untreated, when tested in accordance with Engineer’s recommendations at age 28 days. The adhesion to the treated concrete shall be at least 90 percent of the adhesion to the same concrete, untreated. The test for adhesion will consist of forming mortar or concrete slabs, three moisture cured and three liquid chemical cured for each type of covering to be applied. After curing for 28 days, the slabs shall be permitted to dry in air. The covering shall be adhered to the troweled face of the slabs with the adhesive to be used in the work. After the adhesion has set, cuts one inch apart and 6 to 10 inches long shall be made through the adhered covering, forming strips to one end of which a calibrated spring type balance or other devise shall be attached. The strips shall be peeled off at a rate of 2 to 100 inches per minute. The pull required to peel the covering from the slabs shall be the average of three specimens.

H. Chemical Floor Hardener:
1. Chemical Floor Hardener: All concrete floor slabs, both interior and exterior, not having an additional applied finish, University Project Manager may require a liquid concrete hardener applied in accordance with the manufacturer's recommendations. Acceptable hardeners are:
   a. Sonneborn Lapidolith
   b. Chem-Masters Sciolith
   c. W.R. meadows Pena-lith
   d. Protex Lithoplate

I. Joint-Sealing Materials:
1. Joint-sealing materials shall conform to Engineer's recommendations.
2. Expansion Joint Filler:
   a. Expansion joint filler shall be preformed type conforming to Engineer's recommendations.
3. Accessories
   a. Black "house sheathing" material is not acceptable.

J. Slots and Inserts for Masonry Anchors:
1. Dovetail Anchor Slots:
   a. Dovetail anchor slots shall be formed of zinc-coated sheet steel, U.S. 24 minimum gage, provided in concrete faced with or abutting masonry.
2. Inserts:
   a. Inserts shall be formed of 9 minimum gauge zinc-coated steel wire, engaged between a two-piece half-round wood core, and having loops for embedding in concrete.

K. Epoxy Bonding Compound:
1. Epoxy bonding compound shall conform to Engineer’s recommendations.

L. Vapor Barrier:
1. Vapor barrier shall be polyethylene sheet .006 inch (6 mil) thickness of widest practicable widths. See Construction Drawings for locations.

2.2 STEEL REINFORCEMENT

H. Unless specified otherwise on drawings, all reinforcing steel shall be ASTM A-615, Grade 60 and shall be fabricated and placed in accordance with ACI 301. All continuous rebar reinforcing shall be lapped as shown on the drawings.

I. If wire fabric is required, it shall be welded cold-drawn steel wire fabric, ASTM A-185.
PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL

A. Air Entrainment:
   1. Determine the air content of concrete in accordance with the Engineer's recommendations.

B. Testing of Concrete:
   1. General requirements:
      a. Compression test cylinders for all concrete pours shall be made at the Contractor's expense by an independent testing laboratory approved by the Project Manager and tested in accordance with the ACI Code and "Method of Test for Compressive Strength of Molded Concrete Cylinders (ASTM C39)" three cylinders will be required for the first 5 cubic yards and four for each 50 cubic yards thereafter for each day's pour.
      b. Furnish two (2) copies of each report to the Project Manager and one copy to local government building department, if required and structural engineer. Concrete, which does not meet the Specifications, will be required to be removed and replaced at the Contractor's expense or may be subjected to a load test, also at Contractor's expense.
      c. For each work shift, when concrete is delivered, at least one set of specimens will be made. A set of test specimens will consist of at least four standard cylinders from a batch. At least one specimen of the set will be tested for 2-day, 7-day, and 28-day compressive strength. The tests for 2-day compressive strength, approximately 25 percent of the 28-day compressive strength, will be used to aid in the determination of form, falsework and centering removal. The tests for 7-day compressive strength, approximately 60 percent of the 28-day compressive strength, will be likewise used.
      d. Slump tests, yield tests, and air content tests will be performed by the laboratory with no less frequently than that of casting strength specimen sets; however, the Project Manager reserves the right to have the concrete tested as often as he deems necessary.
      e. Submit a delivery ticket from the concrete supplier to the Project Manager before unloading at the site for each batch delivered to the site setting forth the following information:
         1) Name of supplier
         2) Name of batching plant and location
         3) Serial number of ticket
         4) Date
         5) Truck number
         6) Specific job designation (contract number and location)
         7) The volume of concrete (cubic yards)
         8) Specific class and type of concrete (in conformance with the specification requirement)
         9) Time loaded
         10) Type and brand of cement
         11) Weight of cement
         12) Maximum size of aggregates
         13) Weights of coarse and fine aggregates, respectively
         14) Maximum amount of water to be added and amount of water added at the site, if any
         15) Kind and amount of admixtures
   2. Concrete Strengths:
      a. Determine compressive strengths from standard test specimens taken by the laboratory according to ASTM C31 and ASTM C172, and cured and tested in
accordance with ASTM C39. Core drilling and testing will be in accordance with ASTM C94.

b. Compute and evaluate in accordance with Engineer’s recommendations.

3. Air content:
   a. Determine in accordance with Engineer’s recommendations.

4. Cement factor:
   a. Determine in accordance with Engineer’s recommendations.

5. Modulus of elasticity:
   a. Determine the modulus of elasticity and Poisson's Ratio in accordance with ASTM C469 as directed by the Structural Engineer.

6. Slump:
   a. Determine in accordance with Engineer’s recommendations.

7. Unit Weight:
   a. Determine the unit weight in accordance as directed by the Structural Engineer.

C. Design Mix:
1. Specified 28 days compressive strength of concrete shall be as follows:
   a. f′c = 4000 psi for all structurally reinforced concrete work.
   b. f′c = 3000 psi concrete for exterior work and all flatwork underfoot, such as walks, steps, ramps, drives, and porch floors: Also use for pipe thrust blocking and masonry cell fill.
   c. Concrete exposed to weather shall have a maximum of 5-1/2 gal. of water per sack of cement and a minimum of 6-1/4 sacks of cement per cubic yard.
      1) f′c = 3000 psi concrete for mud mats, limited site voids, soil boring voids, and for under foundations where excavated to excessive depth.
      2) f′c = 3000 psi concrete for grout with maximum size coarse aggregate not exceeding 3/8 inch.

D. Classes of Concrete:
1. Classes of concrete are designated by numerals corresponding to their specified 28-day compressive strengths in pounds per square inch as determined by Engineer’s recommendations.
2. When class is not indicated use 3,000 psi concrete.
3. Each class of concrete may comprise one or more mixes determined by the maximum size of aggregate, cement factor and types of admixtures used.

E. Minimum Cement Factor:
1. Observe the minimum cement factor for the various classes of concrete as follows:
   a. Classes of Concrete Minimum Cement Factor (in psi) (Bags per cu yd of Concrete)
      1) 5,000 ~ 6.5
      2) 3,500 - 4,000 ~ 6.25
      3) 3,000 - 3,400 ~ 5.75
      4) Less than 3,000 ~ 4.5

3.2 MATERIAL PREPARATION

A. Concrete Production:
1. Ready Mix Concrete:
   a. Ready-mixed concrete shall be batched, mixed and transported in accordance with Engineer’s recommendations. Plant equipment and facilities shall conform to "Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association."

2. On-site Batching:
   a. Concrete produced by on-site volumetric batching and continuous mixing shall be batched and mixed in accordance with and shall conform to all requirements of Engineer’s recommendations.

B. Admixtures:
1. Air entraining admixture:
   a. Use for concrete exposed to weathering or in contact with rock or moist soil.

2. Chemical admixtures:
   a. Use water reducing admixtures in concrete areas below grade in contact with rock, earth, or fill.
   b. Employ admixtures without interfering with the specified air content dosage of air-entrained concrete.
   c. Except as specified, use water reducing, set retarding or set accelerating admixtures only with Project Manager’s approval.
   d. If the introduction of certain admixtures to improve concrete strength is permitted by the Engineer, do not reduce the cement content below the minimum amounts specified.

3. Use calcium chloride only as specifically authorized in writing by the Project Manager. Do not use calcium chloride in prestressed concrete, underground structures, reinforced concrete, or in concrete used to encase or in contact with structural steel or cast iron.

C. Consistency:
1. Slump shall not exceed 2-inches above design mix slump as approved by the Engineer, and shall be kept at a practical minimum for the point of placement.

D. Construction Joints:
1. Joints not shown on the Construction Drawings shall be made and located so as to not impair the strength of the structure and shall be subject to approval of the Engineer. In general, construction joints must be placed such that no vertical pour may exceed 10 to 15 feet and no horizontal pour may exceed 20 to 30 feet. Horizontal joints in walls and columns shall be at the underside of floors, slabs, beams, or girders and at the top of footings of grade slabs. Joints shall be perpendicular to the main reinforcement.

2. Reinforcement in Construction Joints: All reinforcing steel and welded wire fabric shall be continued across joints. Keys and inclined dowels shall be provided as indicated. Longitudinal keys at least 1-1/2 inches deep shall be provided in all joints in walls and between walls and slabs or footings.

3. Preparation of Surface: The surface of the concrete at all joints shall be thoroughly cleaned and all laitance removed.

4. Bonding:
   a. When a bonded construction joint is required, bond shall be obtained by one of the following methods.
   c. The use of suitable chemical retardant which delays but does not prevent setting of the surface mortar. Retarded mortar shall be removed within 24 hours after placing to produce a clean exposed aggregate bonding surface.
   d. By roughening the surface of the concrete in proper manner which will expose the aggregate uniformly and damaged concrete at the surface.

E. Expansion Joints, Cleavage Joints, Waterstops and Embedded Items:
1. Expansion Joints and Cleavage Joints:
   a. Expansion joints shall be provided in any structure having a dimension of 120 feet in any principal direction. Desirable maximum spacing is 50 to 60 feet. Reinforcement shall stop 2 inches from the face of an expansion joint. Expansion joints and cleavage joints shall not be less than 1/2-inch wide except as indicated otherwise. Expansion joints not exposed to weather shall be filled completely with preformed joint material conforming to Engineer’s recommendations. Expansion joints exposed to weather and cleavage joints between vertical masonry surfaces and floor slabs laid on earth shall be filled to a depth of one-inch from the surface or face of the concrete width deep space above the preformed material conforming to Engineer’s recommendations. The one-inch deep space above the preformed material shall be cleaned after the concrete has been cured, and when dry, filled
flushed with joint sealing material. Reinforcement or other embedded metal items bonded to the concrete, except dowels in floors bonded on only one side of joint, shall not be permitted to extend continuously through any expansion joint.

F. Waterstops:
1. All horizontal and vertical construction and expansion joints providing for fluid containment in a wet space as well as joints located in exterior walls below grade shall have placed in the joint a waterstop to develop effective watertightness. Wet space shall include tanks, channels, chambers, etc. used to store, convey or contain fluids or solids containing fluids.
2. The material, design, and location of waterstops in construction joints and expansion joints shall be as indicated or as specified herein. Each piece of pre-molded waterstop shall be maximum practicable length in order that the number of end joints will be held to a minimum. Joints at intersections and at ends of pieces shall be made in the manner most appropriate to the material being used. Joints shall develop effective watertightness fully equal to that of the continuous waterstop material and shall permanently develop not less than 50 percent of the mechanical strength of the parent section and shall permanently retain its flexibility.

G. Other Embedded Items:
1. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support are placed prior to concreting. All sub-contractors, whose work is related to the concrete or must be supported by it, shall be given ample notice and opportunity to introduce or furnish embedded items before the concrete is placed. All ferrous metal sleeves, insets, anchors, and other embedded ferrous items exposed to the weather or where rust would impair the appearance or finish of the structure shall be galvanized.
2. Placing Embedded Items:
   a. Expansion joint material, waterstops, and embedded items shall be positioned accurately and supported against displacement. Voids in sleeves, inserts, and anchor slots shall be filled temporarily with readily removable material to prevent the entry of concrete into the voids. Aluminum shall not be embedded in concrete except where aluminum is protected from direct contact with the concrete.

H. Reinforcing Bars:
1. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items, but not so as to impair design strengths of the members. If bars are moved more than one bar diameter, the resulting arrangement of bars shall be subject to the approval of the Project Engineer.

3.3 CONVEYING
A. General Requirements:
1. Convey concrete from the point of delivery with a continuous flow of concrete to the point of placement without segregation.
2. Provide an arrangement at the discharge end of a conveyor to prevent segregation.
B. Chutes and Troughs:
1. Use only ferrous metal or approved plastic or rubber lined chutes and open troughs. Where steep slopes are required, discharge the concrete into a hopper. Keep chutes or open troughs clean of hardened concrete by thoroughly flushing with water after each use.
2. Discharge the water used for cleaning outside the lines of the structure.
C. Adjustable Length Pipes (Elephant Trunks):
1. Use flexible pipes only of ferrous metal, rubber or plastic, six-inch minimum diameter and use in a manner that will not cause segregation of the concrete.
2. Locate chutes or flexible pipes so that concrete is delivered in a continuous flow to points not more than five feet horizontally and five feet vertically from its final location.
3. Thoroughly clean flexible pipes or elephant trunks after each use.

D. Buggies:
1. Construct runaways on which buggies will operate such that they will not come in contact with or be supported by the reinforcing steel of the structure.

E. Pumping Equipment:
1. Use pumping equipment, designed to handle the types, classes and volumes of concrete to be conveyed without segregation.
2. Operate the pump equipment so that a continuous stream of concrete without air pockets is conveyed. Position the discharge end of the line as near the final position of the concrete as possible.

3.4 WARRANTY FOR SLAB WATERPROOFING & ADMIXTURE
A. Project warranty: Refer to Conditions of the Contract for project warranty provisions.
B. The manufacturer’s standard warranty document executed by the authorized company official. The manufacturer’s warranty is in addition to, and not a limitation of, other rights the owner may have under provisions of the contract documents.
   1. Warranty period: Five years commencing on the date of acceptance of the project by the Owner or Notice of Completion.
   2. Warranty terms: Terms to include moisture related failure, including all finish floor materials and labor.

3.5 PREPARATION FOR PLACEMENT
A. Do not place concrete until all formwork, steel reinforcement, installation of embedded parts, preparations for finishing unformed areas, scaffolding, lighting, power and methods and procedures for placing concrete have been approved. All surfaces of forms and embedded materials shall be cleaned of dried mortar or grout from previous pours. Poorly consolidated concrete at construction joints and all loose material shall be removed. Surfaces of concrete and embedded materials shall be cleaned of laitance, or oil and other bond destroying agents.

B. Surfaces against which concrete is to be placed shall be clean and free of running water, mud, loose material, oil, debris, frost and ice. Rock surfaces shall be free of semidetached and unsound fragments. Absorptive foundation surfaces shall be moistened thoroughly or otherwise treated so that moisture will not be drawn from freshly placed concrete.

C. Coat faces of removable concrete forms with form oil approved by the University Project Manager.

3.6 PLACEMENT
A. General Requirements:
   1. Place concrete continuously and as soon as possible after mixing. Do not use vibrators for shifting the mass of fresh concrete.
   2. Place concrete in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. Cover each layer of concrete with fresh concrete within 45 minutes.
   3. Do not place concrete which has attained its initial set or concrete which has contained its mix water for more than 90 minutes.
   4. Notify the Project Manager at least 24 hours in advance of the start of concrete placing.
5. Placing will not be permitted when, in the opinion of the Project Manager, the sun, heat, wind or limitations of facilities furnished prevent proper finishing and curing.

6. Control concrete temperature at time of placement:
   a. To be not less than 45° F
   b. To be not more than 90° F

7. Unless approved by the University Project Manager, do not start concreting when descending natural air temperature falls lower than 40° F.

8. Start placement of structural concrete on/or next to a construction joint with a 3inch thick layer of oversanded mix with 3/4-inch maximum aggregate, an extra sack of cement per cubic yard, and a five-inch slump.

9. Deposit concrete as nearly as practicable directly in its final position so that the lateral movement will not result in segregation of the coarse aggregate, mortar, or water from the concrete mass. Do not use methods and equipment in depositing concrete in forms which result in clusters or groups of coarse aggregate being separated from the concrete mass. When concrete is placed through a drop chute, use one or more vibrators where concrete is falling to prevent stacking and separation.

10. Place formed concrete, in continuous, approximate horizontal layers, the depth of which generally shall not exceed 24-inches. Lesser depths may be required where necessary to ensure that each new layer can be made monolithic with the previous layer.

B. Compaction:
   1. Consolidate all concrete by vibration to the maximum practicable density, so that it is free from pockets of coarse aggregate and entrapped air, and filled tightly against, all formed surfaces and embedded materials. In consolidating each layer of concrete operate the vibrator at regular and frequent intervals, and in a near vertical position. Allow the vibrating head to penetrate and revibrate concrete in the upper zone of the underlying layers.

   2. Re-vibrate the top layer of each placement systematically at the latest time the concrete can be made plastic by means of vibration. Do not place layers of concrete until the layers previously placed have been vibrated thoroughly as specified.

   3. Consolidate concrete by electric or pneumatic drive vibrators of sufficient power and capacity to consolidate the concrete effectively and quickly. Operate concrete vibrators at speeds of at least 7,000 rpm when immersed in the concrete. Have standby vibrators in good condition readily available if needed during concrete placement. Use equipment capable of obtaining results and operating reliably and effectively with a concrete mix that is not excessively oversanded or high in slump and may occasionally be of lower slump than intended.

3.7 CURING AND PROTECTING

A. General Requirements:
   1. Protect freshly placed concrete from excessive hot or cold temperatures. Maintain concrete surfaces without drying for the period of time necessary for the hydration of the cement and the proper hardening of the concrete.

   2. Cure newly placed concrete for a cumulative period of seven days at an air temperature in excess of 55° F.

   3. During the curing period keep steel and wood forms set. If forms are removed during curing use one of the following methods of curing immediately and continue for the remainder of the curing period.

B. Normal Curing And Protection:
   1. (Use any one of the methods specified below)

      a. Use ponding on horizontal surfaces providing the surface is submerged at all time for the required curing period.

      b. Apply continuous sprinkling with nozzle or nozzles which, during the first 24 hours, atomizes the follow of water providing a mist and not a spray.
c. Do not apply the moisture under pressure directly upon the concrete and avoid flowing or washing on the surfaces while susceptible to erosion.
d. Cover the entire surface of the concrete with double thickness burlap sheet, laid directly on the concrete and kept wet at all times. Maintain in good condition.
e. Sprinkle, as specified above, for at least 18 hours and then immediately cover the concrete surface with waterproof curing sheets, free from holes or tears. Hold in position in such manner that the entire surface of the concrete being cured is fully covered at all times.
f. Do not damage burlap or waterproof sheet or concrete surfaces.

2. Membrane-Forming Curing Compound:
   a. Use a curing compound when authorized for circumstances where the application of moisture is impracticable and where such compounds will not jeopardize the appearance of the concrete. Except as otherwise specified, use Type 1 compound, uniformly applied over the surface at the thickness recommended by the manufacturer. Thoroughly mix compound and apply within one hour after mixing.
   b. Where the surfaces are subjected to sunlight, apply Type 2 White compound.

3. Do not apply wax-resin type curing compounds to a surface where bond is required for additional concrete or where a bonded surface coating such as paint, tile, dampproofing, waterproofing, or roofing is to be applied.

4. Warm the curing compound if required for satisfactory application in accordance with the manufacturer's recommendations. If the film of the compound is damaged before the expiration of the curing period, repair immediately with additional compound.

5. Give surfaces the required surface finish prior to the application of the curing compound. Do not use curing compound on construction joints.

6. Apply curing compound in two coats, apply the first coat immediately after stripping of forms and acceptance of the concrete finish.

7. If the surface is dry, thoroughly wet the concrete with water and apply the curing compound just as the surface film of water disappears. Apply the second coat after the first coat has set.

8. Protect the coating against damage for a period of at least 10 days after application. Apply an additional coating to coatings which are damaged.

3.8 WEATHER PROTECTION

A. Concrete shall not be placed during rain or freezing weather unless approved measures are taken to prevent damage to concrete. Concrete placed during periods of high winds, low humidity, high temperatures, and other conditions causing rapid drying shall be initially cured with a fine fog spray of water applied immediately after finishing and maintained until final curing operations are started. Under hot weather conditions, steps shall be taken to reduce concrete temperature and water evaporation by proper attention to ingredients, production methods, handling, placing, protection, and curing. Subject to approval, applicable preventive measures shall be taken for placing concrete during hot and cold weather in conformance with ACI Reports 305 R-77 and 306R, dated May 1978, respectively entitled, "Hot Weather Concreting", and "Cold Weather Concreting".

3.9 DEFECTIVE CONCRETE

A. Concrete will be considered defective if it is structurally unsound, not watertight, improperly finished, or not within the tolerances specified herein.

1. Concrete will be considered defective if the concrete cylinder tests fail to meet the specified strength requirements at any location of the work. In such cases, take drilled cores at locations specified by the University Project Manager. Core specimens will be tested by the laboratory in accordance with the requirements of ACI 301. If cored specimens do not indicate compliance with the compressive strength requirements, replace the defective portion of the structure.
2. Windsor probe tests conducted in conformance with Engineer’s recommendations may be conducted by the laboratory if approved by the Project Manager in lieu of taking and testing core specimens.

3. The University Project Manager, at his discretion, will require replacement of the defective portion of the structure in accordance with Engineer’s recommendations. All strengthening or correction of defective concrete will be at no additional cost to the University.

3.10 DAMAGED WORK

A. Before final acceptance of the work, damage to surfaces, corners of concrete and concrete finish, whether such damage shall have resulted from the action of the elements or damage from any cause whatsoever, shall be neatly repaired, as approved by the University Project Manager at no additional cost to the University.

B. At damaged places where surface repairs are permitted, the concrete shall be chipped out and a concrete patch installed. The patch shall have a minimum thickness of two-inches, shall be dense and watertight to meet specification requirements, and shall have a smooth exposed surface matching the neat line of adjacent concrete.

3.11 TOLERANCE FOR CONCRETE CONSTRUCTION

A. Permissible surface irregularities are defined as "finishes," and are to be distinguished from tolerances as described herein.

1. Allowable tolerances are:

   a. Structures:

      1) Departure from established alignment.....................1 inch
      2) Departure from established grade .......................1 inch
      3) Variation from the plumb in the lines and surfaces of columns, piers, and walls exposed,
         a) in 10 ft..................................................1/2 inch
         b) Backfilled, in 10 ft.................................1 inch
      4) Variation in the level or from grades specified in slabs and beams exposed,
         a) in 10 ft.................................................1/2 inch
         b) Backfilled, in 10 ft.................................1 inch
      5) Variation in cross-sectional dimensions of columns, piers, slabs, walls and beams,
         a) minus.....................................................1/4 inch
         b) plus......................................................1/2 inch
      6) Variation in sizes and locations of slab and wall openings..............................................1/2 inch

SECTION 03 4500 – ARCHITECTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Precast manufacturing plants shall be certified by the Precast Concrete Institute’s (PCI) Plant Certification Program. Visits to the precast plant by the Designer and Owner may be applicable to inspect the work process and quality. All welded connections shall be made by a certified welder.

B. Testing: Precast manufacturers shall employ their own testing services with the Designer specifying frequency of testing.
PART 2 - PRODUCTS

2.1 SUSTAINABILITY

A. UNC Charlotte recommends the use of cement substitutes and additives in the concrete design that promotes the use of recycled materials such as fly ash and slag.

B. Concrete materials and products should be extracted, recovered and manufactured within 500 miles of UNC Charlotte.

C. Approved manufacturers will be listed in the specifications.

2.2 CONCRETE MIX

A. Antique White cement with crushed limestone aggregate.

END OF DIVISION
DIVISION 4 - MASONRY

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 04 2000 – UNIT MASONRY ASSEMBLIES

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Masonry Mock-up: A masonry mockup for approval of colors and workmanship shall be built on site prior to beginning masonry work. This panel shall show workmanship and will include face and backup construction and all accessories specified for on this project. The panel shall be 4'-0" x 4'-0", unless specified otherwise. The panel shall be constructed at a location indicated by the Architect/Project Manager. The materials used shall be provided by the project supplier and shall represent the final product in all aspects. The panel shall be protected from construction operations, but shall remain in place and exposed to the elements until project completion. This mock-up will be used for approval of brick, mortar, joint material, flashing, weep holes and precast pieces to be used on the project. This panel shall show color range and texture of masonry units and mortar joints required on this project.

B. Quality Standards: Perform work in accordance with ACI 530 and ACI 530.1.

1.2 DELIVERY AND HANDLING

A. Contractor shall store all materials in manufacturer's original unopened bundles or containers with manufacturer's brand name and identification clearly marked thereon. All material shall be sorted in packs, on platforms or other supports above ground to prevent damage, deterioration or contamination.

PART 2 - PRODUCTS.

2.1 CMU

A. Concrete masonry units shall be of modular dimensions and units shall be of the same appearance and shall be cured by the same process delivered to the project site in an air-dry condition. Units shall be made with semi-lightweight aggregate conforming to ASTM C 331 and meet or exceed the following requirements. Units shall be a cast minimum of 21 days old prior to delivery to the site.

1. Load-Bearing Concrete Masonry Units: ASTM C 90, Type II.
2. Hollow Concrete Masonry Units: ASTM C 129, Type II.
3. Concrete Building Brick: ASTM C 145, Type II, Grade U.

2.2 BRICK

A. Face brick shall be “Morrocroft Special” #02-79-1 manufactured by Hanson Brick at www.hansonbrick.com (one available source in Charlotte is Brick Yard Limited). Installation shall comply with UNCC Std. Spec S02515. Brick Pavers shall be 2-1/4"x4"x8"
B. Use Basic Square Rowlock Corner units at corners and ends of masonry walls. After brick laying is complete, quartz sand or hard rock screenings shall be swept over the brick and repeated for a minimum total of three “wet/dry” applications. More applications may be required at no extra cost, if necessary to stabilize the pavers and fill voids between bricks.

2.3 STONE TRIM UNITS

Base material shall be quartz or hard rock screening as described by NCDOT Spec 1012.1C3. References UNCC Std. Detail G02.1A. Various site situations may require additional requirements. Mortar shall be color BY115 (available from Brick Yard Limited).

2.4 MORTAR AND GROUT

A. Cement shall be Portland Cement, Type S, meeting Standard Specifications for Portland Cement (ASTM C 270). Below grade load bearing masonry work should be Type M (ASTM C270).

B. Sand shall meet the requirements of Standard Specifications for aggregate for Masonry Mortar (ASTM C-144-81), with the gradation to satisfy paragraph 3, Grading, and with the omission of subparagraph 3.4.

C. Hydrated lime shall meet the requirements of the Standard Specification for Hydrated Lime for Masonry Purposes (ASTM C-207), Type S.


E. Water shall be potable.

F. Admixture workability and air entraining admixtures, if specified, shall conform to ASTM C-260.

G. Prepackaged mortar cements may not be used unless approved in writing by the designer.

H. Grapevine Joint: All tooled joints for brick work shall be tooled 1/8”grapevine joints. Head joints to be struck first and then bed joints. The jointing tools shall be replaced as necessary to provide crisp, distinct grapevine joints.

I. Mortar shall match Robinson Hall, Brick Yard Limited 115, or match previous projects on campus.

2.5 REINFORCEMENT

A. Unless specified otherwise on the drawings, Reinforcement steel for lintel blocks, bond beams and other reinforced masonry work as required, shall conform to ASTM A 615, Grade 60, size as indicated or specified.

2.6 TIES AND ANCHORS

A. Anchors and ties shall be wire ties of hot-dipped galvanized in accordance with ASTM A 153, Class B-2 (1.5 oz. /sq. ft.) of types as specified hereinafter.

B. Welded steel adjustable anchors for anchoring masonry shall be No. 359 anchor rod Ties shall be as follows:
   1. Brick: No. VWT triangular ties sized such that they are imbedded at least 2" into bed of brick veneer.
   2. CMU: No. VWT triangular ties or No. 302W.
2.7 MISCELLANEOUS ACCESSORIES
   A. Control joint material for exterior walls shall be as specified by designer or approved equal. Width shall be as specified by the Architect.
   B. Horizontal Expansion Joint Material shall be prefabricated neoprene joint material, 1/4" thick by approximately 2-3/4" wide with an adhesive surface on one side. Neoprene material shall conform to ASTM D 1056, Class RE41.
   C. Vertical Expansion Joint Material shall be prefabricated neoprene joint material, 3/8" thick by approximately 3" wide. Neoprene material shall conform to ASTM D 1056, Class RE41.

2.8 INSULATION
   Block wall insulation shall be masonry fill processed for purpose of insulating masonry walls. Block wall insulation shall have been tested for water repellency in accordance with procedures developed by the National Bureau of Standards (NBS-82).

2.9 MASONRY CLEANERS
   A. Exercise caution to keep the masonry and adjacent surfaces clean during the erection of masonry. Clean wall surfaces as the work progresses and to the extent practical, clean masonry on the same day in which it is laid.
   B. Clean brick or stone masonry with water and brushes with nonmetal bristles. Diluted detergents may be used if the water is containerized and pumped to the sanitary sewer. Repeated washings are preferred to fewer washings that are too abrasive or chemically laden. Acid content in washing solutions is forbidden. The Designer and Contractor are to make every effort to prevent infiltration of cleaning water into the storm sewer system during masonry cleaning. This is especially the case when very old masonry units or mortar joints are involved.
   C. All cleaning agents to be environmentally safe.

SECTION 04 7200 – CAST STONE MASONRY

PART 2 - PRODUCTS

2.1 GENERAL:
   All head joints at coping stones and joints at column covers, cornices, platforms, soffits, window sills and in general, all stone sections with projecting profiles, exposed top joints or rigid suspension connections to the supporting structure should be ‘soft’ sealant joints.

2.2 SUSTAINABILITY
   A. UNC Charlotte recommends that masonry materials and products should be extracted, recovered and manufactured within 500 miles of UNC Charlotte.
SECTION 2
DIVISION 05
METALS
DIVISION 5 - METALS

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

GENERAL DESIGN:

1.1 GENERAL REQUIREMENTS
A. Structures shall be designed in accordance with the North Carolina Building Code.
B. Take expansion and contraction into account in the design and detailing. Handrails and long members are noted in particular, especially when they span over an expansion joint in other materials.
C. Try to design column base plates for ease of installation; i.e. use anchor bolts with double nuts and 1 ½" space to grout after leveling.
D. Specify that work be temporarily braced during construction until the structural system is adequate to brace itself.

1.2 GENERAL TESTING
Structural tests on welds, bolts, shear studs, etc. shall be performed by a qualified independent laboratory (conforming to American Society for Testing and Methods standards) selected and paid for by the Owner in accordance with the NC Construction Manual. The University solicits proposals for the testing laboratory shortly after the receipt of construction bids. The Designer should contact the University prior to this time and provide the scope of work for testing and any other unique requirements for the proposal request. The Designer should contact Engineering and Construction Management during the design phase of the project to discuss testing frequency to be included in the specifications.

SECTION 05 5000 – METAL FABRICATIONS

PART 2 - PRODUCTS

2.1 MATERIALS
A. Steel:
1. Steel Plates, Shapes, and Bars: ASTM A 36, pickled when exposed to view.
2. Cold-Formed Steel Tubing: ASTM A 500, Grade B.
3. Hot-Formed Steel Tubing: ASTM A 501.
4. Hot-Rolled Carbon Steel Bars: ASTM A 575, Grade as selected by fabricator.
5. Steel Plates to be Vent or Cold-Formed: ASTM A 283, Grade C.
9. Steel Pipe: ASTM A 53, type as selected, Grade A, black finish unless galvanizing is required; standard weight (Schedule 40), unless otherwise shown or specified.
10. Steel Wire Rope: ASTM A 475, plastic covered zinc-coated steel wire strand, size and number wires shown. Proved “Common” grade with Class B zinc-coating unless otherwise shown or specified.
11. Cold-Finished Steel Bars: ASTM A 108, Grade as selected by fabricator.

2.2 FASTENERS
A. Provide zinc-coated fasteners, with galvanizing complying with ASTM A 153. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.
B. Standard Bolts and Nuts: ASTM A 325, Grade A, regular hexagon head.
C. Lag Bolts: FS FF-B-561, square head type.
E. Plain Washers: FS FF-W-92, round, general assembly grade carbon steel.
F. Lock Washers: FS FF-W-84, helical spring type carbon steel.

2.3 MISCELLANEOUS MATERIALS
A. Steel Primer Paint: Tnemec 10-99G, Green, modified alkyd rush inhibitive primer exceeding the performance requirements of FS TT-P-86d, Types I and II or equal.
B. Galvanizing Repair Paint: High zinc-dust content paint for re-galvanizing welds in galvanized steel, complying with Military Specifications Mil-P-21035 (ships).
C. Anti-Slip Surfacing: 3M Company “Safety-Walk,” Black color with adhesive recommended by manufacturer for substrates indicated.

2.4 FABRICATION
For the fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding or welding and grinding prior to cleaning, treating, and application of surface finishes and including zinc coatings.

2.5 ROUGH HARDWARE
Furnish custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes for framing and supporting and anchoring Project Work, unless specified to be provided under other Sections of the Specifications. Provide with hot-dipped galvanized finish unless otherwise noted.

2.6 MISCELLANEOUS STEEL TRIM
Provide shapes and sizes as required for the profiles shown. Except as otherwise noted, fabricate units from structural steel shapes and plates and steel bars with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cut outs, fittings, and anchorages as required for coordination of assembly and installation with other work.
2.7 GRATINGS

A. Provide grating platforms, platform frames, hangers, connections, and fasteners as indicated and required. Provide all hangers, structural connections, and fasteners required for platforms and to supporting structure as indicated. Provide one shop coat PMS 349 modified alkyd rust-inhibitive primer as specified after fabrication.

B. Provide banded metal bar grating as shown on the Drawings, complying with the NAAMM "Metal Bar Grating Manual" and as specified herein.

C. Grating shall be provided complete with angle frames where indicated on the Drawings. Frames and fastening devices shall be of same material and finish as grating being fastened.

D. Notching of bearing bars at supports to maintain elevations will not be permitted.

E. Provide miscellaneous structural steel framing and supports as required to complete the work.

2.8 STEEL AND IRON FINISHES

A. All exterior ferrous metals shall be aluminum or hot-dip galvanized after fabrication. Field welds shall be ground and have cold galvanizing applied.

B. Clearly define limits and type of paint for metal elements including primers. Shop painting is preferred. Preparation methods prior to applications of primers and paints shall be described in the specifications.

1. Shop Painting: Shop paint miscellaneous metal work, except those members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.

2. Remove scale, rust and other deleterious materials before the shop coat of paint is applied. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 “Hand Tool Cleaning.” Remove oil, grease and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning.”

3. Apply one shop coat of metal primer paint to fabricated metal items, except apply two coats of paint to surfaces which are inaccessible after assembly or erection. Change color of second coat.

4. Brush or spray on metal primer paint at a rate to produce a uniform dry film thickness of 2.0 mils for each coat. Provide full coverage of joints, corners, edges, and all exposed surfaces.

5. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal.
SECTION 05 7300 – ORNAMENTAL RAILINGS

PART 1 - GENERAL

1.1 CODES
   All guardrails and handrails must be in compliance with the ADA Accessibility Guidelines and all governing codes.

1.2 STORAGE AND HANDLING
   Store structural steel in a manner that will prevent damage from falling objects, etc. and soiling from mud, concrete and debris. Make proper repairs if damaged or replace items where damage is extensive.

PART 2 - PRODUCTS

2.1 HANDRAIL POCKETS, SLEEVES, OR ANCHOR PLATES
   Shall be designed to shed water and prevent corrosion. Provide drawing details for installation and/or describe fabrication methods if critical to the finished product.

2.2 EXTERIOR METAL RAILINGS AND GRILLWORK:
   A. Exterior railings at steps and ramps will comply with Campus standard details (Section 3, Annex F).
   B. Railings which are an integral part of the architecture should be similar to Campus standard details (Section 3, Annex F).
   C. All railings and grillwork of painted metal will dark green, Campus standard.
SECTION 2
DIVISION 06
WOOD, PLASTICS AND COMPOSITES
DIVISION 6 – WOOD, PLASTICS, AND COMPOSITES

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

GENERAL DESIGN

1.1 GENERAL REQUIREMENTS:

A. Campus buildings vary on the use of interior woodwork depending on their function. Therefore, the University only reviews specifications provided by the architectural consultant on a project by project basis.

B. Since the University has used very little wood in the past, most specifications have been adequate. For millwork or areas exposed to view it is recommended to use wood with a moisture content of 19% or below to control shrinkage. The design shall take shrinkage into account if wood is allowed with moisture content greater than 19%.

SUSTAINABILITY

1.2 GENERAL REQUIREMENTS:

A. Certified Wood: When available, lumber and boards shall be certified by the Forest Stewardship Council (FSC).

B. Locally Available Wood: Specify wood-based materials and products harvested and manufactured within 500 miles of UNC Charlotte.

C. Recycled Plastics: Specify plastic products made from the highest practical post-consumer and then post-industrial recycled content

D. VOC Content for Installation Adhesives and Glues: Comply with the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Wood Glues: Not more than 30 g/L.
   2. Contact Adhesive: Not more than 250 g/L.

E. Provide composite wood and agrifiber products with no added urea-formaldehyde.

SECTION 06 1063 – WOOD AND TIMBER CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Provisions of the contract, including General and Supplementary Conditions and Division 1 specifications sections, apply to work in this section.

1.2 DESCRIPTION OF WORK:

A. Extent of timber construction is shown on drawings and as detailed in this manual.
1.3 QUALITY ASSURANCE:
   A. All products and construction shall comply with all applicable codes and standards specified in the front of this manual.

PART 2 - PRODUCTS

A. ROUGH LUMBER TIMBERS:
   1. All wood components shall be fabricated from Southern Yellow Pine. Dimensional members shall be No. 2 or better. All wood shall be surfaced on all sides, all edges, and ends shall have 1/8" radius.
   2. Wood shall be taken from live trees, free of sweep, rot, loose knots, wane and compressed wood. Wood shall be smooth and relatively free of excessive splinters, checks and splits. Excessively rough, split or checked members shall be rejected.

B. PRESERVATIVE TREATMENT:
   1. All wood components shall be pressure treated to a net retention of 0.40 lbs. per cubic foot except structural members in ground contact, timbers used as edging or borders, and/or retaining walls which shall be pressure treated to a net retention of 0.60 lbs. per cubic foot.

PART 3 - EXECUTION

3.1 TIMBER BORDERS:
   A. Construct as shown on details in this manual, on existing grade if possible. Hand dress bedding to uniform grade if required. Timbers shall be 8’ or longer as much as possible. No section shall be less than 4’ in length unless otherwise specified. Joints shall be lap joints as detailed in this manual.

3.2 TIMBER RETAINING WALLS:
   A. Construct as shown on details in this manual and described herein. Walls are to be constructed with tightly fitting timbers, 8’ or longer where possible. No timber shall be less than 4’ in length unless otherwise specified.
   B. Filter fabric, porous backfill and structural backfill shall be placed as wall goes up. Ties and deadmen shall be placed and surrounded by properly compacted fill as wall is constructed.
   C. Wall height shall not exceed 5’4” unless approved. Where cuts or fills exceed 5’4”, a landing not less than 3” wide will be used between upper and lower walls, total maximum height of 11’-0”.

SECTION 06 4023 – INTERIOR ARCHITECTURAL WOODWORK

PART 2 - PRODUCTS

2.1 GENERAL:
   A. Standing and running trim, frames, closet and utility shelving, cabinetry and countertops. Comply with AWI Custom standards.

2.2 COUNTERTOPS:
   A. Countertops in restrooms to be solid surface material or stone.
B. Countertops in areas other than restrooms can be solid surface, stone or plastic laminate.

2.3 WARDROBE SPECIALTIES:
A. Coat and hat racks or hooks, installed in a manner not be hazardous to pedestrians, are required.
DIVISION 7 - THERMAL AND MOISTURE PROTECTION

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

SECTION 07 1000 – WATERPROOFING

PART 1 - GENERAL

1.1 QUALITY ASSURANCE
Applicators: Submit a letter from the manufacturer of waterproofing materials stating that the applicator is approved by the manufacturer for application of the waterproofing system specified. Applicator shall have a minimum of five years experience in satisfactory application of the type(s) of system(s) specified.

1.2 WARRANTY
Guarantee: Guarantee membrane waterproofing for two years with the Contractor or waterproofing sub-contractor agreeing to repair or replace work which leaks or otherwise fails to perform as required due to failures of materials or workmanship. This shall include the removal and replacement of any work which conceals the membrane work.

PART 2 - PRODUCTS

2.1 LOCATION
A. Provide membrane waterproofing at the following locations:
1. All exterior walls below-grade that enclose rooms and spaces.
2. Walls of below grade elevator pits.
3. Toilet rooms, housekeeping closets and all floors containing floor drains, except where located on slab on grade (slab on grade damp proofing is standard (6) mil reinforced polyethylene with all punctures/penetrations sealed).
4. Floors (including penetrations) of all mechanical rooms above other areas.

PART 3 - EXECUTION

3.1 APPLICATION
Before applying waterproofing, surfaces shall be completely free of dirt and loose materials, concrete fins shall be chipped back, form ties removed and honey-combs, cracks, and other voids filled. Prime surfaces and otherwise prepare as recommended by the material manufacturer. Provide a layer of a suitable membrane protection material. Take care to avoid puncturing the membrane when backfilling against waterproofed foundation wall.

SECTION 07 2100 – BUILDING INSULATION
PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS
A. In addition to compliance with the State Energy Code, construction assemblies must have the following minimum R-values:
   1. Walls: 19
   2. Built Up Roofing: 25
   3. Attic Ceiling: 30

1.2 SUSTAINABILITY
A. Batt insulation must be formaldehyde free
B. Recycled Content: Provide glass-fiber insulation with recycled content so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 30%.

SECTION 07 3113 – ASPHALT SHINGLES

PART 1 - GENERAL

1.1 SUSTAINABILITY
A. Where possible, provide roofing products that meet the following reflectivity standards:
      Solar Reflectance Index (SRI):
      a. Low sloped roof (less than or equal to 2:12): SRI of 78 or greater
      b. Steep sloped roof (greater than 2:12): SRI of 29 or greater

PART 2 - PRODUCTS

2.1 ASPHALT SHINGLES
Federal Specifications SS-S-001534 Class A, Type 1 Self Sealing Fiberglass. Shingles shall meet the requirements of Underwriters Laboratories, Inc. for Class A, I-90, wind-resistant shingles, by equaling or exceeding the requirements of UL 55B, UL 790 and UL 997. Shingle bundle wrapping shall bear the label of Underwriters Laboratories, Inc. Shingles shall be square-butt strips of uniform thickness or of thick-butt style, with internal fiberglass matting, asphalt coating and ceramic surface granules. Size of shingles shall be approximately 12" x 36", 3-tab design; weight 205 lbs. per square.

2.2 UNDERLAYMENT
Roofing Felt: ASTM D 226, asphalt saturated, organic, non-perforated, 30 lb, Type II.

2.3 ACCESSORIES
A. Roofing Nails
B. Material Galvanized Steel
C. Head Diameter 3/8"
D. Length sufficient to penetrate roof sheathing.
E. Shank 11 or 12 gauge.
F. STAPLES ARE NOT ACCEPTABLE
G. Bituminous Plastic Cement FS-SS-C-153, Asphaltic Base, Type I.

SECTION 07 4113 – METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUSTAINABILITY
A. Where possible, provide roofing products that meet the following reflectivity standards:
   1. Solar Reflectance Index (SRI):
      a. Low sloped roof (less than or equal to 2:12): SRI of 78 or greater.
      b. Steep sloped roof (greater than 2:12): SRI of 29 or greater.
C. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 60 percent.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS
Sheet Metal shall be Base and Counter Flashing SMACNA Plate as applicable or required, 26-gauge, Galvanized Metal.

2.2 ACCESSORIES
A. Concealed Flashing: Concealed flashing shall be "Fiberweb 310" thru-wall flashing as manufactured by Fiberweb International Corp., "Cop-A-Bond" 202 weight as manufactured by AFCO, Duplex "Cop-R-Flash" as manufactured by Phoenix, "Cop-R-Tex Duplex" as manufactured by York Manufacturing or an approved equal.
B. Gutters and Downspouts: Gutters and downspouts shall be 24 gauge; pre-finished aluminum in color as shown on the drawings. Provide all fasteners, elbows, screens, splashblocks and other accessories required for a complete installation of gutters and downspouts.
C. Fasteners: All nails, screws, bolts, rivets and other fastenings for sheet metal, unless otherwise noted, shall be type 304 or 305 stainless steel of size and type suitable for intended use. Nails shall be minimum 12 gauge, flat head annular-thread type, and of sufficient length to penetrate backing at least 3/4”. Galvanized steel is not acceptable.
D. Solder: Solder shall conform to ASTM Designation B 32T, 60-40 or 80-20 percent block tin and pig lead.
E. Flux: For tinning galvanized steel surfaces, use acid type flux designed especially for use in soldering galvanized steel. For re-tinted surfaces, use regular rosin type flux.

2.3 FINISHES
A. When located in the academic core, they will be standing seam. The color will be gray to match the roof of the Barnhardt Student Activities Center. If located in the vicinity of the athletic fields, metal roofs will be dark green to match the Irwin Belk Track and Field Center.
SECTION 07 4213 – METAL WALL PANELS

PART 1 - GENERAL

1.1 SUSTAINABILITY
Recycled Content of Steel Products: Provide products with an average recycled content of steel products so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 60 percent.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL PANELS
A. Refer to drawing C-017.10 for selection of architectural panels, size, seam location, and configuration.
B. Acceptable architectural panel materials are:
   1. Manufacturer: Citadel
      a. Type: glazeguard 1000
      b. Size: 5'x12''x1'' sheets with batten moldings to cap seams
      c. Color: clear stock anodized
   2. Manufacturer: Greensteel
      a. Type: typical 5-ply insulating panel
      b. Size: 5'x12''x1'' sheets with batten moldings to cap seams
      c. Color: clear stock anodized
   3. Manufacturer: Laminators Incorporated
      a. Type: System II
      b. Size: 5'x12''x1'' sheets with batten moldings to cap seams

SECTION 07 5000 – ROOFING SYSTEMS

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS
A. Design: Roof designs shall comply with the latest version of the State Construction Office’s "Roofing Design Criteria."
B. Re-roofing:
   1. The Designer shall have a core sample taken of each existing roof system to determine the materials contained in each existing system. The Designer shall not rely on previous construction documents or record documents for this information.
   2. Guarantee: Insert the following into the Supplementary General Conditions involving roofing of existing structures: "The Contractor shall be responsible for all repairs of water damage to the building, including furnishings, occurring during the construction phase of the project. The Designer shall survey, in the presence of the owner and contractor, existing water damage prior to construction and prepare a written and photographic record of this survey with copies distributed to both the owner and contractor. The contractor shall be responsible for all damage not so documented."
C. The Designer shall have a roofing analysis report made of the existing roof materials to determine the presence of asbestos. The Construction Documents shall include the complete report and interpretation.
1.2 SUSTAINABILITY
   A. Where possible, provide roofing products that meet the following reflectivity standards:
      1. Solar Reflectance Index (SRI):
         a. Low sloped roof (less than or equal to 2:12): SRI of 78 or greater
         b. Steep sloped roof (greater than 2:12): SRI of 29 or greater
   C. Preference should be given to roofing systems that are able to be recycled.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS
   A. For low-sloped roofs, the top surface color shall be white: this may be achieved with a white
      roofing membrane or white smoothly rounded (river washed) stone ballast.
   B. Drainage: Extra slope to roof drains should be provided two feet around the drain. Prior to final
      inspection, the contractor shall conduct a flood test of the roof in the presence of the Designer
      and the Owner to verify drainage.
   C. Flat membrane roofs - will be white roofing materials only.

SECTION 07 6200 – SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 QUALITY ASSURANCE
   Specifications for products included in this Section and accessories shall meet the ANSI,
   SMACNA and ASTM criteria for each material. Use flashing recommended by manufacturer as
   part of roofing system where applicable.

1.2 SUSTAINABILITY
   Recycled Content of Steel Products: Provide products with an average recycled content of steel
   products so post-consumer recycled content plus one-half of pre-consumer recycled content is
   not less than 60 percent.

PART 2 - PRODUCTS

2.1 MATERIAL
   Flashing to be either Stainless steel or copper, unless otherwise approved by UNC Charlotte

SECTION 07 7000 – ROOF ACCESSORIES

PART 2 - PRODUCTS

2.1 ROOF SCUTTLE
   A. Scuttle shall be Type ‘S’ by The Bilco Company, RSL-3036 by Naturalite Company, RD-1 by
      Milcor Limited Partnership or approved equal.
1. Clear opening (inside of curb) shall be 2’-6” x 3’0”.
2. Cover shall be 11 gauge aluminum with 3” neatly welded beaded flange, insulated with 1” fiberglass, fully covered and protected with an 18 gauge aluminum liner.
3. The roof curb shall be 12” in height and be constructed of 11 gauge aluminum. The curb shall be formed with an integral predrilled 3½” flange for securing to the roof deck.
4. The curb shall be equipped with an integral 11 gauge aluminum cap flashing, fully welded at the corners for weather tightness. All clips, rope packing, etc. required for a proper fit and installation as described by the scuttle manufacturer shall be provided and installed by the Contractor.
5. Insulate the side walls of the curb with 1” thick rigid fiber board insulation (provided attached to the curb by the Manufacturer).
6. Scuttle shall be completely assembled with heavy duty hinges, spring operators to assist opening, a positive snap latch with turn handles and padlock hasps inside, and thermoplastic rubber gasket.
7. The cover shall be equipped with an automatic hold-open arm with vinyl grip handle for easy release and one hand control of cover to its closed and latched position.

SECTION 07 9200 – JOINT SEALANTS

PART 1 - GENERAL

1.1 SUSTAINABILITY

Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

Joint Sealers Indicate that caulk selection by the designer shall not be limited to the manufacturer’s standard list of colors.

SECTION 07 9500 – EXPANSION CONTROL

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

Building Expansion joint covers on interior floors shall be of color and texture that matches adjacent carpet or floor covering. Aluminum covered joints shall be avoided.
DIVISION 8 - OPENINGS

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

DOORS

1.1 GENERAL
A. All entrance doors and all exterior doors shall be “hinge-type.” Sliding doors are not acceptable unless specifically requested by the University. Every new building shall have mechanically assisted door operators at primary entrances. The mechanical mechanisms shall be activated by plunger buttons located approximately 10’ to the side of the door to discourage unnecessary use of the automated systems.
B. The plunger button shall be located 12” away from building corners, overhang trim, or stationary and permanent objects that prevent individuals from engaging the plunger.
C. The doors at primary entranceways shall be of “human scale” and not exceed 84” height and 42” width unless there is a pragmatic reason to install larger doors. Variations shall be brought to the attention of the UPM.

SECTION 08 1113 – HOLLOW METAL DOORS AND FRAMES

1.2 QUALITY ASSURANCE
A. All steel doors, door frames, miscellaneous frames, and transoms when required, which are specified in this Section, shall be by the same manufacturer.
B. Fire-Resistance Classification:
   1. Wherever a fire-resistance classification is shown, scheduled or required, provide materials which have been tested and listed by building code rating authority for rating construction assembly.
   2. Wherever a fire-resistance classification is shown or scheduled for hollow metal work, label each fire door assembly, complete with type of fire door hardware to be used. Identify each fire door and frame individually with UL labels, indicating applicable fire rating of both door and frame.
   3. Construct and install assemblies to comply with NFPA Standard No. 80 and as herein specified.
   4. Hardware reinforcement of labeled doors and frames shall conform to requirements of labeling agency. In addition the doors and frames shall conform to applicable local codes and regulations of authorities having jurisdiction.

1.3 SUSTAINABILITY
A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 60 percent.
PART 2 - PRODUCTS

2.1 MATERIALS

A. Doors shall be manufactured from cold rolled steel - ASTM A 366.
B. Commercial quality, carbon steel sheets, free from scale, pitting, and surface defects. Gauges shall be U. S. Standard.
C. Steel for face sheets of hollow metal doors, and for broad frame faces, shall be stretcher-leveled.
D. Sheet steel for exposed surfaces of doors and frames for exterior openings shall be hot-dipped galvanized, phosphatized steel sheet with not less than light commercial zinc coating in accordance with ASTM A 526.

2.2 STANDARD HOLLOW METAL DOORS

A. General:
   1. Doors shall be manufactured in accordance with ANSI/SDI Publication 100 and the documents referenced therein.
   2. Doors shall be of the types and sizes indicated and shall be strong, rigid, neat in appearance, free of defects, warps, and buckles, and with corner bends true, straight, and of minimum radius for the metal gauge used.
   3. Unless noted otherwise, doors shall be 1-3/4" thick.

B. Exterior Doors:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty)
   2. 16 gauge minimum.
   3. Non-labeled exterior doors shall have foamed-in-place insulation which completely fills all areas except those areas to receive the specific schedule hardware. Fibrous type insulation shall not be used.
   4. Exterior doors shall have a flush end channel (closure) at top rail which shall be sealed against moisture entry. Openings shall be provided in bottom recessed end channel (closure) to permit drainage of any entrapped moisture.
   5. All exterior doors shall be provided with weatherstripping.

C. Interior Doors:
   1. Level 3 and Physical Performance Level A (Extra Heavy Duty)
      a. 16 gauge minimum.
   2. Interior Metal Doors shall have the following Sound Deadening Materials:
      a. Non-Labeled Doors
         Non-combustible mineral wool (minimum 3 lbs. per cu. ft. density), or other acceptable non-combustible sound deadening material. Provide 100% coverage.
      b. Labeled Doors
         D. UL approved insulating materials for designated class.

2.3 STANDARD HOLLOW METAL FRAMES

A. Frame Construction (All types):
   1. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
   2. 16 gauge minimum.
   3. Fully welded units with integral trim, conforming to gauges, sizes, and profiles noted, complete with cutouts and reinforcing in accordance with approved shop drawings.
   4. Head and jamb members of each frame shall be carefully butted, lapped, or mitered together with contact edges tightly closed and trim aligned to fit straight, true and level. Weld corner joints together accurately with welds on exposed surfaces ground smooth and flush and rendered inconspicuous.
5. Where frames are installed in masonry walls or indicated to be filled with grout, provide steel mortar guards over mortised hardware reinforcements.

6. Rubber silencers: Drill stops to receive three silencers on strike jambs of single-swing frames and four silencers on heads of double-swing frames. Install plastic plugs to keep holes clear during construction. Silencers to be installed after final paintings.

7. Spreaders: Furnish all frames with a temporary, removable steel spreader at bottom. Do not remove until frames are securely anchored in place, square, and plumb.

8. Properly cut frames for 4-inch strike plate; reference Standard Detail A01.1.

9. Provisions for Hardware: Prepare frames at factory for installation of hardware. Frames shall be mortised, reinforced, drilled and tapped to templates to receive mortised hardware; frames to receive surface-applied hardware shall be provided with reinforcing plates only.

10. Welded Frames:
   a. Corner joints of frame and stops shall be mitered with contact edges closed tight and continuously welded. Joints shall not be visible. Exposed welding shall be ground smooth and flush with the surrounding surface making the welds invisible.
   b. The use of "body putty" and other similar materials shall not be permitted. A temporary steel shipping bar shall be securely attached to the bottom of each frame. Welded frames shall be used for:
      1) All exterior hollow metal frames.
      2) Locations specifically noted on drawings.
      3) Where required by code as related to the fire rating of the wall.

11. Labeled Frames:
   a. Fire resistance ratings in hours shall be as indicated. Frames shall have the testing facility label securely attached to the hinge jamb and in such a position it cannot be seen when the door is in the closed position.

2.4 FRAME ANCHORS

A. Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, of gauge scheduled.

1. Anchors: Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, of gauge scheduled.
   a. Jamb Anchors: Provide a minimum of 3 anchors for each jamb. Locate anchors opposite top and bottom hinges and midway between, with maximum spacing of 24" between anchors.
      1) Provide a minimum of 3 anchors per jamb for frames 7'0" high and under, and 1 additional anchor for each additional 30" or less of frame height. Position anchors at level of butts and locks, and as indicated. Jamb anchors shall permit passage of conduit as required by job conditions, except at rated frames and as noted.
      2) Masonry: Provide anchors of corrugated or perforated steel straps or 3/16"diameter steel wire, adjustable or T-shaped, minimum10" length.
      3) Stud Partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to wood studs with nails, to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding.
   b. Floor Anchors: Provide floor anchors drilled for 3/8" anchor bolts at bottom of each jamb member.

2. Gauges for hollow metal work shall be U.S. Standard. The following are minimum gauges to be used:
   
<table>
<thead>
<tr>
<th>Item</th>
<th>Gauge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamb anchors</td>
<td>16</td>
</tr>
<tr>
<td>Floor anchors</td>
<td>11</td>
</tr>
<tr>
<td>Structural reinforcing</td>
<td>12</td>
</tr>
<tr>
<td>Stirrups for adjustable</td>
<td>14</td>
</tr>
<tr>
<td>Louver frames</td>
<td>18</td>
</tr>
</tbody>
</table>
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f. Louver blades 20
g. Hardware reinforcement
   1) Hinges, pivots, butts 3/16" plates
   2) All other 12

2.5 STOPS AND MOULDINGS
A. Door Sight Glass: Provide moldings around glass panels. Provide non-removable moldings on the outside of exterior doors and on non-secure side of interior doors. Other moldings may be stationary or removable.
B. Gauge of Removable glass stops, frame stops and beads: 18 gauge.

2.6 FABRICATION
A. Doors:
   1. All welds on the exterior shall be ground smooth and flush with the surrounding surface making the welds invisible. The use of "body putty" and other similar materials shall not be permitted.
   2. Door faces shall be without concave areas and convex areas when viewed no closer than 5'0" at any angle.
B. Coordinate the undercut of the door bottom on all exterior doors in order that the gap between the door bottom and the surface over which it stands in the closed position will be no greater than 1/4" and no less than 1/8".
C. Hardware:
   1. Unless shown otherwise on the drawings, hardware mounting heights shall comply with Standard Detail A01.1: Pulls, Pull Plates, and Push Plates shall be mounted 42" AFF to center.
   2. Where "cylindrical" type locks, latches, deadbolts, night latches, etc., are to be installed, provide proper SDI cylindrical lock reinforcement for support of the latch bolt and deadbolt mechanism.
   3. Doors shall be manufactured for specific hardware to be provided and with "latch" and "push-pull" stiles properly beveled.

2.7 FINISHES
A. Steel Priming shall be as follows: After fabrication and assembly, all steel products shall be cleaned, phosphate treated, and coated with a baked-on, rust-inhibitive primer, 2 mils thick dry minimum. Concealed surfaces in contact with masonry or concrete shall be coated with bitumastic paint conforming to SSPC No.
B. Shop Coating
   2. Zinc-Rich Primer: Equivalent to Red Oxide (Cat. No. 41820) as mfg. by Devoe Paint Div. of Celanese Coatings Co., or approved equal.

SECTION 08 1416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUSTAINABILITY
A. Certified Wood: When available, lumber and boards shall be certified by the Forest Stewardship Council (FSC).
B. Locally Available Wood: Specify wood based materials and products harvested and manufactured within 500 miles of UNC Charlotte.

C. VOC Content for Installation Adhesives and Glues: Comply with the following limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Wood Glues: Not more than 30 g/L.
   2. Contact Adhesive: Not more than 250 g/L.

D. Provide composite wood and agrifiber products with no added urea-formaldehyde.

PART 2 - PRODUCTS

2.1 CONSTRUCTION
Doors shall be flush type, solid core. Core, rails, and stiles shall be glued together to form solid slab. Doors shall be 1-3/4” thick and shall be width and height shown on DOOR SCHEDULE. Doors shall be equal to Weyerhaeuser “Marshfield Series” Core DPC-1 or approved equal.

2.2 FACE VENEER
Face Veneer shall be standard thickness, thoroughly dried, tapeless, spliced with Type II adhesive per CS 35, laid at right angles to cross banding. Species shall be premium grade, rotary cut birch or red oak veneer as specified.

2.3 CROSS BANDS
   A. Cross Bands shall be thoroughly oven-dried hardwoods, 1/16” minimum thickness extending the full width of the door and laid with the grain at right angles to the face veneer.
   B. Edge Bands: The stile edge bands shall be a two-ply edge band laminated to the core on four (4) sides with Type II highly water-resistant glue, using the high frequency method. The outer stile shall be of the same or compatible species as the face. Two-ply stiles of mill-option hardwoods shall be used. Stiles must measure a minimum of 1-1/4” after trimming, top and bottom rails, 1-1/8”. Finger jointing in outer stiles shall not be permitted.

2.4 ADHESIVES
Cross bands and faces shall be laminated to the cores with Type I, 100% waterproof Melamine Fortified Urea glue, by the hot plate process.

2.5 CORE
   A. Weyerhaeuser Timblend with average density of 28-32 lb. per cu. ft.
   B. Core shall comply with ANSI A208.1, Mat Formed Particleboard.

2.6 OPENINGS
Factory cut openings for glass. See drawings and Standard Details for dimensions. Provide fire rated metal lite beading for all openings.

2.7 FINISHING
Doors shall be prefit. All doors shall be job finished.
2.8 MANUFACTURER'S MARKINGS
Any manufacturer's markings such as colored pegs shall occur on the top hinge edges of the doors only.

SECTION 08 3323 – OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 PERFORMANCE REQUIREMENTS
A. All materials installed by the Contractor shall be approved by a certified testing agency approved by the North Carolina Department of Insurance. All materials shall meet N.C. State Building Codes, and should there be any discrepancies between design and code, the more stringent requirement shall apply.

1.2 SUSTAINABILITY
A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIAL AND CONSTRUCTION – GENERAL
A. All materials shall be new and shall be manufactured for the intended use. No manufacturer's or installer's logos or other decals or signs will be attached to the door or any part thereof without authorization of the owner.
B. Provide perimeter gasketing on guides and bottom bars and field installed at the head of the opening. UL listed gasketing shall bear the label of an approved certified testing agency. It shall be installed to effectively close the perimeter gaps, but not so tight as to affect the automatic closing of the door under alarm or test conditions.
C. Brackets shall be steel plates to support counterbalance assembly, form end closures and provide mounting surface for securing ends of hoods.

2.2 DOOR CURTAIN MATERIAL AND CONSTRUCTION – ROLLING DOORS
A. Curtain to consist of interlocked flat-faced slate, 1/2"deep, #22 gauge primed steel. Furnish matching bottom bar angle complete with UL approved vinyl astragal smoke seal.
B. Guides to be #12 gauge primed steel. Attach to jamb with 3/8" bolts, 18" maximum spacing. Provide trim to eliminate exposed fasteners.
C. Equip door for latching by slide bolts.

2.3 DOOR CURTAIN MATERIAL AND CONSTRUCTION – COILING DOORS
A. Fire door assemblies may be mounted on masonry walls of concrete, brick or filled concrete block (CMU) with expansion anchors. If the hollow CMU blocks are not concrete filled within 18" of the wall opening, the guides must be thru-bolted to hollow block walls with a crush plate on the opposite side of the wall. Guides mounted to soft brick walls must be thru-bolted with a 3" diameter flat washer on the opposite side of the wall.
B. The guide assemblies may be mounted to structural steel jambs that are an integral part of the masonry wall. Only face mounted guide wall angles may be welded to structural steel jambs on masonry walls, provided the welding rod and welding procedure are as specified in the Manufacturer’s installation instruction for rolling fire doors, and provided that the structural steel jamb is an integral part of the masonry wall and linked to the wall by rebar. Between jambs, mounted guide wall angles must be bolted to structural steel jambs on masonry walls.

C. Guides shall be roll formed steel shapes on doors through to 12’ wide, three structural steel angles between jamb mounts.

D. Bottom bars are two structural steel angles. Sloping bottom bars are available for uneven floor conditions with a limit of 1/2” per foot of opening width. Bottom weather seals are optional.

E. Curtains shall consist of interlocking curved or flat profile slats with end locks to maintain alignment. Slats shall be roll formed galvanized steel and receive a rust-inhibitive roll-coating process which includes bonderizing, baked-on prime paint, and baked-on polyester topcoat paint in gray or tan.

F. Hoods and Accessories
   1. Hood shall be #24 gauge primed galvanized steel. Intermediate supports shall be provided as required to prevent excessive sag. The hood shall be equipped with a thermally controlled, internal, galvanized steel flame baffle, when required.

G. Counterbalancing Mechanism
   1. Counterbalance shaft assembly shall consist of steel pipe capable of supporting curtain load with maximum deflection of 0.03” per foot of width and helical torsion spring assembly designed for proper balance of door to insure that effort to operate door will not exceed 15 pounds. Provide wheel for applying spring torque and for future adjustment located outside end bracket.

2.4 MANUAL DOOR OPERATORS
A. Operation shall be push-up.

B. Rolling fire and counter fire door shall be equipped with a speed governor activated by melting of either of two (2) fusible links (one on each side of wall) and a closure system which will cause the door to close on a smoke/fire alarm signal. The safety edge will cause the door to stop upon meeting an obstruction and will cause the door to close when the obstruction is removed. Doors shall close at an average speed of not less than 6 inches per second and not more than 24” per second.

2.5 ELECTRIC DOOR OPERATORS
The time delay release device shall be UL listed; power loss, fail safe and FM approved for use in conjunction with the Manufacturer’s rolling steel fire doors and counter fire doors, and meet all the latest UL 864 requirements. The device shall respond to emergency conditions through smoke and fire detection devices and alarm systems. The unit can be positioned for operation with the mechanism pulling to the side or downward with a hold/release rating of 40 lbs. and is vibration resistant. The device shall provide a 10-second delay on alarm signal and a 10-second delay on power loss to activate closure of the fire door.

2.6 FINISHES
Galvanized steel curtain slats to be phosphate treated and finished with a baked-on prime coat of paint. Galvanized steel hood and all other exposed ferrous surfaces shall be primed.

SECTION 08 4113 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
PART 2 - PRODUCTS

2.1 FINISHES
   A. Exterior window frames shall have baked-on enamel paint finish. Color is to match University standards.
   B. Frames should be white baked-on enamel matching the color of the Fretwell Building.

SECTION 08 4413 – GLAZED ALUMINUM CURTAIN WALLS

PART 2 - PRODUCTS

2.1 FINISHES
   A. Exterior window frames shall have baked-on enamel paint finish. Color is to match University standards.
   B. Frames should be white baked-on enamel matching the color of the Fretwell Building.

SECTION 08 5000 – WINDOWS

PART 2 - PRODUCTS

2.1 FINISHES
   A. Exterior window frames shall have baked-on enamel paint finish. Color is to match University standards.
   B. Frames should be white baked-on enamel matching the color of the Fretwell Building

PART 3 - EXECUTION

3.1 FIELD QUALITY CONTROL
   A. Testing Services: Testing and inspecting of representative areas to determine compliance of installed system with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
      1. Water Spray Test: AAMA 501.2 tests to be performed at 5%, 50% and 90% completion to show construction is watertight.

SECTION 08 7100 – DOOR HARDWARE

PART 2 - PRODUCTS

2.1 MATERIALS
   1. Within each type of device, Hinges, Exit Devices, Locksets, and Closers shall be furnished totally by one manufacturer unless schedule indicates otherwise.
   2. Fasteners shall be concealed whenever possible. Hardware shall be furnished with Phillips head machine screws. For exposed fasteners on interior in bronze or brass, use matching color and material for fasteners. For all other exposed fasteners on interior,
use stainless steel except where noted specifically otherwise. Furnish stainless steel screws for all exterior work.

2.2 HINGES

A. Doors shall include hinges as follows:
   1. Provide 1-1/2 pair per door of average height. For doors under 5', one pair will suffice. Doors 90" or taller in height shall have (2) two pair. Dutch doors shall have a minimum of two pair.
   2. All hinges shall be ½ Mortis, ½ Surface heavy duty continuous type unless specified otherwise.
   3. Hinge size shall be 4-1/2 x 4-1/2, .134 gauge for all doors up to and including 36" wide. Doors over 37" wide and less than 42" shall have 5" x 4-1/2" .146 gauge scheduled. Doors over 42" shall have 5" x 4-1/2" 4 ball bearing hinge.190 gauge.
   4. Hinges shall be full mortise type generally.
   5. Exterior out-swinging doors shall have 4 non-removable pin (N.R.P.) ball bearing hinges .190 gauge hinges sized as paragraph 3 above in brass, bronze, or stainless steel. Stainless shall be scheduled unless finish dictates otherwise.
   6. Interior doors shall have steel hinges.
   7. Provide ball or Oilite bearing hinges on all doors with closers and on all metal doors, and on doors over 37" wide and all high frequency openings. Other doors shall be plain bearing.
   8. Provide hinges with non-removable pins and/or security studs for all out-swing exterior doors and high security interior controlled doors.
   9. Products by Hager, McKinney, or Stanley will be considered equal.
10. Exposed Hinges: All doors with exposed hinges on the outside of the room (such as doors which swing into halls) shall have continuous non-removable hinges. All exterior doors shall have non-removable hinges. The non-removable hinges in all cases shall be removable with Allen wrenches.

2.3 LOCKS AND LOCKSETS

A. Door knobs shall be the lever style as indicated on the Key Plan presented on the drawings.
B. All locksets will allow emergency locking from inside.
C. Without exception, locksets shall be Schlage 6-pin. Prior to ordering, consult with the Designated Representative to select the keyway. If keyway is not shown on the drawings, DO NOT order lockset without confirmation.
D. Door knobs for all interior doors shall be:
   1. Lock-type Schlage D53PD-69-RH0. All latch bolts shall have dead latches.
   2. Passage Schlage D105-RH0-626. All latch bolts shall have dead latches.
   3. Door strike plates shall be 4-inches height.

2.4 EXIT DEVICES

A. Exterior Hardware: Doors shall be equipped with one of the following:
   1. Von Duprin Series 98/99
   2. American Device Series 6306
   3. Sargent Series 6800
B. Panic Hardware: All exterior doors shall be on hinges and equipped with Panic Bar Hardware. Thumb latch locks are not acceptable.
2.5 KEYING
A. Key Plan: The Contractor shall provide locks which have been pinned according to the Key Plan approved by the University Locksmith and shown on the drawings.
B. Key Delivery: All keys shall be delivered by the General Contractor Superintendent personally to the University Project Manager.
C. Locksmith: The Contractor shall provide a complete lock-system, fully operational, which can be operated with the keys specified. All locksmith work necessary to provide the complete, operating system shall be provided by the Contractor.

2.6 CLOSERS
A. Exterior Doors: Shall be equipped with interior mount top jamb mounted parallel arm closers. Exterior door stops shall be LCN 4020/4110 Cush-N-Stop. Interior closers shall be installed only at locations indicated on the drawings and where required shall have full covers, back check adjustment, and shall be delayed action as required by code or indicated in the remarks column of the Door Schedule. The closers shall be LCN 4041 Super Smooth or app. Equal. All closer arms shall be of type required to provide maximum permissible swing of door. Size scheduled shall be as required by manufacturer's size chart. Closers shall be mounted parallel arm wherever closer may strike a wall or the arm projects into a corridor.

2.7 STOPS
A. All interior and exterior doors shall have door stops or mechanisms in door closers which act as door stops.
B. Wall stops shall be installed where possible. Where the wall stops cannot be used effectively, the Designated Representative will approve locations for floor stops.
C. For wall stops, specify Glynn Johnson MS3LD (or approved equal) and for floor stops, specify Glynn Johnson Dome Type FB13. (or approved equal)
D. Use carpet risers as required. All wall stops shall be installed with proper blocking within the wall.

2.8 HOLDERS
A. Door Holders shall be installed at locations shown on the drawings and shall be:
   1. Exterior doors shall have Rixson Checkmate surface mounted 9 series - bronze arm and channel.
   2. Interior doors shall have Rixson Checkmate concealed 5 series or surface 55 series. Where doors are over 200 lbs., use Rixson Checkmate No. 9 in steel.

2.9 GASKETING
A. Weather-strip: All exterior doors shall be equipped with Zero 316 seal or equal. Provide door sweep Zero 39 when flat thresholds are detailed. Products of equal design, finish, and function manufactured by Baldwin, Ives, Rockwood, Quality, or Trimco will be considered equal.
2.10 THRESHOLDS
A. Thresholds shall be as shown on the drawings. Unless noted otherwise, they shall be aluminum as manufactured by Pemko, 2005AVS (or approved equal) for water resistant applications and Pemko 171A (or approved equal) for all other applications.

B. Concealed door closers shall have covers which match thresholds. Products of equal design, finish, and function manufactured by Baldwin, Ives, Rockwood, Quality, or Trimco will be considered equal. Provide carpet driver fire stop thresholds at all rated doors where carpet extends through the door opening. Divider strip shall be National Guard Products No. 414 or 414-DKB (certify with Designated Representative) or equal.

2.11 SLIDING DOOR HARDWARE
Automatic Sliding Doors: Automatic sliding doors are not acceptable unless specifically requested by the University Project Manager.

2.12 OPERATORS
A. All visible materials shall match the existing storefront finish.

B. All materials shall be new and shall be manufactured for the intended use. No manufacturer's or installer's logos or other decals or signs will be attached to the storefront without authorization of the Owner.

C. All materials installed by the Contractor shall be new and UL Approved. All materials shall meet N.C. State Building Codes, and should there be any discrepancies between design and code, the more stringent requirement shall apply.

D. The operating device installed shall allow for manual operation for persons entering the building who do not use the activating button(s). Such manual operation shall be possible without noticeable additional force by the user (compared to the force necessary prior to the installation).

1. Pneumatic Door Openers:
   a. The Owner will provide and install pedestrian guide rails, if needed.
   b. Control Boxes shall contain the system air pump, valve(s) and electronics. Each circuit shall control one automatic equalizer operator.
   c. Operators shall be pneumatically powered for the automatic equalizer system. The unit shall contain a built-in over speed control to prevent excessive speeds as the result of improper field adjustments. The operator shall slowly open the door, hold it at 90°, and then apply full spring power to close the door. The operators shall meet ADA requirements, ANSI Standards A159.19 and A117.1, and have been tested to over one and a half million operating cycles.
   d. The door controlling devices shall be constructed with two integral operating chambers, a pneumatic cylinder actuator and a hydraulic door closer cylinder. The actuator shall be two piston tandem constructions. Cylinders shall be of high strength cast iron construction, be fully hydraulic, and shall have rack and pinion action. The shaft diameter shall be a minimum of 11/16 of an inch (17 mm). Closers shall utilize full complement bearings on the pinion shaft, and pistons shall be hardened.

2. Electro-Magnetic Operators:
   a. Control Boxes shall contain the transformer, relays, rectifiers and other electronic components. Each circuit shall control one automatic operator.
   b. Operators shall be electro-mechanically powered for the automatic swing door system. The unit shall contain a built-in over speed control to prevent excessive speeds as the result of improper field adjustments. The operator shall slowly open the door, hold it at 90°, and then apply full spring power to close the door. The operators shall meet ADA requirements, ANSI Standards A159.19 and A117.1, and have been tested to over one million operating cycles.
c. The door controlling devices shall be completely assembled and sealed unit which shall include helical gear-driven transmission, overriding clutch, (to provide easy manual operation, spring-close) mechanical spring and bearings, all located in cast aluminum housing and filled with special lubricant including necessary transformer, cant for extreme temperature conditions. Attached to transmission system shall be a DC shunt-wound permanent magnet motor with sealed ball bearings. Motor shall operate from 115-volt supply and require less than 5 amps at full power stall. Complete unit shall be resilient mounted with provisions for easy replacement, without removing door from pivots or frame.

2.13 MISCELLANEOUS

A. At all new doors, Contractor shall install ½" diameter rubber silencers, (minimum 3 per door) Glynn Johnson #64 or equal. Products of equal design, finish, and functions as manufactured by Baldwin, Ives, Rockwood, Quality, or Trimco will be considered equal.

B. All exterior screws and fasteners shall be Stainless Steel, preferably with “Phillips” heads.

SECTION 08 8000 – GLAZING

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Manufacturer's Certification: Contractor shall provide a signed certification by the glass manufacturer that the completed glass and frame installation is in compliance with manufacturer's recommended procedure and that the glass manufacturer's warranty is valid. Prior to installations, Contractor shall notify the glass manufacturer of installation schedule to allow for manufacturer's inspection throughout installation.

B. Etched Insignia: Every panel of glass shall have the manufacturer's insignia identifying the type of glass. Labels must be permanently etched and visible when project is complete. Wire glass is not required to have the etched insignia.

C. Manufacturer's Labels: Labels showing strength, grade, thickness, type and quality will be required on each piece of glass. Labels must remain on glass until it has been set in inspection. In addition to Manufacturer's Labels wire glass must comply with the requirements of the Underwriter's Laboratories, Inc.

PART 2 - PRODUCTS

2.1 SEALANTS.

A. Sustainable Requirements:
   VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.2 MISCELLANEOUS ACCESSORIES

Spacer Blocks: Material sufficiently firm to hold glass in position and compatible with glazing sealant.
2.3 GLASS TYPES
A. Glass will be clear. A slight tint is acceptable if it allows clear views into the building. The intent is for passersby to be able to see activity within the building.
B. Wire glass requirements as listed below were deleted due to safety concerns relating to injury that occurs if when glass is broken.
C. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
D. Wire Glass is unacceptable.
E. Insulating Glass:
   1. Made up of 1 panes of glass, with dehydrated air automatically sealed, and surrounded by metal channel.
   2. Designated as Type G-1 on Drawings: Interior panes shall be 1/4" thick clear tempered float glass.
   3. Designated as Type G-2 on Drawings: Interior panes shall be 1/4" thick wire glass.
F. Tempered Glass (Designated as Type G-1 on Drawings): Tempered clear float glass. One of the following:
   1. Tempered Glass as mfd. by ASG Industries, Inc.
   2. Tuf-Flex as mfd. by LOF.
   3. Herculite as mfd. by PPG Industries, Inc.
   4. Or approved equal.
G. Replacement Glass: Replacement glass must be installed with new resilient gaskets at locations where gaskets existed prior to replacement.

SECTION 08 8300 – MIRRORS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE
A. Must be of high quality providing maximum performance and durability.
B. It must exceed federal specification #DO-M-00411C made from primary float (Type 1) clear (Class 1) glass in accordance with ASTM C1036-85 and federal specification DD 9-451 d with QZ quality.

PART 2 - PRODUCTS

2.1 MATERIALS
A. BMP 1,000 or equal.
B. The backing must consist of a layer of copper electrolytically deposited directly over the silver surface with a single layer of protective mirror backing paint applied over the metal stratum.
C. The mirrors must comply with salt spray testing in accordance with ASTM B117 with quality in accordance to DDM-411C it must pass 1800 hours of salt spray and 1½ mm edge creep penetration.

2.2 SEALANTS
A. Sustainable Requirements:
SECTION 08 9000 – LOUVERS AND VENTS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS
   A. Aluminum gable roof vents shall be provided and installed by the Contractor in accordance with industry standards.
   B. Each Bidder shall reference attached drawings for details of construction.
   C. The related details on the drawings are considered to be a part of specified job requirements.

PART 2 - PRODUCTS

2.1 MATERIALS
   Gable roof vents shall be “airolite” Aluminum Vents available from Kuester Sales Co., Inc., or approved equivalent. Bidders may submit alternate aluminum gable vents, but should provide proposed vent information and literature along with their bids for full consideration.

2.2 FINISHES
   Gable vents shall have a dark brown baked enamel finish,

2.3 ACCESSORIES
   A. Insect screen and six square feet of free area each.
   B. All fasteners shall be manufactured for the intended use and shall be non-corrosive. All materials installed by the Contractor shall be new. All materials shall meet NC State Building Codes and should there be any discrepancies between design and code, the more stringent requirements shall apply.

PART 3 - EXECUTION

3.1 INSTALLATION INSTRUCTIONS
   A. The Contractor shall furnish all equipment, materials, and labor for the construction of the exterior roof outlined by the drawings and in this specification.
   B. The Contractor shall take all means necessary to protect existing roof surfaces, finishes, and adjacent walls from damage during the vent replacement by installation of vancas tarps and polyethylene.
   C. All canvas tarps, polyethylene, tape, etc., shall be removed upon completion and the job site left in a clean condition. Any damage areas shall be repaired by Contractor at his expense prior to completion of the job.
   D. Existing gable vents, flashing, and rotted wood (including all blocking, siding, and trim boards) will be properly removed by the Contractor and replaced with new. New aluminum gable roof vents, blocking, siding, trim boards, flashing etc. will be installed in accordance with standard industry methods and shall provide a weatherproof fit.
E. Contractor shall install step flashing at the joints between the sloping roof and the vertical wall (some lap siding may have to be removed and replaced with new siding to install the gable vents and step flashing properly).

F. The Contractor shall adequately protect exposed roofs, attic space and buildings to prevent building or content damage by inclement weather conditions.

G. For each building the Contractor shall have all necessary materials "on hand" prior to beginning work on any building.

H. All greenery in the area such as trees, shrubs, grass, flowers, etc. shall be fully protected from damage. Any such damage shall be immediately corrected to the original condition by the Contractor. Prior to working on any building, the Contractor should bring "pre-existing" damage to the attention of the Owner's job representative.

I. As each building is completed, the Contractor shall magnetically sweep the ground around each building for nails, and remove any nails found.
SECTION 2
DIVISION 09
FINISHES
DIVISION 9 - FINISHES

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

GENERAL

1.1 GENERAL:
   A. Maintenance stock for each color, type, pattern, etc. of the following materials shall be provided. Each shall be packaged, protected, identified, and stored per guidance of the owner’s representative.
      1. Carpet – 2% of installed amount
      2. Paint – 1 gallon of each type and color.
      3. Wall Covering – 5 linear yards.
      4. Tile (floor, wall, ceiling, etc.) – 2% of installed amount.

1.2 COLORS
   A. A color board and color schedule shall be submitted to UPM during design for approval. These colors shall be noted in the construction documents as a general guide. Samples of materials and colors from the actual manufacturers to be used shall be obtained from the contractor and assembled by the designer into a final color board soon after construction begins. This board will be submitted to the UPM who will obtain approvals as necessary. Approvals will be provided in writing to the designer.
      1. UNC Charlotte official colors:
         a. Green (PMS 349) and white. Gold (PMS8005 or PMS 465) is used in Athletic Marks but is not an official school color.
      2. Exterior Signage
      3. Interior Signage
         a. By ASI Sign Systems or approved equal.
      4. Exterior Windows and Trim:
         a. White to match Fretwell Building
      5. Exterior equipment and fixtures such as posts, bicycle racks, railings, and bollards
            Manufacturer: Matthews Paint Co.
            Paint Code: MP21337 R91290 - Satin Finish
            Satin Clear overcoat
         b. Light Green: Campus Green
            Manufacturer: Matthews Paint Co.
            Paint Code: MP00457 R91290 - Satin Finish
            Satin Clear overcoat
         c. Gold: Campus Gold
            Manufacturer: Matthews Paint Co.
            Paint Code: 64600SP 42228SP – Satin Finish
            Satin Clear overcoat
      6. Mechanical Room Colors:
         a. Ceilings and walls – white
         b. Floors – dark gray
         c. Hand rails – dark gray
         d. Air dryer, air receiver, & compressor – light blue
         e. Blowdown separator & blow off tank – dark green
f. Boiler, Burner & combustion control – dark gray
g. Chemical feed – purple
h. Condensate receiver & polisher – medium blue
i. Deaerator – dark blue
j. Flash tank – medium green
k. Heat exchanger – light green
l. Oil pump – medium green
m. Silencer – light orange
n. Softeners – medium blue

7. Piping color codes:
   a. Bottom blowout – dark green
   b. Breeching – medium brown
c. Chemical feed – purple
d. Chilled water – lime
e. City water – light blue
f. Compressed air – white
g. Condensate – medium blue
h. Continuous blowdown – medium green
i. Drain lines – dark brown
j. Fire protection – red
k. Fuel oil – black
l. Gratings and platforms – medium gray
m. High pressure steam – light orange
n. Hot water – dark blue
o. Low pressure steam – yellow
p. Natural gas – turquoise
q. Treated water (feed water) – medium blue
r. Vents – light gray

8. Note: Stencil labels may be required when the pipes of the same general character must
   be differentiated from one another such as steam pipes of various pressures. Coded
   banding systems without lettering to differentiate pipes from one another may not be
   used.

1.3 ACOUSTICAL TREATMENT

Noise control as measured by decibel reduction through partitions and floors shall be thoroughly
reviewed during the design.

SECTION 09 2216 – NON-LOAD-BEARING STEEL FRAMING

PART 1 - GENERAL

A. SUSTAINABILITY
   1. Recycled Content of Steel Products: Provide products with an average recycled content
      of steel products so postconsumer recycled content plus one-half of preconsumer
      recycled content is not less than 60 percent

PART 2 - PRODUCTS:

2.1 GENERAL:

A. For purposes of designating type and quality, this Section is based on products manufactured
   by United States Gypsum (or approved equal).
B. The stud and runner system shall be in compliance with ASTM C 645, including requirements for minimum thickness. Manufacturers include: Dale Industries, Dietrich Industries, (or approved equal).

C. Ceiling and soffit framing system for furred and suspended gypsum board ceilings shall be USG (or approved equal) drywall ceiling system, designed for screw attachment of gypsum board, furnished with required fasteners and accessories for complete system.

2.2 FURRING CHANNELS SHALL BE AS FOLLOWS

A. Furring channels for gypsum board applied to ceiling and soffit framing shall be hat-shaped USG (or approved equal) drywall furring channels, roll-formed from not less than 25 gauge galvanized steel, 2-3/4" wide by 7/8" deep with ½" minimum wing flanges and 1-3/8" minimum crown width for gypsum board attachment.
1. Furring channels for dropped ceilings, soffits, and where indicated at expansion joints shall be C-shaped studs, formed from not less than 25 gauge galvanized steel sheets, and of size indicated on drawings.
2. Main Runners shall not be less than 16 gauge USG (or approved equal) cold-rolled channels, 1-½" web width with 19/32" flange.
   a. Tie Wire shall be not less than 16 gauge soft annealed wire.
   b. Hanger Wire shall be 9 gauge galvanized hanger wire.
   c. Clips shall be galvanized wire USG furring channel clips.
   d. The Mechanical and/or Plumbing Contractor shall furnish to the General Contractor for installation into the wall and/or ceiling framing all access panels as required to allow for maintenance and operation of mechanical and plumbing items concealed in walls or ceiling areas.

SECTION 09 2400 – PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 STUCCO

Stucco or EIFS use should be avoided at ground level where it can be easily damaged. Stucco used in locations such as soffits shall be glass-reinforced type.

SECTION 09 2900 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUSTAINABILITY

A. Recycled Content - Gypsum: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 50 percent by weight.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrates.
1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD: GYPSUM BOARD SHALL CONFORM TO THE FOLLOWING
   A. Water-Resistant gypsum board shall be "Sheetrock W/R Gypsum Wallboard" 5/8" tapered-edge with treated manila paper finish. Fire resistant partitions shall be W/R gypsum wallboard, 5/8" thick, Type X gypsum board in accordance with ASTM C 36. Use 5/8" water-resistant gypsum board for all high humidity areas including all ceilings in locker rooms, mechanical rooms, mop receptors, etc.
   B. Gypsum soffit board shall be 1/2" thick, "Dens-Glass Gold" exterior gypsum soffit board by Georgia-Pacific or equals manufactured by Domtar, U.S. Gypsum or National Gypsum. Provide gypsum soffit board at all bathroom and shower ceilings and at all exterior soffit locations.
   C. Provide standard 5/8" thick gypsum board for ceilings in offices and at walls for furring.
   D. FRP clad gypsum board (by NUDO or approved equal) is an option for wet areas including showers, locker rooms, and kitchens. Consult with UPM before specifying.

2.2 JOINT TREATMENT
   A. Reinforcing Tape and Joint Treatment (Interior)
      1. Tape shall be USG Standard, or approved equal.
      2. Compound for embedding and fill coat application shall be "Durabond Joint Compound", or approved equal.
      3. Compound for finishing shall be "topping Compound".

2.3 TRIM
   A. Metal Corner Beads and Trim
      1. Fabricate corner beads and metal trim from galvanized steel, not lighter than 0.02" nominal thickness, on following shapes and sizes.
      2. Corner beads for all external corners shall be No. 800 metal/corner reinforcement. Metal trim shall be USG 800 series, sized for wallboard thickness.

2.4 AUXILIARY MATERIALS
   A. Fasteners: Screws for attachment of board to metal ceiling shall be 7/8" or 1" USG Drywall Screw, Type S. All screws shall have bugle head.
   B. Caulking: Caulking Compound shall be Acoustical type sealant, finished by gypsum board products manufacturer.
   C. Sound batts: USG Thermafiber Sound Attention Fire Blankets, Product Code B1, 1½ inch thick and meet requirements of ASTM C518 and C177.

SECTION 09 3000 – TILING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:
   A. Bathrooms and showers – ceramic tile
   B. Food Service Areas – Quarry Tile
1.2 QUALITY ASSURANCE
   A. The design, specifications, materials, and installation method should adhere to all applicable
      ANSI and ASTM codes and standards, in addition to the Handbook for Ceramic Tile Installation,
      Tile Council of America (TCA).

PART 2 - PRODUCTS

2.1 TILE PRODUCTS
   A. Glazed Ceramic Wall Tile:
      1. Provide "Standard Grade" units complying with ANSI A 137.1, Section 5. Color and
         pattern of units shall be as shown on drawings.

   B. Unglazed Ceramic Floor Mosaic Tile:
      1. Provide "Standard Grade" units, complying with ANSI A 137.1, Section 6, or size, color
         and pattern as shown on drawings. Provide cushion edge units except where square
         edge units are indicated. Factory mount tile onto sheets with mesh, dot, net, or other
         backing methods which is to remain permanently, in the setting bed.

   C. Provide rounded external corners, and trim shapes at head, jamb and sills of opening, of same
      material and finish as ceramic wall tile.

   D. Sanitary cove units shall be 4" high.

   E. External Corners

   F. Provide nose shapes, with an inside radius of not less than 3/4", unless otherwise shown.

   G. Internal Corners shall be field-butted square except use square corner, combination angle and
      stretcher type cap.

2.2 THRESHOLDS
   Marble Threshold shall be Class "A" Tennessee Sterling Gray, unless shown otherwise.

2.3 MEMBRANES
   A. Waterproof at Ceramic Tile
      1. Waterproofing where required or as indicated shall be Laticrete System (9235 Waterproof
         Membrane, 4237 Latex Thinset Mortar and accessories) as manufactured by Laticrete
         International, Inc. or approved equal.

2.4 SETTING MATERIALS:
   A. Mortar and Grout Materials
      1. Portland Cement ASTM C 150, Type 1, white or gray.
      2. Hydrated Lime ASTM C 206, Type S, or ASTM 207, Type S.
      3. Sand ASTM C 144 washed clean and graded. Use fine sand passing 1/16" mesh
         screen when mixed for grouting; use white sand for white cement.
      4. Water Clean and potable.
      5. Dry Set Mortars ANSI A 118.1 Tile Council of America (TCA) Formula 763, White, L & M,
         Tech, or Upco. Mortar in swimming pool shall be Formula 759 Thinset.
      6. Organic Adhesives ANSI A 136.1 for walls in shower areas with waterproof joints
         (silicone rubber or latex) Type II, AD, 1200.

   B. Thin Set Mortar; Low Absorption Tile
      1. Mortar shall comply with requirements for ANSI Standard A 118. 1967 Specifications for
         Thin-Set Portland Cement Mortar.
2. Mortar shall be pre-sanded, gray Portland Cement with additives, and for use with ceramic mosaic tile (TCA Formula 759), and one of the following
   b. Laticrete “Dry Bond” thinset mortar.
   c. Tile-Mate Sanded as manufactured by Upco Company.

C. Grout Materials (One of the following)
   1. K. B. Ceramic Floor tile grout as manufactured by C. E. Kaiser Company, Inc.
   2. L & M Ceramic Mosaic, manufactured by L & M Surco Manufacturing Company, Inc.
   3. Floor Tile Grout, manufactured by Upco Company.

2.5 MIXING MORTARS AND GROUT
   A. Bond Coat: Creamy paste made of Portland Cement.
   B. Portland Cement Mortar Setting Bed; Floors 1 part Portland Cement to 6 parts damp sand, by volume. Add water to obtain consistency or workability to promote maximum density as evidenced by smooth, slickened appearance when stroked with trowel.
   C. Thin-Set Mortar Mix in strict accordance with written instruction of mortar manufacturer.

SECTION 09 5113 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE
   Provide products, conditions, and installation methods that meet or exceed all applicable ASTM standards, and are UL approved.

1.2 PROJECT CONDITIONS:
   A. Acoustical ceiling tile shall not be installed until work above ceilings has been completed and temperature and humidity will be maintained as indicated for final occupancy.
   B. Tile will be stocked in the room for 48 hours prior to installation to acclimatize.
   C. Access to all utilities shall be provided to the fullest extent possible regardless of ceiling type used.

1.3 SUSTAINABILITY
   A. Recycled Content: Provide acoustical panel products with average recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS
   A. Tile selection shall be based on standard types by national suppliers and costs of maintenance and replacement must be considered in the selection.
B. Ceiling Tile Selection For Interior Air-Conditioned Spaces

<table>
<thead>
<tr>
<th>Company</th>
<th>Size</th>
<th>Grid Color</th>
<th>Series</th>
<th>Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armstrong</td>
<td>5/8” x 24” x 24”</td>
<td>White</td>
<td>769A</td>
<td>Cortega Miniboard Work/ Instruct./ circ</td>
</tr>
</tbody>
</table>

Or approved equal

2.2 SUSPENSION SYSTEMS
  A. Two by two grid configurations are preferred.
  B. Concealed grid systems, such as tee-and-spline systems, which are not accessible are not authorized.
  C. The ceiling suspension system shall be the type using formed double web tee sections.
  D. Exposed surfaces below the acoustical material shall be white baked enamel either directly applied to the bottom flange or by a cap piece applied to the flange.
  E. The system shall be of the type that each section shall have a positive interlock to the other.
  F. Main beams shall be approximately 1” wide and 1½” high. Cross tees and bridging tees shall be of the same width as main beam and approximately 1 1/4” high.
  G. Provide wall angles and splices as required for complete installation.

2.3 EXTERIOR CEILING SYSTEMS
  A. For ceilings installed in exterior space or non-air conditioned space the T-bars, wall angles, etc. shall be Series 830 manufactured by Chicago Metallics, color: off-white, all aluminum. (or approved equal).
  B. Hanger wires shall be aluminum or stainless steel and shall be non-corrosive in every respect (galvanized steel is not acceptable). Hanger wire number and spacing per code.
  C. The ceiling panels shall be 24-inch x 48-inch "Vinylrock" manufactured by Capul Company, color to match the T-bar color. (or approved equal).

SECTION 09 6000 – FLOORING GENERAL

PART 1 - GENERAL

1.1 SUSTAINABILITY
  A. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
     1. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
     2. Rubber Floor Adhesives: Not more than 60 g/L.
     3. Cove Base Adhesives: Not more than 50 g/L.

PART 2 - PRODUCTS

2.1 THE FOLLOWING MATERIALS ARE PREFERRED AT THE LOCATIONS INDICATED:
  A. High traffic areas such as lobbies and corridors – terrazzo or non-slip porcelain tile.
B. General Purpose rooms – Vinyl Composition Tile (VCT)
C. Offices, conference rooms, auditorium aisles (with permanent seating), lounges, music or language listening rooms, etc. – carpet
D. Bathrooms and showers – ceramic tile.
E. Food service areas – quarry tile or anti-bacterial cement
F. Laboratories – monolithic systems with no seams or cracks
G. Mechanical, storage, and custodial rooms – sealed concrete with steel trowel finish.
H. Computer rooms – raised, removable panels supported on interconnecting grids and pedestals providing an under-floor plenum for air distribution and utilities (where the extra utilities access needed for these rooms is not provided in some other way).

SECTION 09 6500 - RESILIENT FLOORING

PART 1 - PRODUCTS

1.1 VCT
   A. Tile Selection
      1. As an alternate to the below materials, the Contractor may submit a bid on any approved equal tile. The University reserves the right to refuse alternates based on its desire to select specific patterns and colors. Request for alternates must be submitted in writing with the Bid.
         a. Company TBD
         b. Series TBD
      2. Cove Base Selection
         a. Company TBD
         b. Series TBD
      3. Base boards should be rubber at carpet and VCT areas.
   B. Size at Carpet: 1/8" x 4"

1.2 FLOORING ADHESIVE:
   A. S-515 Clear Thin-Spread Adhesive manufactured by Armstrong World Industries Inc.
   B. Parabond M-269 manufactured by Para-Chem Southern, Inc. (or approved equal).
   C. Material at site must be in manufacturer's labeled containers.
   D. Adhesive for direct glue down installation shall be non-toxic low odor and solvent free with no alcohol, glycol, and ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials per OSHA regulation 29 CFR 1910-1200. Adhesive shall have a flame spread rating of 25 or less.

1.3 COVE BASE ADHESIVE:
   A. Parabond M-273 Acrylic Cove Base Adhesive or approved equal

SECTION 09 6810 – CARPET
PART 1 - GENERAL

1.1 SUSTAINABILITY

A. In addition to recycling waste, prefer the use carpets with:
   1. high recycled contents
   2. modular
   3. manufactured within a 500 mile radius of campus
   4. manufactured, transported, maintained and ultimately disposed of in manners reflective
      of the University’s sustainability vision and initiatives.
   5. CRI Green Label Plus required
   6. High recyclability using current technology.

PART 2 - PRODUCTS

2.1 CARPET SELECTIONS:

A. All carpet shall be selected from the North Carolina QPL (Qualified Products List) established by
   the State Purchasing Department and available from the UNC Charlotte Purchasing Director.
   Exceptions for special areas may be granted in writing by the University Project Manager
   provided the total of the exceptions does not exceed 10% of the carpeted floor area of the
   project.

B. Carpet Pattern and Orientation:
   1. All carpet of the same pattern shall be installed in the same orientation throughout a floor
      unless the Designer provides in writing to the UPM specific reason for other orientation.
   2. The Designer shall not select carpet with tight repeating patterns where long views of the
      carpet would expose irregular installation.

2.2 CARPET COLOR AND CONSTRUCTION

A. Color:
   1. The Designer shall not select solid color carpet; a mixed pattern with high soil and stain
      hiding capabilities is preferred.
   2. Construction:
   3. Needle Punch Construction.
   4. 100% Solution Dyed.

B. Polypropylene Fiber.
C. Minimum 37 ounces Face Weight.
D. Natural & Synthetic Composite Rubber Backing.
E. Seams Sealed Against Water Penetration into Adhesive.
F. Stain Resistant Against Kool-Aid, Red Dye, Ink, Coffee, and Mustard.
G. Manufactured with recycled content materials.
H. Purchased from a company that will recycle the carpet when time to replace.
I. Resistant to chemical damage from Bleach, Sodium Chloride, and Sodium Magnesium Acetate
   (Ice Melt).

2.3 INSTALLATION ACCESSORIES

A. Carpet Adhesive:
1. Health Tech Premium Adhesive 88 or Approved Premium Adhesive. Material at site must be in manufacturer's labeled containers. **VERY IMPORTANT: See Article G4.B in Bidding Instructions.**

2. Adhesive for direct glue down installation shall be non-toxic low odor and solvent free with no alcohol, glycol, or ammonia. Adhesive shall be antimicrobial with no hazardous vapors and contain no carcinogenic materials per OSHA regulation 29 CFR 1910-1200. Adhesive shall have a flame spread rating of 25 or less.

**SECTION 09 7200 – WALL COVERINGS**

**PART 1 - PRODUCTS**

1.1 GENERAL REQUIREMENTS

A. Wall corners at locations such as elevator entrances shall have vinyl bumper guards attached to the baseboard molding. These bumper guards will prevent damage from delivery carts, etc. The guards are to be stained or of a color which matches the adjacent floor baseboard material.

B. Wall coverings shall be durable, non-porous and easily cleaned. Carpet is not an acceptable wall covering material. Fabric coverings are not permitted as wall covering materials unless special requirements dictate and written acceptance is obtained through the UPM on a room by room basis.

C. When special wall coverings are used, the University shall be provided with maintenance instructions.

D. Use of vinyl wall covering is discouraged and must be limited to specially approved areas.

**SECTION 09 9100 – PAINTING**

**PART 1 - GENERAL**

1.1 DEFINITIONS

A. The Term "Paint" as used herein includes emulsion, enamels, paints, varnishes, stains, oils, and other coatings used as prime, intermediate, or finish coats.

1.2 SUSTAINABILITY

A. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. North Carolina’s Executive Order #156 on State Government Environmental Sustainability, Reduction of Solid Waste, and Procurement of Environmentally Preferable Products, Section 3.a (signed July 20, 1999) directs all state agencies to seek opportunities to reduce environmental impacts associated with capital improvements through project planning, design, and construction.

2. The University is dedicated to conserving materials and energy. The Designer shall consider the use of recycled materials “whenever economically practical” in conjunction with State Law SB58, Chapter 256. The Designer shall propose finish products that have recycled content such as floor tile, ceiling tile, paving materials, and carpet. The Designer should consider the recyclability of a material at the end of its life. The Designer should also consider the use of low-volatility non-toxic, organic-content paints, stains and other finishes.
1.3 STORAGE
A. Paints, enamels, lacquers, sealers, stains, varnish, paste fillers and similar materials shall be delivered in original sealed containers that plainly show designated name, formulas, or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer.
B. Store all materials in single, heated space provided by General Contractor.
C. Keep storage place neat and clean, and remove soiled or used rags, waste and trash from building every night to avoid danger of fire.

PART 3 - EXECUTION

3.1 PREPARATION
A. Exterior painting shall not be performed when the temperature is below 50 degrees F., while the surface is damp, during cold, rains, or frosty weather, or when temperature is likely to drop to freezing within 24 hours. Avoid painting surfaces while they are exposed to hot sun.
B. Before painting is started in any area, it shall be broom cleaned and dust shall be removed from all areas to be painted. After painting operations begin in a given area, room cleaning will not be allowed.
C. Contractor to provide adequate illumination, such as temporary lighting in all areas where painting operations are in progress.
D. Protect adjacent areas and installations by use of drop cloths or other approved precautionary measures. Use polyethylene sheeting to prevent spray drifting.
E. Remove and protect hardware, accessories, device plates, lighting fixtures, factory finished work, and similar items; or provide ample in-place protection. Upon completion of each space, carefully replace all removed items.
F. All painting work shall be performed only by skilled mechanics, using adequate tools for work to be provided.
G. Protect plumbing fixtures and trim. Standing on fixtures shall be prohibited.
H. Before starting any work, thoroughly examine surfaces to receive paint finish for defects and which might prevent satisfactory results. Do not proceed with work until such conditions are corrected. Commencing of work shall constitute acceptance of surfaces, and thereafter shall be fully responsible for satisfactory work.
I. Paints shall be applied only to surfaces that are completely free of surface moisture as determined by sight or touch. In no case shall paint be applied to surfaces upon which there is visible frost or ice.
J. Remove electrical panel box covers and doors before painting wall. Paint separately and reinstall after all paint is dry.
K. Surface Prep:
   1. Wood: Sandpaper wood surfaces to smooth and even surface, then dust off. After priming coat has dried, apply shellac, four (4) pounds cut, to all knots, pitch and resinous sapwood. After priming coat has dried, putty all nail holes, cracks, open joints and other defects. Putty shall be colored to match stain or paint.
   2. Masonry: Masonry surfaces to be painted shall be prepared by removing efflorescence, chalk, dust, grease, oil, excessive mortar, and other material detrimental to painting. Surfaces shall be thoroughly dry, properly cured, and clean before application of paint.
   3. Ferrous Surfaces:
      a. Surfaces that have not been shop-coated shall be solvent cleaned to remove oil and grease. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be mechanically cleaned by power wire brushing or sandblasting.
b. After cleaning, apply one coat of ferrous metal primer to all ferrous surfaces that are to receive paint other than asphalt varnish. Protect shop-coated metal from corrosion before and after installation by treating corroded areas immediately upon detection. Abraded or corroded spots on shop-coated surfaces shall be wire brushed and touched up with same materials as the shop coat. All edge of repair shall be carefully feathered out on exposed surfaces.

4. Galvanized surfaces: to be painted shall be solvent cleaned and treated in accordance with Paint Manufacturer's directions.

3.2 APPLICATION

A. Application shall be as follows
1. All interior paint shall be applied by brush or rollers in accordance with manufacturer's recommendations. Spray painting may be used only by permission of the Designated Representative.
2. Allow sufficient time between successive coats to permit proper drying. Modify as necessary to suit adverse weather conditions.
3. Coverage and hide shall be complete. Where color, stain, dirt, or undercoats show through final coat of paint, surface shall be covered by additional coats until paint film is of uniform finish, color, appearance, thickness, and coverage, at no additional cost to Owner.
4. Rate of application shall not exceed average rate of coverage recommended by manufacturer for type of surface involved.
5. Finished surfaces shall be free from runs, drops, ridges, waves, laps, sags, brush marks; and free of variations in color, texture and finish.

B. Visible surfaces on interior of ducts behind louvers, diffusers, registers, and grills shall be primed and painted (typically flat black enamel).

C. Painting of all insulating pipe shall be clearly put in the general construction specifications since this contract contains the majority of the painting.

D. Items typically not to be painted: Ducts, conduit, and mechanical equipment where concealed from view and not susceptible to rusting, items completely finished at the factory, non-ferrous metals, pre-finished millwork and casework, and acoustical tile and grid system.

3.3 SCHEDULE

A. Paint Sheen:
1. Walls – satin
2. Doors – gloss
3. Door and Window trim – gloss
4. Ceilings – flat

B. Complete coverage of all exposed surfaces is intended. Without restricting the extent of the work to be performed, the work shall include, but is not limited to the following:
1. Structural Steel - Remove any rust and touch-up after erection. Exposed steel shall be finished painted.
2. Ferrous Metal: All exposed surfaces of all ferrous metal work, including both exterior and interior of building, which is not finished/painted under other Sections. This includes all hollow metal work, exposed metal flashing, handrails, and similar items.
3. Masonry: Painting of all exposed concrete unit masonry.
4. Gypsum Drywall: All exposed surfaces.
5. Wood: Staining of all wood doors and wood lockers except that specified to be prefinished. If painted, prime with I.C.I. 1020 wood primer or app. Equal.
6. Paint-grade woodwork shall be painted – not stained.
7. Mechanical Grilles and Diffusers and Electrical Panels: Paint to match color of surface in which item is mounted.
8. Fire Extinguisher Cabinets: Paint doors and trim to match wall surface mounted on.
Section 2, Division 09 – Finishes

9. Concrete: Painting of all exposed surfaces except floors.

C. Room Requirements:
1. Mechanical room walls – epoxy paint
2. Mechanical room floors – multi-coat sealer adequate for wear and dust protection on concrete.
3. High Traffic Areas such as corridors and stairwells – Enamel Paint
4. Restroom Walls: For painted restroom walls, use high gloss enamel for a distance up to five feet above the floor.
5. Mechanical Room Equipment: Glidden Glid-Guard Alkyd Gloss Enamel #4500 or equal (except boilers and burners – Glidden Glid-Guard Silicon-Alkyd Enamel #5539 or equal).

D. Exterior Painting Schedule (See Art. D for color selection)
1. Ferrous Metal
   a. One (1) coat Rust Penetrating Metal Primer
   b. Two (2) Coats Alkyd Enamel
2. Galvanized Metal
   a. One (1) Coat Galvanized Metal Primer
   b. Two (2) Coats Acrylic Latex Flat
3. Masonry Surfaces (Block)
   a. One (1) Coat Block Filler Coat
   b. (2) Coats Acrylic Masonry Coating
4. Exterior Plywood Soffit Board
   a. One (1) Coat Vinyl Latex Primer
   b. Two (2) Coats Latex Satin
   c. Interior Painting Schedule (See Art. D for color selection)
5. Concrete Masonry Units
   a. One (1) Coat Block Filler
   b. Two (2) Coats Semi-Gloss Alkyd Enamel
6. Ferrous Metal Work
   a. One (1) Coat Rust Penetrating Metal Primer
   b. Two (2) Coats Semi-Gloss Alkyd Enamel
7. Gypsum Wallboard (Ceilings)
   a. Spot prime all cemented and taped joints with Latex Vinyl Primer.
   b. One (1) Coat Latex Vinyl Primer
   c. Two (2) Coats Latex Flat
8. Birch Veneer Doors (Natural Finish)
   a. Prior to application of stain thoroughly wash all faces of doors with mineral spirits or alcohol.
   b. One (1) Coat Wood Sealer
   c. One (1) Coat Gloss Spar Varnish
   d. Two (2) Coats Satin Varnish
9. Birch Veneer Doors (Satin Finish)
   a. Prior to application of stain thoroughly wash all faces of doors with mineral spirits or alcohol.
   b. Stain as selected
   c. Two (2) Coats Satin Varnish
10. Wood (Natural Finish)
    a. One (1) Coat Wood Sealer
    b. One (1) Coat Gloss Spar Varnish
    c. Two (2) Coats Satin Varnish
11. Wood (Stain Finish)
    a. Stain as selected
    b. One (1) Coat Gloss Spar Varnish
    c. Two (2) Coats Satin Varnish
12. Wood (Painted)
    a. One (1) Coat Enamel Undercoat
13. Epoxy Finish on Masonry
   a. One (1) Coat Block Filler
   b. Two (2) Coats Epoxy Gloss Coating

E. Materials: For purposes of designating type and quality for work under this Section, Drawings and Specifications are based on products manufactured or furnished by Duron, excepting as noted specifically otherwise. All materials used for work shall be types specified in this Section. Paint shall arrive at project site, ready-mixed, except for tinting of undercoats, and thinning, if directed by Manufacturer's printed instructions. Tinting materials shall be as recommended by Manufacturer for particular materials to be tinted.

F. Colors for interior wall surfaces shall be as follows
   1. Final Coat Duron Antique White, No. 22-03111 (or approved equal)
SECTION 2

DIVISION 10

SPECIALTIES
DIVISION10 - SPECIALTIES

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s Contract Documents.

SECTION 10 1100 – VISUAL DISPLAY SURFACES

PART 1 - GENERAL

1.1 SUMMARY
A. All classrooms should be provided with markerboards and / or chalkboards with required blocking.

SECTION 10 1400 – NON-ILLUMINATED EXTERIOR SIGNS

PART 1 - GENERAL

1.1 SUMMARY
A. The University of North Carolina at Charlotte supports the goal of making wayfinding along campus roadway and pedestrian ways understandable and accessible and has developed guidelines in an effort to promote mandatory design conformance and compliance. This information and guidelines are structured in accordance with the North Carolina department of transportation (NCDOT) and the federal manual on uniform traffic control devices (NCDOT adopted 2003).

All Exterior Signage for Roadways, Parking Lots, Loading Docks, Building Identification, Safety or any other exterior sign application, must be approved through Facilities Management Design Services which is governed by University Policy Statement #17 as related to all signage as applied to State Property and Facilities.

UNC Charlotte has adopted standard signage policies and design features for all exterior signs erected on campus. For visual reference; refer to the drawings in Annex D for typical campus exterior signs and sign groups. Permanent signs required by a project but not referenced here shall be submitted to Facilities Services for approval. New Sign products shall be equal or exceed in quality to the signs currently in place on campus.

B. Refer to Section 02 4116 for the requirements on labeling insulation to indicate the presence or the absence of asbestos.
Refer to Section 33 1150 for requirements relating to the identification of underground piping and utilities described in Division 2.
Refer to Section 10 1401 for interior signs.
Refer to Section 26 0100 for electrical identification.
SIGN TYPES – DESCRIPTION

A. Two sign types require additional feature boards across the top in keeping with Campus Logo identification on public road access. Please refer to Type A and B signage in the attached manual.

B. This Section contains the identity and function of exterior signs types:
   TYPE A - LARGE ROAD DIRECTORIES -
   MAIN ENTRANCE ROADS AND PERIMETER HIGHWAY DIRECTIONAL

   TYPE B - MEDIUM ROAD DIRECTORIES -
   INTERIOR CAMPUS ROADWAYS AT INTERSECTIONS AND EXTENDED LENGTH ROADS

   TYPE C - SMALL ROAD DIRECTORIES -
   PARKING DECK AND SERVICE ROAD ENTRANCE SIGNS (SEE SIZE FOR E)

   TYPE D.1 – 2 - ATTACHED PARKING DECK ID

   TYPE E - DETACHED BUILDING ID

   TYPE F.1 - .3 - ATTACHED BUILDING ID (SIGNS, METAL LETTERS, VINYL GRAPHICS)

   TYPE G - ATTACHED OVERHEAD VEHICULAR DIRECTIONAL PARKING DECKS

   TYPE H – H.1 - PEDESTRIAN DIRECTIONAL

GRAPHIC STANDARDS

This section provides graphic standards for all Exterior Sign configurations. Standards for exterior ADA directional signs (entrance signs) shall be approved by Facilities Management Design Services with regard to the specific placement, content or layout.

A. COLOR:
   1. Full Crown – Stand Alone
      a. Gold – 04 or equal metallic vinyl 7 year
      b. Background – Black Green (see Annex D for paint codes by MPC).
      c. Crown Gold option - Paint to match if that is specified
   2. Half Crown and Text
      a. Gold – 04 or equal metallic vinyl 7 year
      b. Background – Black Green (see Annex D for paint codes by MPC).
      c. Crown Gold option - Paint to match if that is specified
      d. Text – White (see Annex D for paint codes by MPC).

   The color of the sign face is to match Matthews Paint Co. MP21337 R91290 or approved equal with Satin Finish and Satin Clear Coat to seal. The color of the ‘band’ whether as an attached feature (TYPE A and B) or as accent band for vinyl decal crown feature is to be PMS 349 Campus Green.

B. LETTERING:
   1. The University of North Carolina at Charlotte Crown and Text logo on the sign is registered as a legally protected trademark of the University and shall be produced from authorized originals without being modified.

   2. Go to this link for reference and logo access.
      http://www.publicrelations.uncc.edu/logo/main-logo.html

   3. All copy shall be UTOPIA (True Type Version). A number of standard letter sizes have been
established which should be appropriate for most signage needs (see Annex D for references). Lettering sizes will depend on distance readability and the surrounding area of placement. Speed and travel of vehicular and pedestrian traffic may also have influence on letter stroke and sizing. The final graphic and letter height selected shall be based on current sign placement content.

C. HEIGHT:
See Annex D for height descriptions. WBLAOCK CAD details may be provided upon request via FTP site.

1.4 FABRICATION:
Manufacturer will visit the University grounds to verify existing signage sizing and component structure; then provide working drawings for review prior to fabrication. Some environmental conditions may require alteration in order to provide maximum affect for the driver or pedestrian. These must be approved via drawing submittal prior to fabrication.

1.5 PLACEMENT:
Placement and location of all signs shall be approved by Associate Vice Chancellor for Facilities Management via a Design Services Project Manager.

Contractor or Vendor is responsible for all public utility locate requests and will provide schedule of utility locates that coincide with University Department utility locations. If placement falls within the 'no dig' area as stipulated by North Carolina One Call (NCOCC), then installer is required to hand dig without up-charge for installation of the sign.

For Utility Locate information: [http://www2.ncocc.org/ncocc/default.htm](http://www2.ncocc.org/ncocc/default.htm)

1.6 BUILDING NAMES:
Names will be provided by Facilities Management prior to fabrication. Submittal of Color elevation drawing approval required prior to finishes being applied to signage.

1.7 RESPONSIBILITIES:

A. Capital construction projects shall provide funding to pay for all signs associated with each project.

B. In Capital Construction projects, the General Contractor shall be responsible for contracting manufacture of and for placement of the signs on campus in compliance with the policies and specifications outlined in this document under the direction of Design Services.

C. The Contractor shall be responsible for full replacement for defects in materials or workmanship for five years.

D. Budget entities and auxiliaries shall be responsible for paying for the costs of requested signs for existing buildings. A Project request must be entered via Archibus for any fixed signage needed.

1.8 UPDATES:
If required, vendor will provide submittal drawing or outlined process to update graphics or failed sign features prior to a Purchase Order being released. If a sign requires removal, the Vendor must put in place a sign readable for the location that will continue to direct traffic and pedestrians without undue stress.
PART 2 - PRODUCTS

2.1 EXTERIOR:

All should be handled in accordance with the University’s “Campus Signage Standards” Room Number Assignments:

A. All spaces including custodial, mechanical, and closet spaces shall have assigned numbers. It is desirable that the construction numbering system be retained throughout the life of the facility. Numbering systems will be coordinated with University CAFM requirements. Please Refer to the Space Manual on:  http://cafm.facilities.uncc.edu/CAFM/data.htm’ Following are general guidelines for space numbering in all buildings:

1. The Construction Documents for all design disciplines shall display the approved, permanent room number assignments.
2. The numbering system shall use three-digit numbers with alpha suffixes, if necessary; four-digit numbers are not acceptable. Suites can be numbered with nested letters such as 243 A, 243 B, 243 C . . . etc.
3. Number sequence shall progress continuously in a corridor. Using odd or even numbers on either side of the corridor is neither required nor desired. Where corridor configurations make it impossible for a continuous numerical progression, the Designer shall strive to achieve a logical numerical progression. Consult with the UPM.
4. The numbering system shall provide spare numbers in the sequencing, especially in areas where there are large rooms or open spaces where future renovations could subdivide the space.
5. All spaces are to be assigned room numbers (closets, elevators, janitorial rooms, lobbies, rest rooms, stair landings, vestibules, etc.). Lobbies will not have signage.
6. The lowest floor with a primary entrance shall be assigned “100” series numbers. All other floors located below grade shall be assigned numbers with a “B” prefix, (B02, B03, etc.).
7. Basement room numbers shall be three digits and begin with the letter “B”.

2.2 FABRICATION:

A. 1. Sign Types B.1, D, E, and F2 also have a photopolymer plaque with integral raised graphics applied to the backer.
2. Sign Type G - provide surface silk-screened header and surface silk-screened graphics.
B. Exterior ADA signs, type A.EXT, for example, shall be "chemically etched zinc" it is for use in exterior applications as the photopolymer will biodegrade over time if subjected to the elements.

SECTION 10 1401 – NON-ILLUMINATED INTERIOR SIGNS

PART 1 - GENERAL

1.1 SUMMARY

The University of North Carolina at Charlotte supports the goal of making facilities accessible and has developed guidelines in an effort to promote mandatory compliance. This information and guidelines are structured on the Americans with Disabilities Act (ADA). The University has used extreme care and high standards to assure accuracy in interpretation of the law.
It is not the intent to convert entire buildings to the new Design Manual specification unless fund-
ing department is doing so to bring building into compliance with ADA and other governing bo-
dies. There will be instances where the Manufacturer will be asked to match existing room and
space identification in order to conserve funding for more critical safety projects. But for all project
signage, a review is required by Facilities Management Design Services designate in accordance
with University of North Carolina at Charlotte Policy Statement 17.2.c. that instructs us in Code
Compliant actions required regarding State facilities that includes the correct action regarding
“addition, removal, or movement of signs”.

Signage Guidelines are taken from the Department of Justice's final rules implementing Title III of
the Americans with Disabilities Act, printed in the Federal Register, 28 CFR, Part 36, 26-July-
2010.

A. Section includes: Interior non-illuminated directional, control, and information surface
mounted signage as complete assembled and fixed system.

B. Related sections:
   1. Section 08 1113: Steel Doors and Frames.
   2. Section 08 1416: Wood Doors.
   5. Section 09 9100: Painting.
   6. Section 09 7200: Vinyl Wall Covering.

C. Unit prices: Provide installed unit price for each type unit in designed system for extra
possible required signage.

D. Large projects will require Manufacturer to fabricate a minimum of two each of each small
size for submittal review, and renderings of Wayfinding Map and Direction signage.

1.2 REFERENCES:
A. Standards of the following as referenced:
B. Industry standards:
   1. Department of Justice, Office of the Attorney General, "Americans with Disabilities
   2. ANSI A117.1: Providing Accessibility and Usability for Physically Handicap People,
   3. Federal Register Part III, Department of Justice, Office of the Attorney General, 28
      CFR Part 36: Nondiscrimination on the Basis of Disability by Public Accommodations
   4. Federal Register Part II, Architectural and Transportation Barriers Compliance Board,
      36 CFR Part 1191: Americans with Disabilities Act (ADA) Accessibility Guidelines for

1.3 DEFINITIONS:
A. Terms:
   1. Braille: Grade 2 Braille including 189 part-word or whole word contractions in addi-
tion to Grade 1 Braille 63 characters. Tactile is required whenever Braille is required;
see SYSTEM DESCRIPTION Article below.
   2. Non-tactile: Letters and numbers on signs with width-to-height ratio between 3:5 and
1:1 and stroke width ratio between 1:5 and 1:10 using upper case "X" to calculate
ratios. Use typetstyles with medium weight; upper and lower case lettering is
permitted; NO serif typestyles are permitted. See SYSTEM DESCRIPTION Article below.

3. Symbols: Symbol is required to be tactile AND equivalent verbal description is required\ both in tactile letters and Braille.

4. Tactile: 1/32" raised capital letters without serifs at least 5/8" height and not more than 2" height based on upper case "X". Braille is required whenever tactile is required; see SYSTEM DESCRIPTION Article below.

1.4 SYSTEM DESCRIPTION:
A. Signage under this section is intended to include items for identification, direction, control, and information where installed from single manufacturer.

B. ADA design requirements:
1. Signage requiring tactile graphics:
   a. Wall mounted signs designating permanent rooms and spaces such as, room numbers and restroom, department, office, accessibility designated space, and fire exit identifications.
   b. Individually applied characters are prohibited for either tactile letters or pictograms.

2. Signage not requiring tactile graphics but require compliance to other ADA requirements: All other signs providing direction to or information about function of space such as, directional signs (signs with arrow), informational signs (operating hours, policies, etc.), regulatory signs (no smoking, do not enter), and ceiling and projected wall mount signs.

3. Excluded signage:
   a. Exterior signs.
   b. Building directories.
   c. Menus.
   d. Temporary signs include personnel signs and tenant identification; suite numbers are not considered temporary.

C. ADA performance requirements:
1. Tactile graphics signs mounting requirements:
   a. Single doors: Mount 60" to sign centerline above finish floor and on wall adjacent to latch side of door.
   b. Openings: Mount 60" to sign centerline above finish floor adjacent opening.
   c. No wall space adjacent latch side of door, opening, or double doors: Mount 60" to sign centerline above finish floor on nearest adjacent wall.
   d. ADA Signs Type A, B, C, E.1, F, and J: Signs constructed from a clear Photopolymer Sheet, graphics are integral to the sign, no etched or separately applied characters are permitted. Plaques are surface painted with automotive grade polyurethane and then the raised graphics are tipped in second color, do not tip Braille.

1.5 SUBMITTALS:
A. Product data:
   1. Manufacturer's signed statement regarding compliance with QUALITY ASSURANCE Article.
   2. Manufacturer's product literature indicating units and designs selected.
   3. Manufacturer's signed statement regarding compliance with ADA Statutes and requirements.

B. Shop drawings:
   1. Indicate materials, sizes, configurations, assembly diagram, installation details for mounting, and applicable substrate mountings.
   2. Typography sample for copy and approval.
3. Signage schedule complete with location of each sign and required copy; include floor plans, if required.
4. Artwork for special graphics.

C. Samples and/or Submittals:
1. Full size samples for Sign, insert, and copy in colors specified.
2. Furnish samples in small size sign.

Note: Samples will not be returned for use in Project but will remain with the University as reference for future sign projects and demonstration of product requirements.

D. Contract closeout:
1. Furnish appropriate checklist for aiding in reordering after Date of Substantial Completion. Maintain computer schedule program for FIVE years for ordering new signage required by Owner.
2. Maintenance data and cleaning requirements for exterior surfaces.
3. Proper steps to remove signs for repairs or updated installation replacement.
4. Furnish accurate templates in PowerPoint or other Microsoft based application useful for creating replacement insertable information cards.

1.6 QUALITY ASSURANCE:
A. Qualifications:
   1. Manufacturer:
      a. Work required under this section from manufacturers regularly engaged in work of this magnitude and scope for minimum of five years.
      b. Third party vendor must provide manufacturer information including Name, Contact, Location, and manufacturer must provide all within this Division outline as if they were the direct supplier and installer for the sign package.
      c. Maintain computer link between schedule input and computerized typography production.

1.7 DELIVERY, STORAGE, AND HANDLING:
** USE EITHER A or B **
A. Please refer to ANNEX D.1 indicated for Delivery, Storage, and Handling Section.
B. Acceptance at site: Coordinate delivery of work to Project site under this section for immediate installation.

1.8 SEQUENCING AND SCHEDULING:
A. Schedule system installation after related finishes have been completed.
B. Provide timeline of installation.

PART 2 – PRODUCTS

2.1 MANUFACTURED UNITS:
A. Acceptable product:
   1. APCO; 388 Grant Street SE, Atlanta, Georgia, 30312, USA. Phone: (404) 688-9000. Telex: 752098. Fax: (404) 577-3847.
   2. Other manufacturer's products are acceptable if submitted in accord with Product Options and Substitutions section and are in strict compliance with these specified requirements.

2.2 COMPONENTS:
COMPONENTS LISTED BELOW GIVE ONLY GENERAL INFORMATION. SCHEDULES ARTICLE REQUIRES COMPLETE SIGNAGE SCHEDULE DEVELOPED BY
MANUFACTURER'S REPRESENTATIVE.
A. Plaque:
   1. Face material:
      Wall or vertical surface:
      a. *1/4" - 5/16" thickness (*single etch versus assembly signage) clear non-glare,
         optically corrected, cast virgin acrylic sheet with second surface (backside) ap-
         plied perimeter line and border graphics application leaving center see-through
         area for insert.
      b. ADA tactile signs: Individual 1/32" high letter characters chemically etched into
         surface material; Braille portion chemically etched into surface material.
      Ceiling:
         1/4" thickness expanded PVC with first surface applied perimeter line and back-
         ground color; 20 mm applied die-cut vinyl graphics.
   2. Thickness: 1/16".
   4. Insert: Die-cut vinyl; 20 mm thickness. (N/A for Ceiling Mound Modules).
   5. Corners: Square. (see Annex D.1 Interior Signage)
   6. Mounting:
      a. MOUNTING PLAQUES TO SURFACE; SELECT TYPE OR TYPES:
         1) WALL MOUNTING:
            a) VT; Double sided vinyl tape mounting.
            b) SA; Silastic adhesive for mounting to irregular surfaces, vinyl tape is
               used in conjunction for holding sign in position during adhesive curing
               time.
            c) "2-way close cell VHB foam tape" The FullView signs, type L.1, should
               indicate that they are also to be mounted with Mechanical Fasteners,
               they are too heavy to be securely mounted with tape only.
         2) CEILING MOUNT:
            a) CM; grid track and clip system or cable and clip.
            b) Projection mounted signs or Ceiling mounted signs: Projection
               mounting bracket to be constructed using two mating aluminum
               extrusions, whereby one extrusion can be mechanically mounted to the
               wall or ceiling and the corresponding extrusion can be mechanically
               fastened to the sign face or holder and the entire assembly can be joined
               to the mounting bracket by engaging the mating tracks from either the top
               or bottom and sliding the sign into position. Assembly to be secured via
               discreet locking set screws.
            b. Wall or vertical surface: VT or SA as indicated in schedule.
            c. Ceiling grid: Furnish manufacturer's standard track and clip system, or cable tie
               and hardware for suspension installation direct to ceiling grid as required.
   7. Colors:
      a. Perimeter line color: PMS 349 "Campus Green".
      b. Border and insert colors:
         PMS 349 "Campus Green is default standard (all other colors must receive
         approval from Facilities Management Design Services. A submittal drawing must
         be provided that will be approved by Design Services, or if required, the
         Associate Vice Chancellor for Facilities Management.
      c. Other Colors currently used in the Campus Sign Package to date (11-01-10).
         Putty – all backgrounds.
         1) PMS Green –
            Kennedy, ROTC, Colvard,
         2) PMS Green Border with Black text –
            King Building.
         3) Matte Black –
            Fretwell, Cone Center (Academic Spaces), Reese 4th Floor.
(Colors Cont.)

4) Satin Silver –
   Cameron Applied Research, Bioinformatics.
5) Wine –
   Rowe Arts
6) Olive Green –
   Denny Complex
7) Windsor Blue –
   Cone Center Main Color, Winningham
8) Jade Blue –
   Student Health Center
9) Malaga Black Green –
   Student Union
10) Bronze Metallic –
    Duke Centennial Hall

8. Interior Sign Group (may be expanded – check with Project Manager for current list):
   a. Wall Mounted:
      1) 7-1/4" by 7-1/4" - Type A
      2) 9" by 7-1/4" - Type B
      3) 9" by 7-1/4" - Type B
      4) 9" by 7-1/4" - Type B.1 - Insertable
      5) 9" by 7-1/4" - Type B.2
      6) 9" by 7-1/4" - Type B.3
      7) 9" by 7-1/4" - Type B.4
      8) 9" by 7-1/4" - Type B.5
      9) 7-1/2" by 7-1/2" - Type C - Insertable
     10) 7-1/2" by 7-1/2" - Type C.1
     11) 7-1/2" by 7-1/2" - Type C.2
     12) 9" by 9" - Type C.3
     13) 9" by 1-3/8" - Type D - Insertable
     14) 5-7/8" by 5-1/4" - Type E - Insertable
     15) 2-1/2" by 5-1/4" - Type E.1
     16) 3-1/2" by 7-1/4" - Type F
     17) 4-1/2" by 8-1/2" - Type F.1
     18) 15-1/2" by 8-1/2" - Type F.2 - Insertable
     19) 12" by 12" - Type G - Insertable
     20) 11-3/4" by 17-3/4" - Type H - Insertable
     21) 9-3/4" by 11-3/4" - Type I - Insertable
     22) 5-7/8" by 5-1/4" - Type J
     23) 4" by 4" – 4" by 3" - Type J.1 - Insertable
     24) 11-3/4" by 11-3/4" - Type K - Insertable
     25) 36-3/16" by 18-7/16" - Type L.1 - Insertable
     26) 8" by 24" (varied) - Type L.2 - Insertable - CM
     27) 12" by 36" - Type L.3 - Insertable - CM
     28) 6" by 6" - PM - Type PM.01
     29) 6" by 6" - PM - Type PM.02
     30) 6" by 6" - PM - Type PM.03
     31) 6" by 6" - PM - Type PM.04
     32) 6" by 6" - PM - Type PM.05
     33) 6" by 6" - PM - Type PM.06
     34) 8" by 8" - SM - Type SM.01
     35) 8" by 8" - SM - Type SM.02
     36) 8" by 8" - SM - Type SM.03

Or - Indicated in SCHEDULES Article from manufacturer's standard sizes.
b. Suspended Ceiling Wayfinding Directories:
   1) 8" by 24".
   2) 12" by 36".
   3) Or as indicated in Drawings referencing manufacturer's standard sizes.

c. Wall suspended Wayfinding Directories:
   1) 36-3/16" by 18-7/16".

B. GRAPHICS:
   1. Type: Factory printing OR Manual.
   2. Factory printing:
      a. Type style: **UTOPIA - Bold.** (may not always apply)
         (Not to be used for Tactile lettering applications.)
      b. Type style: **INTERSTATE - Bold.** (may not always apply)
         REMINDER: ADA REQUIRES ALL UPPERCASE FOR TACTILE;
         UPPER/LOWER CASE FOR NON-TACTILE.
      c. Type code: Uppercase. Initial caps. Combination.
         Indicated in SCHEDULES Article.
      d. Type size:
         1) HM: ** 3/16". ** 7/32". ** 1/4". ** 5/16". ** 3/8". ** 7/16". **
         2) CB: ** 1/2". ** 5/8". ** 3/4". ** 15/16". ** 1". ** 1-1/4". **
      e. Color: ** PMS 349 Green ** Black ** White ** (alternate to be approved)
   3. Furnish Grade 2 Braille characters for tactile signs; same text as letter designations
      and symbol translation indicated in DEFINITIONS Article.
   4. Insertable signage – Manufacturer to provide Microsoft based templates (.docx; pptx)
      with dotted border trim line to meet all signage package templates for insertable room
      signs. Manufacturer to keep on hand, Large Wayfinding directory content for updates
      for a period minimum of 5 years. (see 1.5, c)

2.3 FABRICATION:
A. Shop assembly: (check with Design Services for available submittals for reference)
   1. Fabricate units to configurations indicated on reviewed shop drawings.
      a. Wall or vertical surface units:
         1) Apply border colors to second surface of face material using photographic
            screen printing process.
         2) Apply color to insert material matching face color.
         3) Laminate back to face material using manufacturer's standard procedure
            leaving space for insertable message unit.
      b. Ceiling-mount units:
         1) Apply perimeter line color to plaque surface using photographic screen
            printing process.
         2) Apply background color to plaque material; both surfaces.
         3) Attach plaque to ceiling mount grid track and clip system.
   2. Furnish required copy indicated on reviewed shop drawings.
   3. Wrap each individual unit with polyethylene.
   4. Provide card stock for insertable message printing.
B. FullView Signs (Ceiling & Type L.1):
   Low Profile Sign Frame/Holder assemblies shall
   be comprised of extruded aluminum and/or aluminum composite materials and
   hall feature an overall depth of 7/16" (12mm) or less. Inserts are clear matte acrylic con-
   structed using a continuous extruded sheet acrylic with a consistent non-glare (matte)
   surface finish. Digital Print Inserts are Full Color printed on HP premium instant dry gloss
   photo paper.
C. Type SM Signs:
   These are not chemically etched or photopolymer, it is a 1/8" thick
   continuous extruded sheet acrylic with surface silk-screened graphics.
D. Signs that accept paper inserts:
   Sign consists of 1/8" thick continuous extruded sheet acrylic solid color backer with a clear 1/8" thick continuous extruded sheet acrylic with
   surface silk-screened rule line (borders) applied to the face of the backer with 2-way
   close cell VHB foam tape.
PART 3 – EXECUTION

3.1 EXAMINATION:
   A. Verification of conditions: ** Indicated in Coordination Section. ** OR **
      1. Examine areas to receive signage; notify Architect in writing of unacceptable substrate.
      2. Beginning work indicates acceptance of substrate.
      3. Subsequent modifications to substrate or signage becomes this section’s complete responsibility.

3.2 INSTALLATION:
   A. Install holders in locations with mounting types indicated in accord with reviewed shop drawings; square, plumb, and level units.

3.3 CLEANING:
   A. Clean exposed surfaces not more than 48 hours prior to Date of Substantial Completion in accord with manufacturer's written cleaning instructions.

3.4 SCHEDULES:
   A. See attached sheet for Schedule.

3.5 REMOVAL AND REPAIRS:
   A. Verification of conditions: ** Indicated in Coordination Section. ** OR **
      1. Examine areas to remove existing signage; notify Architect in writing of areas that will be damaged and repaired.
      2. Beginning work indicates acceptance to repair wall conditions up to paint (to be provided by Facilities Management Zone group).

SECTION 10 2113 – TOILET PARTITIONS

PART 1 - PRODUCTS

1.1.1 TOILET COMPARTMENTS:
   A. All toilets, urinals and their respective partitions shall be wall hung.
   B. Solid (homogenous color, not coated or laminated) phenolic toilet and shower partitions are preferred over other materials such as steel or laminates.
   C. Provide stainless steel trim and hardware with self closing door hinges.
   D. Latches that do not depend on precision alignment of door and wall to operate are preferred.
   E. Provide coat hooks in toilet partitions.

SECTION 10 2800 – TOILET AND BATH ACCESSORIES

PART 1 - PRODUCTS (TO BE VERIFIED WITH UNIVERSITY PROJECT MANAGER)

1.1 TOILET PAPER DISPENSER
   Will be supplied by the Owner and installed by the contractor.
1.2 PAPER TOWEL DISPENSER  
   A. Will be supplied by the Owner and installed by the contractor.  
   B. Paper towel dispensers are generally preferred over electric hand dryers and should be  
      designed for roll-type paper towels. Integral trash cans may be used for recessed or semi-  
      recessed locations. Dispensers will have stainless steel finish and locking covers.  

1.3 SANITARY PRODUCTS DISPENSER  
   Will be supplied by the Owner and installed by the contractor  

1.4 SOAP DISPENSERS  
   Will be supplied by the Owner and installed by the contractor.  

2.3 SOAP DISH  
   A built-in ceramic tile soap dish shall be installed with each shower or tub.  

2.4 METAL SHELF  
   At lavatories, a metal shelf finished to match adjacent trim shall be provided.  

2.5 WASTE RECEPTACLE  
   At minimum of one waste receptacle with a minimum 18 gallon capacity shall be provided for  
   every two lavatories. Women’s restroom stalls shall include sanitary napkin receptacles.  

SECTION 10 4300 – EMERGENCY AID SPECIALTIES  

PART 1 - GENERAL  

1.1 OWNER PROVIDED, CONTRACTOR INSTALLED EQUIPMENT.  

PART 2 - PRODUCTS  

2.1 MATERIALS  
   A. Automated External Defibrillator Basis of Design: Philip Heartstart FR2+ series  
      1. Indoor cabinets: 19.25” height, 13” width, and 6” depth.  

PART 3 - EXECUTION  

3.1 PLACEMENT  
   A. Work with Project Manager in designing appropriate locations for Automated External  
      Defibrillators.  
      1. The American College of Occupational and Environmental Medicine (ACOEM),  
         recommended that when practical, AEDs be placed in locations throughout a workplace  
         that will allow initiation of resuscitation and use of the AEDs (the “drop-to-shock” interval)  
         within 5 minutes of recognized cardiac arrest. Estimating time needed for transport and
set up the AED for various work areas can help determine if a proposed location for AED placement is appropriate.

SECTION 10 4400 – FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 DESIGNERS
   A. Shall clearly identify locations for Fire Extinguishers and cabinets on the plans. Locations shall be planned with the intent to provide appropriate coverage, while having the least interference with the interior design concept.
   B. Shall specify in-wall Fire Extinguisher Cabinets and Fire Extinguishers according to the guidance of the University Safety Officer. The General Contractor shall install the specified extinguishers new, unused, and certified on the date of Beneficial Occupancy.

1.2 FINAL LAYOUT
   Will be provided to the UPM and forwarded on to the University Safety Officer for review and approval.

1.3 FIRE EXTINGUISHERS
   Shall be provided according to NFPA – 10 and shall be UL approved. All fire extinguisher cabinets shall comply with ADA height and sign criteria.

1.4 PROVIDE
   Automated External Defibrillator as per information contained in Appendix A.

PART 2 - KNOX BOX

2.1 LOCATION
   A. The Knox box shall be externally mounted in a location where first responders will service the building in an emergency. Preferably in close proximity to the main fire alarm panel.

2.2 INSTALLATION
   A. The Knox box will be tied to the campus security system which is monitored by the campus police department.
   B. The Knox box will have a 2 taper switches to which will be tied to the door if it is opened and the wall if the Knox box is removed.
   C. The Knox box will be through bolted and securely attached to an external wall. See manufactured for proper mounting instructions.

The Knox box will contain a minimum 2 sets of keys to fire pumps, elevators, and rooms. If the building is over 5 stories the Knox box will require 5 sets of keys.

2.3 REQUIREMENTS
   A. The campus standard Knox box is 1300 series Knox box which is only surface mountable.
For smaller buildings a 4100 series recess-able Knox box may be used.
B. The Knox box must be dual keyed and the second key shall be keyed to the campus police department standard.

SECTION 10 5113 – METAL LOCKERS

PART 1 - GENERAL

1.1 SUSTAINABILITY
A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent

PART 2 - PRODUCTS

2.1 MATERIALS
A. All similarly specified materials shall have matching finish and colors.
B. All materials shall be new and shall be manufactured for the intended use. No manufacturer's or installer's logos or other decals or signs will be attached without authorization of the Owner.
C. All materials shall meet N.C. State Building Codes, and should there be any discrepancies between design and code, the more stringent requirement shall apply.

2.2 LOCKERS
A. The lockers shall have the following features unless specific changes are requested and approved by the University through the UPM. The Designer is responsible for ensuring that modifications to the following general requirements are not needed by the University:
1. Height: 72" minimum
2. Width: 15" on center
3. Depth: 18"
4. Sloped tops
5. Colors:
   a. Doors, dark green
   b. All other parts, black
6. Base: Approx. 4" height with 2" minimum horizontal "kick set back" under the front face.
7. Interior
   a. 3 hooks with one single hook on each side and one double hook on the back wall.
   b. 2 shelves; one at top and one at bottom approximately 8 inches above the bottom.
8. End face plates where a row of lockers do not abut a wall, face plates shall be equal, at each end of each row to center the lockers on the wall. Color will match other framework.
B. Doors:
1. 2 sections of louvers for air circulation, one at top and one at bottom. Louvers shall prevent visibility into locker
C. Hardware:
1. Numerical plates with first plate being numbered 49-1 followed by 49-2, 49-3, 49-4, etc. Each room shall have the first plate being 49-1.
2. Name card holders to accommodate slide-in cards. (Minimum card size 1 inch height, 4 inch length)
3. Hasp for standard pad lock.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. The specified materials shall be provided and installed by the Contractor in accordance with the "best quality" industry standards. The installed materials shall be complete and operate safely and efficiently for the intended use.

B. The Contractor will make final clean-up. All adjustments necessary to provide proper operation will be performed by the Contractor prior to leaving the site.

C. The Contractor's installation shall include, but not be limited to, all parts, fasteners, finishes and whatever other materials and equipment are needed for a complete operating system. Prior to starting work, the Contractor shall have all needed materials at the site, so that installation will progress efficiently.

D. The lockers shall be firmly attached to the adjacent walls and floor with non-corrosive fasteners.

E. If the concrete floor is un-even, the Locker Contractor shall apply leveling grout.

F. Locker doors shall be installed in a flat place with a tolerance of 1/8 inch.

SECTION 10 5500 – POSTAL SPECIALTIES

PART 1 - GENERAL

1.1 PROVIDE 1 MAILBOX PER ROOM/APARTMENT.

SECTION 10 7313 – AWNINGS

PART 1 - PRODUCTS

1.1 AWNING FABRICS

A. Use a mildew resistant fabric with a solution dyed modacrylic.

B. Woven fabric made of 100% self-extinguishing fibers. These are modacrylic solution-dyed fibers with a fluorocarbon finish.

C. Fabric shall be approximately 9.25 oz. per square yard. The fibers shall be flame resistant to pass or exceed Test Procedure #801, Title 19, California State Fire Marshal's Test (Registration #F-368.01), National Fire Protection Association Test #701, and ASTM E-84-84 (flame spread and smoke density is Class A or Class 1). Conforms to virtually all local building codes. Fabric does not melt drip.

D. Fabric shall be highly resistant to ultraviolet rays and color degradation.

E. Fabric underside shall be same as top surface-both sides alike.

F. Fabric shall be plain weave and have excellent breathability. Also, fabric shall be chemical resistant that is highly resistant to acids, alkalies and solvents. It shall also be water repellent.

G. The sew ability shall be of soft draping properties; mean all measures to prevent excessive puckering and uneven.
H. Fabric can be heat sealed using equipment in accordance with manufacturer's specifications.

1.2 AWNING FRAMING

A. All aluminum frame tubing shall be painted to match the material color.

B. Framing shall be designed and installed to be structurally sound, and meet all North Carolina construction codes and regulations. This includes material connections to framing.

C. Front of awning shall have a 6" facia overhang. Sides of awning shall be fully open.
SECTION 2
DIVISION 11
EQUIPMENT
DIVISION 11 - EQUIPMENT

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

GENERAL PROVISIONS

1.1 CAPITAL IMPROVEMENT PROJECT EQUIPMENT IS IN ONE OF TWO CATEGORIES

A. Fixed (built-in) Equipment is defined as equipment that will become an integral part of the project by the fact that it will require connections with the structural, mechanical, plumbing, or electrical systems. It is acquired through the construction contract and is in the project construction budget. This includes such items as shelving, food service equipment, unit kitchens, cabinets, laboratory work benches, fumes hoods, and fixed seating. The specifications shall clearly define which contractors have responsibilities relative to equipment receiving, inventory, and installation (including utility hook-ups).

B. Moveable Equipment is generally defined as equipment that does not have permanent attachment to the building’s systems. There is a budget for moveable equipment within the total project authorization. This equipment will be purchased by the University directly and is not part of any construction contract. Most of the items will be purchased by the University's Purchasing Department and, therefore, are governed by state purchasing regulations.

C. There may be a list of moveable equipment in the project's program statement and the designer may be asked to help develop the final moveable equipment list as an additional service.

D. Allowances for all equipment need be considered during design. Some equipment may require connections to the project structure or utilities; therefore provisions for connections shall be in the project design (power, waste, water, natural gas, etc.). Both drawings and specifications shall clearly define who is responsible for receiving, installing, and connecting equipment.

VENDING EQUIPMENT

1.2 COORDINATION

A. The owner’s representative will coordinate vending area requirements to be included in the design. Connection requirements of equipment (power, water, etc.) shall be provided to the designer and included in the design. Equipment shall be provided by the University or vending companies having contracts with the University. Requirements for a typical vending area are as follows:
   1. Drink, sandwich, and candy require a 20 amp duplex receptacle.
   2. All water and electrical outlets should be 18 inches A.F.F.
   3. Floor finishes should be hard surface (ceramic tile, etc.).

1.3 VENDING MACHINES PROGRAM SPECIFICATIONS

A. Purpose: To provide students, faculty and staff convenient access to snack and beverage vending machines whenever the facility is open for operation. Machines should be located inside the facility in an easily accessible location but visual presentation and minimization of noise transference is important. If the facility includes covered outside areas and patios, consideration should be given to locating additional vending machines in this location if it can be
done tastefully. If workrooms, kitchenettes, or lounges are included in the program consideration should be given to locating vending machines in or near these areas also.

B. Quantity Needed:
1. Faculty/Staff Office Building
   a. Minimum: 1 snack and 1 beverage machine per building per 100-150 people.
   b. Optimal: 1 snack and 2 beverage machines per building per 100-150 people.
2. Combination of Classrooms & Office Building
   a. Minimum: 1 snack and 2 beverage machines per building per 100-150 office people & 10 classrooms.
   b. Optimal: 2 snack and 4 beverage machines per building per 100-150 office people & 10 classrooms.

C. Design Factors
1. Typical Weight of Loaded Machine: @ 1000 lbs for bottle beverage Diagrams – (Attached?)
2. Space Needed Per Machine:
   a. Space for machine—79” high X 37” to 55” wide X 41” deep
   b. Space need to service—37” from front of the machine
   c. Spaced needed for facade—96” high; 2 end caps at 10” each
   d. Space for convenient customer clearance—44 inches beyond the service space ideal.
   e. Total Spaced needed per machine: 10.77 sq ft to 15.89 sq ft machine only
   f. Total Space Recommended: 79 “high X 185 “wide X 78” deep - Space for typical vending set-up of 3 machines, 1 microwave, and 1 trash/recycle. If a glass front bottle machine is used, add 5” to the width. If an “elevator” machine is used, add 15”.
3. Service Access
   a. Type/Size of Access Needed for Installation and Servicing: Width and Height of door openings needed for machine clearance – 36” wide X 79” high
   b. Preferred access without use of elevator or stairs: If elevator must be used to install, insure width, height and weight rating – 36” w X 79” h—weight empty: up to 680 lbs.
   c. Spatial Relationship of Spaces and Access: Location of vending near fountains and bathrooms, high traffic areas (lounges, labs, concentration of classroom, or other high density utilization spaces), and/or high traffic entrances is optimal. Storage and access to loading dock or other outside unloading area is preferred both for installation and routing servicing.
4. Utility Requirements
   b. Snack machine can be plugged into outlet with beverage machine.
      1) 49er Card Access – Standard network connection
   c. Sanitary Sewer drains in tiled areas to facilitate cleaning
5. Special Considerations (Noise, Aesthetics, etc.):
   a. Floor and Wall treatments – This will be a high use area. Tile floor is recommended around the machines to facilitate cleaning of spills; if carpet is utilized near machines color/pattern should be selected to hide stains.
   b. Sheetrock wall corners should have bumpers or edge protectors to prevent damage during machine filling. Wall finish around machines should facilitate cleaning, i.e. gloss paint.
   c. Noise – Machines should be located as to minimize noise transference to other areas of the facility. This may include placing machines in a room, alcove, or otherwise creating noise barriers.
   d. Aesthetics - We would like as possible to integrate machines with facades so they appear planned versus just stuck together in a space. See Owner for facade approach. Although we would like the machines very accessible, they should be visually attractive. This may require some screening, etc.
6. Trash
   a. Large and attractive Trash and Recycling containers should be located near all vending areas and should be integrated into the wall lines as possible, i.e. not appear to be an afterthought, stuck in a hallway.

D. Amenities
   1. As space permits the following items would be included with a central vending area, as possible in distributed location:
      a. Space, utilities, and counter for a commercial grade Microwave.
      b. Counters for patrons to set their materials/packs, etc on while they use the machine, or consume their purchase.

E. Other Program Considerations:
   1. Avoid placing machines in locations in which usage will block hallway access. If staff workrooms/kitchenettes or staff and student lounges are included in the program, consideration should be given to locating vending machines in these locations also, i.e. one beverage and snack machine per workroom/lounge. Facility tenants/owners should be consulted before placing vending machines in these areas.

1.4 CAMPUS CONTACT
   A. For Additional Information and Design Review:
      
      Name: Auxiliary Services
      Address: Auxiliary Services Bldg.
              UNC Charlotte
              9201 Univ. City Blvd.
              Charlotte, NC 28223-0001
      Phone: 704.687.2413
      Fax: 704.687.6828

1.5 SPACE DIAGRAMS

Bank Width – 136“
COPY MACHINES PROGRAM SPECIFICATIONS

1.1 PURPOSE
A. To provide students, faculty and staff convenient access to copiers whenever the facility is open for operation.
B. Machines may be located in publicly accessible areas and inside departmental workrooms.
C. Should a copier be located in a publicly accessible area presentation and adherence to safety codes is important. Also, most companies have guidelines or requirements for service work zones that need to be accommodated.
D. Care should be taken to not place copiers too close to built-in cabinetry, as copier equipment is changed every 3-5 years and new equipment may vary in size from the initial machine.
E. A small supply cabinet or small worktable is required close to the equipment. Office paper recycling system should also be located close to the machine.

1.2 QUANTITY NEEDED
A. Faculty/Staff Office Building
   1. Minimum: 1 publicly accessible copier per building
   2. Optimal: 1 copier per department with 1 publicly accessible copier per building.
B. Combination of Classrooms & Office Building
   1. Minimum: 1 publicly accessible copier per floor
   2. Optimal: 1 copier per department with 1 publicly accessible copier every other floor

1.3 DESIGN FACTORS
A. Typical Weight of Loaded Machine: @ 250 lbs
B. Space Needed Per Machine:
   1. Space for machine: 42.5” high X 59” wide X 28”deep
   2. Space need to service
      a. Front: 30”
      b. Right Side: 10”
c. Left Side: 10”  
d. Back: 7”  
e. Height: 72” from floor

3. Space for convenient customer clearance—44 inches beyond the service space ideal.

C. Total Spaced needed per machine: 36 sq ft of floor space for machine only

D. Total Space Recommended: 72” high X 135” wide X 65” deep - Space for copier with duplex and high capacity feeder/finisher attachment, adequate service space, 36” table/storage cabinet, and 2 10” wide office paper recycling bins.

E. Type/Size of Access Needed for Installation and Servicing:
   1. Width and Height of door openings needed for machine clearance – 32” wide; height not an issue  
   2. Preferred access without use of stairs  
   3. If elevator must be used to install, insure width and weight rating – 32”w—weight empty: up to 250 lbs not including personnel

F. Spatial Relationship of Spaces and Access:
   1. Location of publicly accessible copiers near high traffic areas (lounges, labs, concentration of classrooms, or other high density utilization spaces), and/or high traffic entrances is optimal.  
   2. Location of departmental copiers near central office or in departmental workroom is optimal.

1.4 UTILITIES REQUIREMENTS
   A. Power: Dedicated 20 amp/115 volt circuit  
   B. 49er Card Access

1.5 ENVIRONMENTAL REQUIREMENTS:
   A. Temperature: Greater than 50 F and less than 90 F  
   B. Humidity: 10% RH minimum and 85% RH maximum

1.6 SPECIAL CONSIDERATIONS (NOISE, AESTHETICS, ETC)
   A. Built-in shelving/cabinetry – Care should be taken to not place copiers too close to built-in cabinetry, as copier equipment is changed every 3-5 years and new equipment may vary in size from the initial machine.  
   B. Heat – Copiers generate heat both at rest and during operation. Proper ventilation should exist to handle 612 BTU per hour when at rest and 2,407 BTU per hour when operating.  
   C. Noise – Machines should be located as to minimize noise transference to other areas of the facility. This may include placing machines in a room, alcove, or otherwise creating noise barriers.  
   D. Aesthetics - We would like as possible to integrate machines so they appear planned versus just stuck together in a space. We would like the machines very accessible and they should be visually attractive. This may require some screening, etc.  
   E. Trash – Small and attractive Trash and Recycling containers should be located near all copier areas and should be integrated into the wall lines as possible, i.e. not appear to be an afterthought, stuck in a hallway.  
   F. Amenities – As space permits the following items would be included with a copier area, as possible in distributed location.
G. Table for patrons to set their materials/packs, etc on while they use the machine

H. Other Program Considerations: Avoid placing machines in locations in which usage will block hallway access. If staff workrooms/kitchenettes or staff and student lounges are included in the program, consideration should be given to locating copier equipment in these locations also, e.g. one machine per workroom/lounge. Facility tenants/owners should be consulted before placing copiers in these areas.

1.7 CAMPUS CONTACT FOR ADDITIONAL INFORMATION AND DESIGN REVIEW:
Name  Auxiliary Services
Address  Auxiliary Services Bldg.
UNC Charlotte
9201 Univ. City Blvd.
Charlotte, NC 28223-0001
Phone  704.687.2413
Fax  704.687.6828

1.8 DIAGRAMS:

PAY-FOR-PRINT PRINTING PROGRAM SPECIFICATIONS

1.1 PURPOSE
A. To provide students, faculty and staff convenient access to printers whenever the public or departmental lab is open for operation. Machines may be located in publicly accessible areas and inside departmental labs. Care should be taken to not place printers in or too close to built-in cabinetry, as equipment is changed every 3-5 years and new equipment may vary in size from the initial machine. A small supply cabinet is required close to the equipment. Office paper recycling system should also be located close to machine.
1.2 QUANTITY NEEDED
   A. Public Lab:
      1. Minimum: 1 publicly accessible printer per building
      2. Optimal: 1 printer per lab.
   B. Classroom/Departmental Lab:
      1. Minimum: 1 publicly accessible printer
      2. Optimal: 1 printer per lab

1.3 DESIGN FACTORS
   A. Typical Weight of Loaded Machine: @ 114 lbs (Printer) & @ 80 lbs (Computer)
   B. Space Needed Per Machine:
      1. Printer:
         a. Space for machine—24.4” high X 18.7” wide X 24.6” deep
         b. Space need to service
            1) Front: 30”
            2) Right Side: 10”
            3) Left Side: 10”
            4) Back: 7”
            5) Height: 72” from floor
      2. Print Release Station:
         a. Space for machine—17” high X 29.5” wide X 27” deep
         b. Space need to service
            1) Front: 30”
            2) Right Side: 10”
            3) Left Side: 10”
            4) Back: 7”
            5) Height: 72” from floor
   C. Space for convenient customer clearance—44 inches beyond the service space ideal.
   D. Total Spaced needed per machine: 36 sq ft of floor space for machine only.
   E. Total Space Recommended: 72” high X 135” wide X 67” deep - Space for printer with Pay-for Print Release Station, adequate service space, 36” table/storage cabinet, and 2 10” wide office paper recycling bins.
   F. Type/Size of Access Needed for Installation and Servicing:
      1. Width and Height of door openings needed for machine clearance – standard size interior door; height not an issue
      2. Preferred access without use of stairs
      3. If elevator must be used to install, insure width and weight rating 32” w—weight empty: up to 215 lbs not including personnel
   G. Spatial Relationship of Spaces and Access: Location of publicly accessible printers in or near public computer labs and departmental labs used as classrooms is optimal.

1.4 UTILITIES REQUIREMENTS:
   A. Power – Two (2) Dedicated 20 amp/115 volt circuit
   B. Network Line
      1. Two (2) campus network drops
      2. 49er Card Access --Twisted pair back to Telecommunications Room
1.5  ENVIRONMENTAL REQUIREMENTS:
   A. Temperature: greater than 50 F and less than 90 F
   B. Humidity: 10% RH minimum and 85% RH maximum

1.6  SPECIAL CONSIDERATIONS (NOISE, AESTHETICS, ETC.):
   A. Built-in shelving/cabinetry – Care should be taken to not place printers in or too close to built-in 
cabinetry, as equipment is changed every 3-5 years and new equipment may vary in size from 
the initial machine.
   B. Heat/Mechanical Ozone – Printers generate some heat and mechanical ozone. Proper 
ventilation should exist to handle 612 BTU per hour.
   C. Noise – Machines should be located as to minimize noise transference to other areas of the 
facility.
   D. Aesthetics - We would like as possible to integrate machines so they appear planned versus 
just stuck together in a space. We would like the machines very accessible and they should 
be visually attractive.
   E. Trash – Small and attractive Trash and Recycling containers should be located near all printer 
areas and should be integrated into the wall lines as possible so that they appear to be planned 
for the space.
   F. Amenities – As space permits the following items would be included with a printer area, as 
possible in distributed location:
      1. Table for patrons to set their materials/packs, etc on while they use the machine 
      2. Small storage area for paper and toner supplies

1.7  OTHER PROGRAM CONSIDERATIONS:
   A. Public labs are often open 24/7 and sometimes do not have attendants on duty. Allowances 
should be made to accommodate devices to secure the equipment to the tables/cabinets.

1.8  CAMPUS CONTACT FOR ADDITIONAL INFORMATION AND DESIGN REVIEW:
   Name          Auxiliary Services
   Address        Auxiliary Services Bldg.
                  UNC Charlotte
                  9201 Univ. City Blvd.
                  Charlotte, NC 28223-0001
   Phone          704.687.2413
   Fax            704.687.6828

CENTRALIZED MAIL ROOM PROGRAM SPECIFICATIONS

1.1 CENTRALIZED MAIL ROOM
   A. Location: Mail is moved about campus in bins transported with small pick-up trucks or cart 
vehicles. To facilitate pick-up and delivery centralized mail rooms should be located near or 
adjacent to the loading dock area, or be otherwise easily accessible from an exterior location by 
mail service personnel using campus motor vehicles. Additionally they must be easily 
accessible to departmental staff within the building.
      1. Door Access Control: The room must contain a secure door to be accessible only by 
mail delivery and designated faculty and staff of each department housed in the building. The
access control mechanism should be a card reader system tied into the campus wide Lenell card access system per the approved University standard with accompanying master key accessible hardware.

2. **Size:** The scale 8’X 10’ drawn above is a maximum size requirement, which will vary depending upon the number of departments occupying the building. Each room should have enough space to place outgoing bulk mail trays or tubs being sent from departments for processing. Shelving should be of such that will allow sorting of newspapers, flats and some small boxes. This design may be modified as space is allowed in each building and based on the number of departments/offices requiring mail services. Size and layout should be coordinated during schematic design with the Director of Mail Services.

3. **Room finishes:**
   a. **Shelving:** A good working sample of the shelving is located in the College of Education building.
   b. **The floor should be finished with tile if possible**
   c. **Lighting needs to be adequate to insure that users can see and read small print on mailing materials**
   d. **Since the space will be accessed by building users it is preferable that the space be interior to the facility and conditioned (air and heat) versus requiring building users to be exposed to the outside elements.**

4. **The following existing mailrooms would serve as a good example of what is needed, again depending on the number and type of departments and individuals occupying the facility:** College of Education Mailroom Woodward Hall Mailroom.

5. **When the mail service area also functions as the recycling area for the department, the recycling area must be large enough to accommodate two paper containers (each 3 feet by 6 feet in plan).**
SECTION 2

DIVISION 11

CAMPUS FOOD SERVICE APPENDIX A
DIVISION 11- CAMPUS FOOD SERVICE APPENDIX A
CAMPUS FOOD SERVICE OPERATIONS

FOOD OPERATION CONSTRUCTION AND RENOVATIONS

1.1 UNIVERSITY DEPARTMENT
   A. Business Services’ Auxiliary Services Department shall review and approve any new food operations construction and renovation along with the appropriate Facilities Management Departments including preliminary program, design drawings, and construction drawings. Auxiliary Services Department administers all food related contracts with the University and outside vendors. Auxiliary Services Department shall be integrally involved in all aspects of construction including scheduling, construction progress, changes, and funding decisions.

1.2 PLAN REVIEW
   A. All new food operation construction and renovations shall be reviewed and approved by the North Carolina Department of Insurance.
   B. All new food operation construction and renovations shall be reviewed by the Mecklenburg County Health Department. Refer to web site under “Environment Health Plan Review” http://www.charmeck.nc.us/Departments/Health+Department/Environmental+Health/Food+and+Facilities+Sanitation/Programs+and+Services/Environmental+Health.htm

1.3 RULE AND CODE COMPLIANCE
   A. All food operation construction and renovations shall comply with all Federal, State, and Local codes and guidelines.

1.4 SPECIFIC RULE AND CODE COMPLIANCE
   A. Note: This is to bring special attention of rules and codes, other rules & codes may be required and govern new construction and renovations as appropriate.
   B. All new food operation construction and renovations shall comply with administrative rules used by the North Carolina Department of Environment and Natural Resources. The rules are from “Title 15A, Subchapter 18A of the North Carolina Administrative Code”.
   C. All new food operation construction and renovations shall require a site survey and review of all new equipment installed by the Mecklenburg County Health Department to insure that installation does follow the original approved plan review. This site survey and review will be scheduled and coordinated by the University’s Food contractor as the health certificate shall be issued to the contractor, not the University.
   D. All new food operation construction and renovations shall be inspected at a later date by the Mecklenburg County Health Department to receive the require health rating certificate which will be posted at each food preparation site.
   E. All new food operation construction and renovations shall comply with the current National Electric Code NFPA 70.
F. All new food operation construction and renovations shall comply with the current State of North Carolina, Department of Administration, State Construction Office, Electrical Guidelines and Policies.

G. All new food operation construction and renovations shall comply with the Charlotte Mecklenburg Utility Department guidelines on requirements for sanitary sewer grease separators or interceptors. Refer to Mecklenburg County Code interpretation 1003.1 dated January 1, 2005.

H. All new food operation construction and renovations shall comply to the current North Carolina Building Code with respect of the use and requirement of exhaust hoods for use in food service operations. This includes North Carolina Mechanical Codes and guides for furnishing make up air required as part of an exhaust hood installation. All “Seismic Bracing” shall be installed as per guides and codes. Food exhaust duct shall have appropriate clean out access hatches for use during regular scheduled contracted duct cleaning.

I. All new food operation construction and renovations shall comply to the NFPA 17A and North Carolina Fire Codes concerning fire suppression systems with food exhaust hoods.

1.5 STANDARDS

A. Flooring- Anti-bacterial ceramic tile shall be installed on all food preparation floors. This tile shall have slip preventative surface but allow for easy cleaning.

B. Ceiling- As per standard building codes, all ceilings shall be cleanable in food preparation areas.

C. Walls, Cabinets, Equipment- All services shall be easily cleanable.

D. Point of Sale
   1. All food locations require 49er card jacks.
   2. One Ethernet jack for credit card machine.
   3. Quad electrical box for each point of sale.
   4. The University will provide the point of sale equipment.

E. Beverage Machines
   1. The University’s contract food vendor arranges for the installation of beverage distribution stations, contractor must provide smooth chases for the installation of beverage lines from the distribution station to the “bag in the box” location and the CO2 propellant location.

F. Loading Docks
   1. Each facility shall have a standard truck height dock with a level pad for tractor trailers. There shall be ample space in the loading dock area for garbage disposal unit, cardboard disposal unit, and grease disposal unit.
   2. All these units shall require ample space for scheduled truck pick up and clean out.
   3. Designers shall consider that most all of food service supply delivery trucks are tractor trailer size vehicles, access and turning radiuses should be considered during the program and design process.

G. Grease Disposal
   1. All new food operation construction and renovations shall be required to subscribe to a grease disposal pickup service including grease disposal unit at the loading dock area.

H. Can Wash
   1. All new food operation construction and renovations shall incorporate a can wash equipment and can wash area at an appropriate location with curbs.

I. Hot Water Heaters
   1. Hot water heaters shall be installed to provide the required 140 degree water for dish washing and prep sinks.
2. Mixing valves and/or additional hot water heater will be required to provide hot water for hand sinks in the food operation area as appropriate.

J. Cameras
1. All new food operation construction and renovations shall incorporate electronic cameras to monitor cash operations at point of sale areas.
2. System to communicate and operate with the campus standard camera systems.

K. Emergency Power
1. All new food operation construction and renovations shall have all walk in coolers and freezers on secondary back up emergency power generator in the case of loss of house electrical power.

L. Restrooms
1. Although covered in the Mecklenburg County Health Department rules and codes, appropriate locations for restrooms shall be provided for both employees and customers including hot running water.

M. Equipment
1. All new food operation construction and renovations equipment shall be required to have the NSF (NSF International Inc.) and UL label.

N. Utilities for Food Equipment
1. General utilities shall be provided at each site by the general contractor for connection to Kitchen and Food Equipment.
2. General contractor shall be required to make all hard utility connections to Kitchen and Food Equipment.
DIVISION 12 - FURNISHINGS

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 12 2113 – HORIZONTAL LOUVER BLINDS

PART 1 - PRODUCTS

1.1 LOUVER BLINDS:
   A. If blinds are included in the project, they shall be of horizontal style and give a uniform appearance from the exterior. Vertical blinds shall be avoided.

SECTION 12 6100 – FIXED AUDIENCE SEATING

PART 1 - GENERAL

1.1 PROJECT CONDITION
   Field Measurements: Coordinate actual dimensions of construction affecting fixed lecture room seating installation by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid delay of Work.

1.2 WARRANTY
   A. Manufacturer’s Product Warranty: Submit manufacturer’s standard warranty form for fixed lecture room chairs. This warranty is in addition to, and not a limitation of other rights Owner may have under Contract Documents.
      1. Warranty Period: One year from Date of Substantial Completion.
      2. Beneficiary: Issue warranty in legal name of project Owner.
      3. Warranty Acceptance: Owner is sole authority who will determine acceptance of warranty documents.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. Materials (Flammability) shall satisfy applicable test, codes, standards, or requirements as follows:
      1. Polyethylene shall meet the Federal Motor Vehicle Safety Standard No. 302 which specifies a burning rate of less than 4 inches per minute.
      4. Cushioning and padding shall be self extinguishing as defined in the requirements as set forth in the State of California Bureau of Home Furnishings Technical Bulletin 117.
2.2 SEATING
A. Fixed classroom seating shall be designed with manufactured, integral horizontal beams for future installation of data transmission cables. Unless directed otherwise, each seat shall be provided with oversized folding tablet-arm writing surface for placement of laptop computers. Tablet-arm support arms shall be heavy duty.
B. Approximately 8% of tablet-arm shall be configured for comfortable use by left-handed persons.

2.3 SEATING FABRICATION
A. Chair standards (legs and sides) shall be constructed of heavy duty cast iron.
B. Backs of chairs shall be curved. Seats shall be upholstered unless directed otherwise.
C. Structural Performance:
   1. Engineer, fabricate and install fixed audience seating to the following structural loads without exceeding allowable design working stresses of materials involved, including anchors and connection. Apply each load to produce maximum stress in each respective component of each audience seat unit.
D. Manufacturer's System Design Criteria:
   1. Table Tops:
      2. Shall be nominal 1-1/4" thick, warp-resistant construction.
      3. Shall have core construction of 1-1/8" thick Novoply of 45 pcf density. Top surface shall have .040" high pressure laminate meeting NEMA 1999 standards, the bottom surface shall have .020" thick backing sheet.
      4. Glue shall be PVA applied under hot press.
      5. Edges shall be extruded 1-1/4" vinyl bullnose with T groove, inserted into a routed groove and secured every 12".
E. Modesty Panels:
   1. Shall be nominal .810" thick, warp-resistant construction.
   2. Shall have core construction of .75" thick Novoply of 45 pcf density. Top surface shall have .040" high pressure laminate meeting NEMA 1999 standards, the bottom surface shall have .020" thick backing sheet.
   3. Glue shall be PVA applied under hot press.
   4. Edges shall be extruded 7/8" vinyl bullnose with T groove, inserted into a routed groove and secured very 8 inches.
F. Frames:
   1. Table and seating frames shall be constructed of 1-1/2" x 2" x 11 gauge welded tube, configured into an integral unit for support of table and seat swing arm mechanism.
   2. Table mounting plate shall be 6" x 8" x 11 gauge formed plate for securing to floor with 3/8" expansion anchors.
   3. Swing arms shall be constructed from 1-1/2" x 2"x 11 gauge welded tube, hinged at the cantilever frame with copolymer thermoplastic bearings at 8 gauge junction box with spring activated return fully enclosed to prevent injury.
G. Seat Modules:
   1. A two piece injection molded thermoplastic seat and backrest. The seats and backrests shall be joined by a maintenance free steel hinge with integral spring mechanism. The hinge is to be covered with a high-strength plastic bellows. Attachment to steel frame shall be through four molded-in sills on bottom of seat.
   2. Upholstered seats and back pads are required.
   3. Provide removable or swing-away chairs where wheelchair spaces are required.
H. Power Modules:
1. Integral power modules shall be 6-1/4" long x 3" wide x 2-1/2" high. Module shall be constructed of polycarbonate with textured finish, meeting UL-VO minimum requirements.

2. Each power module shall have one duplex receptacle (110 volts) and two data ports for data connections to meet AT&T standard connections. Data connectors to be provided by owner. The power module shall have a positive locking device in open position. Shall be constructed for use with eight wire harness.

3. Eight Wire Harness shall be constructed from flexible conduit to distribute power between power/data modules and the power in-feed. The wire harness shall be enclosed in a plastic trough with a metal divider to separate power and communication or data cables. The trough shall be .06 inch thick rigid pvc and attached to underside of table surfaces.

SECTION 12 9300 – SITE FURNISHINGS

PART 1 - PRODUCTS

1.1 SEATING

A. Campus Memorial Benches:
   1. Campus benches are acquired by donations through the University Development Office. Location of benches will be provided through the UPM by the guidance of the Development Office and coordinated with the Facilities Management Planning Section.
   2. Bench Material and Style: Campus benches will be made of wood and metal as made by DuMor model #67-470, or approved equal, with clear heart redwood or fair-weather Transit series model T-2 with clear heart redwood or ipe wood. Legs will be made of metal, painted black, and be a “Gull Wing” design. (see Annex F, attached herewith).
   3. Bench Location Considerations:
      a. The location of the bench shall be placed to create a pleasant and comfortable environment.
      b. Orient benches to face landscaped areas when possible.
      c. Avoid facing benches toward streets and parking areas.
      d. Locate benches to attract students.
      e. Benches made of ipe wood will not be placed in areas in close proximity to benches made of redwood.
      f. Benches will be located to bring honor to those for whom they were dedicated. When large numbers of benches are donated, careful consideration must be given to the location to ensure the selected area will not be inundated with unnecessary seating.

1.2 COLUMNS AND WALLS

A. Refer to the Design Guideline Illustrations. Placement of new columns and walls shall be reviewed with the University Landscape Architect. Seat Walls – Use “Basic Square Rowlock” corner blocks.

1.3 BICYCLE RACKS

   See Annex F, attached herewith.

1.4 TRASH RECEPTACLES

A. Provide exterior trash and recycling containers (consult UPM for appropriate number and orientation).

B. See Annex/Appendix.
1.5  BOLLARDS
    Pipe - Shall be 8” diameter, 36” high painted steel pipe set in 18” 3000 psi concrete.

1.6  SKATE STOPPERS
    A. Install skate board stopping.
    B. See Annex/Appendix.

1.7  ASH URNS
    A. Work with UPM to determine quantity and locations.
    B. See Annex/Appendix.

1.8  SIGNAGE
    A. See “CAMPUS SIGNAGE STANDARDS DOCUMENT”.
    B. Signs, Roads Placement: (See Annex F, attached herewith).
SECTION 2
DIVISION 13
SPECIAL CONSTRUCTION
DIVISION 13 - SPECIAL CONSTRUCTION

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

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SECTION 2
DIVISION 14
CONVEYING EQUIPMENT SYSTEMS
DIVISION 14 – CONVEYING EQUIPMENT

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 14 2000 – ELEVATORS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE
   A. The system must comply with ADA requirements; ASME/ANSI A17.1/A17.5; CSA & UL approved; and FCC Class A approved, and all applicable codes.
   B. Provide heat and smoke detector devices, and sprinkler heads as required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL
   A. Elevator Equipment Room floors shall be a minimum of four feet in elevation above the bottom of the elevator shaft.

2.2 SYSTEMS AND COMPONENTS
   A. New Elevator Controls Modernization System.
      1. This system shall be a microprocessor-based network with improved performance over relay-based or conventional dispatching systems. The system shall have the capability of real time management and advance information processing to analyze building traffic patterns and evaluates estimated times of arrival (ETA) based on car position and hall call assignments for each car in the building. The system shall dispatch the car with the shortest ETA so passenger wait time is minimal.
      2. The system shall also improve ride quality by continually regulating the key elements which affect ride comfort, acceleration and deceleration, door opens, and floor to floor times.
      3. The system shall have modernization compatibility built in, such that it can work and function with existing peripherals such as door operators and signals.
      4. The system shall land elevators consistently at floor levels with greater accuracy. Cars shall not stop first, and then adjust to floor position. Actual floor heights are stored in memory and the system automatically adjusts to compensate for shifts in floor levels.
      5. The system shall be compatible with upgrading the elevator drive control to solid state DC or ACVF depending on the condition of the elevator system and the desired performance improvements.
      6. Each car shall have its own microprocessor so any car can act as the dispatcher. This redundant dispatching capability enables another car to assume master controller responsibilities in the event the master controller is taken out of service.
7. Phase I & II emergency fire service shall be provided in compliance with the ANSI A17.1 and NC State Building Code.

8. An emergency alarm bell shall be located on the car in conformance with ANSI A17.1 Code requirements, and connected to a plainly marked pushbutton in the car.

9. Elevators will return to ground floor and open doors in the event of a power failure. Provide emergency power as needed to accomplish this.

10. Elevator door emergency access keys shall be keyed to match the University Standard system and be placed in a Knox box on premises with a copy given to Campus Police Department.

11. Provide shunt-trip circuit as required.

2.3 OPERATION SYSTEMS (DUPLEX CAR AUTOMATIC, INDEPENDENT SERVICE FEATURE):

A. Control of the elevator car shall be automatic in operation by means of a push button in the car marked for each of the two landing levels served and one button at each landing, wherein all stops registered by the momentary pressure of landing or car buttons shall be maintained until the car answers the call. An emergency stop switch shall be provided in the car push button station which, when in the off position, will render the elevator inoperative, and which will enable attendant or passenger to stop the car at any point during its travel. Opening of this switch shall not cancel registered calls, and when the switch is closed the car will continue to answer calls that have been registered. Each landing station shall contain a push button which shall become illuminated when pressed to indicate that a call has been registered to bring the car to that particular landing. A time delay, noninterference feature shall be incorporated in the control mechanism to allow ample time for opening and closing car and hoistway doors before it is again placed in motion.

B. The operating buttons in the car and at the landings shall be vandal resistant fixtures and mounted in flush plates of a stainless steel finish. Fixtures shall be etched for illumination.

C. An adjustable time delay (minimum 3-15 seconds) shall be provided so that after the car has stopped in response to a hall button, the entering passenger may register his car button before the car will reverse to answer calls in the opposite direction. The car stations hall contain an emergency switch for stopping the car at any point in its travel. Opening of this switch shall not cancel registered calls; when the switch is closed, the car shall continue to answer calls that have been registered. If the emergency switch is activated it shall be connected so as to sound the alarm bell located on the car top.

D. The car station shall contain key switch(es) to operate the fan, lights and independent service operation. The independent service operation shall be capable of locking out each floor by use of key switch at each floor button location. Some floors will have restricted access and some floors will have limited access at certain times of the day. The independent service shall be such that it can be adaptable to add a card reader access system into the cab if necessary. A “door open” button shall be provided for stopping the closing motion of the doors, causing them to return automatically to their open position. The buttons in the car and hall stations shall be of the light-up type which will illuminate when the button is pressed, indicating that a call has been registered for that landing.

E. Smoke detectors in the elevator machine room and each elevator lobby are on a separate zone. Only these detectors will affect the elevator. Should the first floor elevator lobby detector or elevator machine room detector be activated, the elevator is to park at the 2nd floor.

F. Door Hold-Open Timer:

1. The door hold-open timer shall be a modification to the elevator control circuitry combined with a solid state timer which is wired to the door open button in the elevator car. Pressing the door open button twice activates the timer and establishes an open door time which can be adjusted anywhere from 10 seconds to 2 minutes. After this time period has elapsed, the doors close and the car is restored to service automatically.
pressing of a floor button in the car cancels the remaining time and permits immediate elevator service.

G. Corridor Hall Stations:
1. Hall station shall be surface mounted and have a modular design to allow for quick and easy installation of all components including key switches, etched instructions, and signage. Hall stations shall be made of anodized aluminum in stainless tones and mirror finished in frame. Mounting is with tamper resistant screws of a mirror finish. Hall stations must comply with ADA 4.10.3 and ANSI requirements.

2.4 DOOR OPENING DEVICES

A. New Door Operator:
1. New door rollers, interlocks, clutches, door tracks and spirator closures shall be retrofitted to existing elevator cars. Door operators shall provide smooth, quiet operation and outstanding reliability. Operators shall be easy to assemble and their configurations shall be field reversible and adjustable. Operators shall consist of a closed loop operation to provide smooth, steady motion at all times. Doors shall open and close without jerky movement or unnecessary noise.
2. Door operators shall feature solid state technology and strong, durable components. When maintenance is required all door operator elements shall be engineered for quick access and easy servicing.
3. Doors shall react instantaneously to safety sensors, and door closing speed and force shall be well within safety standards.
4. Elevator door safety edges to be Pana 40 continuous light beam.
5. Position adjustments shall be clearly identified and easily accessible from the top of the cab even when the door is in motion.
6. The system’s service switch has open and close button on the control. This allows for easy selection of automatic or manual operation and means that adjustments can be performed quickly and easily. Door operators shall use a rigid door clutch design meeting code requirements.
7. Elevator Door Protection Device:
   a. The elevator door safety system shall provide full opening protection; the screen shall fill the doorway from ground level to a height of six (6) feet. The system shall have no moving parts and can be set to tolerate damage keeping elevator in service.
   b. The elevator door safety system shall protect passengers by setting up a harmless curtain of infrared beams. Block a single beam and the door reopens. The beams shall be controlled by ultra-reliable electronic circuitry. Elevator doors shall open and close automatically. They shall be provided with a reopening device that will stop and reopen the car door and hoistway door automatically if the door becomes obstructed by an object or person. The device shall be capable of completing these operations without requiring contact for an obstruction passing through the opening. The device shall be a non-reflective through beam system with a minimum of forty sensors per edge. It shall have a maximum sensor spacing of 1.8” or less. It shall incorporate a microprocessor controlled fail-safe system. It shall be capable of self adjustment to compensate for varying environmental conditions.

2.5 CAR ENCLOSURES

A. Removable Cab Wall Panels:
1. Panels to be covered in plastic laminate, using a standard design from either Nevamar or Formica product lines.
2. Reveal strip package and kick plate also in plastic laminate.
B. Elevator Ceiling Grid and Tile:
   1. Ceiling shall be elevator standard suspended ceiling. Three light metal frame with translucent diffusers.
   2. Use fluorescent lighting in the elevator cab – not reflector floods.

C. Elevator Cab Flooring:
   1. Floor covering shall be 12” x 12” glue down vinyl composition tile flooring.

D. Elevator Cab Fan:
   1. Elevator 2-speed cab fan shall be fitted for each car.

E. Painting:
   1. All exposed metal work furnished by the elevator contractor under these specifications shall be properly painted after installation, except as otherwise specified.
   2. Minimum requirements shall be include one coat of metal primer, and one coat of semi-gloss industrial grade enamel.
   3. All surfaces painted must be clean and free from rust, grease, etc., before painting.

2.6 SIGNAL EQUIPMENT

A. All elevators shall contain flush mounted emergency telephones meeting University standards. Control wiring and conduit required from the elevator to the elevator equipment room shall be provided and installed by the prime contractor who installs the elevator. Conduit and wiring from the elevator equipment rooms to the facility termination point shall be installed by either the Electrical Contractor or the General Contractor. The University shall provide telephone cabling beyond the project termination point.
   1. Telephones in elevators shall be GAI-Tronics ADA Emergency telephone flush-mounted Model 287RP-AD.

B. Car Position Indicator:
   1. An electrical position indicator shall be provided in the upper portion of the elevator cab. An audible signal shall sound prior to elevator arriving at or passing any landing.
   2. A digital readout type indicator may be substituted.
   3. Fixtures shall be vandal resistant and shall be stainless steel.

C. Car Riding Lantern with Gong:
   1. The elevator shall be provided with a fixture mounted in the jamb, or soffit of the elevator cab entrance. It shall notify waiting passengers by means of electrically illuminated direction arrows and audible gong as to which direction the elevator will be traveling. The gong shall sound once indicating an “up” traveling car and twice to indicate a “down” traveling car. Fixtures shall be vandal resistant and shall be stainless steel.

D. Braille Elevator Plates and Signage:
   1. Plates and signage shall be high quality zinc die cast Braille and shall meet all ADA and ANSI requirements.
DIVISION 21 - FIRE SUPPRESSION

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 21 0510 - MECHANICAL GENERAL – FIRE SUPPRESSION

PART 1 - GENERAL

1.1 GENERAL DESIGN CRITERIA
A. Fire suppression systems are life safety systems and therefore are not subject to the energy conservation criteria applicable to other mechanical/plumbing systems.
B. The fire suppression systems do not require a Life Cycle Cost Analysis.
C. All fire suppression systems shall comply with the requirements of the applicable NFPA standards.
   1. All fire suppression systems shall comply with the applicable DOI/State Fire Marshal’s Office requirements. See the following website for the latest documentation: http://www.ncdoi.com/osfm/engineering/documents/sprinkler%282008%29.pdf.

1.2 STANDARDS
B. Standpipe and hose valve systems shall comply with NFPA 14 – Installation of Standpipes and Hose Systems.
C. Fire pump systems shall comply with NFPA 20 – Installation of Centrifugal Fire Pumps.
D. Fire water storage tanks shall comply with NFPA 22 – Water Tanks for Private Fire Protection.
E. Site fire water systems shall comply with NFPA 24 – Installation of Private Fire Mains and Their Appurtenances.
F. Automatic suppression systems for data rooms and server locations shall comply with NFPA 2001 and all appropriate NFPA standards.
G. Laboratory suppression systems shall comply with NFPA 45 and all appropriate NFPA standards.
H. All fire suppression systems shall comply with the North Carolina Department of Insurance, Office of State Fire Marshal document titles FIRE SPRINKLER AND SUPPRESSION SYSTEMS, latest edition.

1.3 DESIGN SUMMARY
A. Fire protection systems shall be designed in accordance with the requirements of NFPA.
B. Fire protection systems for State-owned facilities (facilities other than the Community Colleges) shall be submitted to the North Carolina Department of Insurance, State Property Fire Fund Division, 410 North Boylan Ave., Raleigh, NC 27603-1212 (919)733-3901 for review and approval at each phase of design.
C. Designer shall solicit input from local fire officials when developing fire protection plans for State-owned facilities.

D. Sprinkler system design shall be shown on fire protection plans, and not included on floor plans of other trades.

E. Provide a summary sheet with, at the minimum, the following information for each fire sprinkler zone: hazard classification, water application density, available water flow and pressure (static and residual data) as determined by a recent (within one year) water flow test, and test hydrant locations.

F. Indicate the size and location of any fire pumps required.

G. Indicate the location of all standpipes, tamper switches and flow switches. Provide a riser diagram for multistory (more than one floor) buildings.

H. Capacities of equipment shall be described on drawings by the way of equipment schedules. Pump rooms shall be shown large scale plans (1/4" = 1'-0" minimum) with piping larger than 2 inches in diameter drawn double line. All valves and appurtenances (tamper and flow switches) shall be properly indicated. Backflow prevention and flow control devices shall also be shown.

PART 2 - PRODUCTS

2.1 SYSTEM

A. As required by NFPA 13 and 24, the sprinkler system shall typically include the following:
1. An alarm check valve with outside water motor gong.
2. A post indicator valve located 40 feet from building walls.
3. A fire department connection on the system side of the water supply check valve.
4. Fire department connections shall be on the street side of buildings and shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets.
5. All sprinkler flow and tamper switches shall be furnished and installed under Division 13, and wired under Division 26.
6. Valves shall comply with the requirements listed in the appropriate NFPA standards and the OSFM documents. All valves shall be fitted with polished brass tags with the stamp-engraved system abbreviation and sequenced valve number. Valve tags shall be attached with brass chains or “S” hooks.
7. Piping shall comply with the requirements listed in the appropriate NFPA standards and the OSFM documents.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Specify that sprinkler heads be centered in ceiling tiles unless specific locations make this impossible.
SECTION 2
DIVISION 22
PLUMBING
DIVISION 22 – PLUMBING

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 22 0510 - PLUMBING GENERAL

PART 1 - GENERAL

1.1 PLUMBING DESIGNER:
   A. Design for Maintainability. Plumbing systems and systems components shall be durable and easy to maintain. The Consultants shall incorporate into equipment and system design sufficient access and clearance for maintenance, repairs, and replacement. Incorporate instrumentation necessary for balance and initial adjustment, as well as for service and monitoring. Design for Reliability. Systems shall have a high degree of reliability. If an entire building system will be affected by lesser reliability of a component (for example, a pump serving building chilled water system), then a redundant piece of equipment shall be provided to increase overall system reliability. Design for parallel operation is acceptable for redundancy.
   B. Design for Energy Conservation. The energy efficiency of building systems and equipment is an essential part of the University design philosophy. Any new project shall be designed with state of the art energy efficiency. Design standards published by American Institute of Architecture (AIA), American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) and the State of North Carolina shall be met or exceeded.
      1. Major energy consuming systems and equipment shall be specified and purchased based on Life Cycle Cost Analysis. Careful evaluation of energy conservation measures shall begin early in the design phase and continue throughout the design process.
      2. Three phase electric motors for mechanical equipment shall be specified to be Premium Efficiency.
      3. The thickness of insulation for chilled water, hot water, steam, and condensate shall be geared toward conserving energy. Insulation thickness shall be selected for optimum cost versus/efficiency. Economic evaluation is desirable.
      4. The Designer shall submit a report indicating utility and energy use for new facilities. The total energy consumption shall indicate monthly use of electricity, water, and gas for the Water and associated energy requirements shall be shown for process water, irrigation and domestic hot water. Energy use estimates shall be submitted with each design phase as well as with each alternate design proposal. The Owner can make an exception for small-scale projects.
      5. The Designer shall submit the attached APPENDIX A Information to the Owner.

1.2 OWNER INTENT
   A. Plumbing Contract shall include:
      1. Gas piping systems, beginning with connections to piping provided by the gas utility or provider, to and including the connection with gas appliances or outlets. Where coordination with a gas utility or provider is required, such as in arranging for gas services to a building, coordination shall be through the Plumbing Contractor.
      2. Domestic water supply and sanitary sewer systems associated with buildings, from and including connection to existing mains, including provision of water meters, backflow preventers, vaults and manholes.
3. Interior roof drainage piping systems, beginning with connections to roof drains fixtures to the point of disposition, five feet outside the building. Roof drains shall be specified by the Architect, and provided in the General Contract.

4. Fire sprinkler and standpipe systems shall be part of the General Contract.

5. Gray water systems should be considered for buildings with large shower, lavatory and sink loads. Discharge from these fixtures should be collected in storage structures, treated in accordance with the State Plumbing Code and circulated to water closets and urinals as the supply for the flush valves. This water will be required to be dyed in accordance with the State statutes and routed in the appropriate piping material. The water can be stored for a maximum of 72 hours before it is either used in the fixtures or discarded. Condensate from the building’s mechanical equipment can be recycled in the gray water system.

6. Rain water harvesting should be considered for all new construction. The collection system, storage cisterns and distribution system shall meet the requirements of the North Carolina State Plumbing Code. The water can be used for site irrigation and to support the water closets and urinals in the building. Mechanical condensate can be collected and harvested along with the roof rain water. The water should be treated prior to use in accordance with the State statutes. Currently there are no time limits on the storage of this water.

1.3 DIVISION OF WORK

A. This section delineates the Division of Work between Division 22 (Plumbing Contracts) and Division 26 (Electrical Contracts).

1. Specific work to be done under Division 26 is hereinafter listed or described. All other work necessary for the operation of Division 22 equipment shall be performed under Division 22.

   a. All individual motor starters for mechanical equipment (pumps) shall be furnished and installed under Division 22 unless indicated as a part of a motor control center. Motor starters for equipment provided in motor control centers shall be furnished under Division 26.

   b. Under Division 26, power wiring shall be provided up to a termination point consisting of a junction box, trough, starter or disconnect switch. Under Division 26 line side terminations shall be provided. Wiring from the termination point to the plumbing equipment, including final connections, shall be provided under Division 22.

   c. All relays, actuators, timers, seven-day clocks, alternators, pressure, vacuum, float, flow, pneumatic-electric, and electric-pneumatic switches, aquastats, freezeastats, line and low voltage thermostats, thermals, remote selector switches, remote push-button stations, emergency break-glass stations, interlocking, disconnect switches beyond termination point, and other appurtenances associated with equipment under Division 22 shall be furnished, installed and wired under Division 22.

   d. All wiring required for controls and instrumentation not indicated on the drawings shall be furnished and installed by Division 22.

   e. The sequence of control for all equipment shall be as indicated in the Division 22 Drawings and specified in the appropriate section.

   f. Where electrical wiring is required by trades other than covered by Division 26, specifications for that section shall refer to same wiring materials and methods as specified under Division 26. No Exceptions.

2. Many of the items covered in the plumbing guidelines pertain to those items which may be unique to The University of North Carolina at Charlotte, its systems or preference or requirements mandated by Facilities Management. Any item not specifically outlined or commented upon in these guidelines is left to the judgment of the engineering design professional to use current accepted good engineering practice. The construction
3. Deviation from concepts noted in these guidelines requires approval of the Project Manager and Facilities Mechanical Engineer for The University of North Carolina at Charlotte.
4. All floor plans and enlargements of floor plans shall bear North arrows, room numbers, and column lines conforming with the designations found on the Architectural floor plans. All floor plans and enlargements shall have the same directional orientation as the architectural floor plans. Site plans and floor plan directional orientation shall agree.

1.4 ADDITIONAL REQUIREMENTS FOR DRAWINGS

A. Capacity of new equipment shall be described on drawings by way of equipment schedules. Equipment schedules shall indicate, in addition to technical data, the location of equipment and areas served by it. Schedules for air-handling units shall indicate minimum and maximum outdoor airflow in cubic feet per minute in addition to other information.

B. Flow diagrams for water and gas shall be shown on drawings with all piping sized. Direction of flow shall be indicated. The Consultant shall incorporate schematic piping diagrams for the following:
   1. Pressure-reducing stations
   2. Domestic hot water heaters
   3. Gas meter installations
   4. Others as they may apply to a specific project

C. Piping sizes shall be clearly indicated. All valves shall be shown. Valves shall be placed in locations with adequate access.

D. Mechanical equipment room layouts shall be drawn in 1/4" scale or larger. As many sections as necessary shall be provided to clarify installation of equipment, piping, and ductwork, and to show clearances for service. All large valves, particularly gate valves, shall be drawn to scale showing the location of the hand wheels.

E. The automatic temperature control schematic shall be shown on drawings. Sequence of operation description shall be included.

PART 2 - PRODUCTS

2.1 VALVES

A. All valves (except plumbing fixture faucets, convenience hose bibs, shut offs at plumbing fixtures, and similar rough-in connections and end-use fixtures) shall be provided with 19-gage polished brass valve tags with the stamp-engraved piping system abbreviation and sequenced valve numbers. Valve tags shall be attached with brass chains or S-hooks.

B. Valve schedules shall be mounted in glazed display frames at the facility and shall include valve number, piping system, system abbreviation (as shown on valve tag) and location of valve (room and space). Valves intended for emergency shut-off and similar special uses shall be marked by “flags” in the margin of the schedule.

C. All valves are required to have a donut.

D. All water valves to operate by turning the square nut clock-wise (right) to close and counter-clockwise (left) to open, as per UNCC requirements.

E. Provide all valves with extensions when grade at location is altered.
2.2 ID MATERIALS

A. Plumbing equipment shall be labeled with name, number as designated on designer’s contract documents, service and operational requirements, safety, and emergency precautions, design capacity, and other design parameters such as pressure drop, entering and leaving conditions, rpm, etc. Ductwork shall be identified as supply, return, exhaust, intake, or relief with signs and arrows showing service and direction of flow. Pipe shall be identified with colored signs and arrows indicating its respective system and direction of flow. See Div 9, Colors, for equipment and piping color schedule. New equipment will be pre-painted by the equipment supplier before shipment.

B. Permanent, bright colored, continuous plastic tape, intended for direct burial, shall be installed 8” below finished grade directly over all buried utilities. Tape shall be printed to most accurately indicate type of buried utility.

C. Tracer Wire: A #12 AWG or heavier (smaller AWG number), solid, insulated (RHW, THW, or polyethylene insulation is recommended); copper wire shall be taped to pipe at 15 to 20 foot intervals. Do not wrap wire around pipe. The wire must be one continuous, unbroken length. Coil tracer wire at meter location and street end with enough wire to extend a minimum of two feet above grade.

D. Tracer Wire Boxes: Plastic gas services longer than 1000 feet in length from curb valve to meter riser must have tracer wire boxes installed at customer’s expense in accordance with Company standards.

2.3 METERING

A. The University operates utility distribution systems for electricity, potable water, steam/condensate, hot water and chilled water. Natural gas is provided by Piedmont Natural Gas Co. Cost distribution for utilities is accomplished through a metering system and a prorated assignment of cost.

1. Meters shall be approved for interface to the FM utilities Monitoring System (Tridium VES).

2. Potable Domestic Water metering shall be by turbine or nutating disk meter with magnetic drive. Meter to be located in mechanical room, easily accessible, read in hundreds of cubic feet, and provide output to building automation.

3. Non-sewered water (consumed but not returned to the sewer, e.g. irrigation, cooling tower makeup, etc.) should be metered at its source. Meter should be located in mechanical room, easily accessible, read in hundreds of cubic feet and provide output to building automation.

4. Chilled water or hot water (where pumped to another facility through a loop system) flow temperature differential and energy consumption shall be measured and calculated for both the main building and the isolated structure. Output shall be in BTUH or Ton hours, be available at the unit, and be tied to the building automation.

5. Natural Gas metering shall comply with all requirements of Piedmont Natural Gas, and interface to the building automation system.

6. Reclaimed water metering to be added at later date.

2.4 SOUND AND VIBRATION CONTROL

A. The Consultant shall provide vibration isolation where required. There shall be no objectionable transmission of vibration from equipment to the building structure.

B. Appropriate vibration isolation of equipment, piping and ductwork shall be specified. Attention shall be paid to the proper use of flexible duct and pipe connectors, the use of resilient pipe hangers and supports, anchors and guides, and the treatment of pipe and duct penetrations through building walls.
C. Mechanical equipment rooms shall be placed preferably at ground level and away from occupied spaces to minimize transmission of vibrations and noise into the building.

SECTION 22 0700 – PIPING INSULATION

PART 1 - EXECUTION

1.1 INSULATION FOR PIPING
   A. The Designer shall evaluate thermal insulation properties and moisture migration to prevent surface condensation. Designer shall evaluate insulation vapor permeability and potential for surface sweating to recommend type of insulation. In areas where insulated pipes are subject to physical abuse, an aluminum covering shall be applied around the insulation.
   B. Insulation of underground piping shall receive special attention. Adequate protection against ground water and electrolytic forces shall be provided.
   C. All valves and fittings shall be insulated with performed fitting insulation. Provide also for insulation for all cold and hot surfaces of equipment when available from the manufacturer.

SECTION 22 4000 - PLUMBING FIXTURES

PART 1 – PRODUCTS

1.1 GENERAL

1.2 PLUMBING FIXTURES
   A. All plumbing fixtures shall be as manufactured by American Standard, Crane, Eljer, Kohler, Zurn or Toto.
   B. Flush valve type fixtures are preferred over tank type fixtures. If used, flush valves shall be manual.
   C. Toilets - Toilets shall have a "dual flush" flush valve or a dual flush tank type.
   D. Urinals – Urinals shall be low flow 0.125 gallons per flush.

1.3 PLUMBING FIXTURE TRIM
   A. Provide lavatory faucets manufactured by Zurn, Toto, Sloan, Kohler or Chicago.
   B. Provide laboratory faucets and accessories manufactured by Chicago.
   C. Automatic faucets should be used for all restroom lavatory faucets.

SECTION 22 4400 - WATER SYSTEMS

PART 1 - GENERAL

1.1 RISER DIAGRAMS
   A. Provide supply and waste riser diagrams for all multistory (more than one floor) buildings
PART 2 - PRODUCTS

2.1 PIPING

A. Sanitary sewer piping shall be cast iron. Joints for underground piping shall be bell and spigot with compression gaskets. Joints for piping above grade may be bell and spigot with compression gaskets or no-hub.

B. Vent piping shall be cast iron or galvanized steel except that galvanized steel shall not be used underground.

C. Drain, waste and vent piping for acid waste systems shall be of high silicon cast iron, borosilicate glass (above grade only) or polypropylene piping.

D. Roof drain leaders above grade shall be galvanized steel or cast iron piping with no-hub or bell and spigot joints with compression gaskets. All roof drain piping below grade shall be cast iron piping with bell and spigot joints with compression gaskets.

E. Water piping inside the building and above grade shall be type L hard drawn copper.

F. Water piping inside the building and below slab shall be type K soft annealed copper tubing with no joints below the slab. Water service shall be stubbed above floor as near the exterior wall as practical, rather than running below slab to an interior space.

G. Solder joints in copper pipe shall be made with 95 percent tin, 5 percent antimony solder in sizes up to and including 1 1/4". Joints in pipe sizes above 1 1/4" shall be made with brazing solder.

H. All piping shall be routed as to remain clear of transformer vaults, refrigerated spaces, switch rooms, elevator shafts, or other critical areas, and vault spaces over same. Do not specify drain pans under piping routed over this equipment. Reroute the piping.

I. Undersides of roof drains, and horizontal storm water drains or roof leaders inside the building shall be insulated to prevent the formation of condensation. Undersides of floor drains receiving condensate drainage from a cooling coil, and associated traps and horizontal drain piping to point of connection with other sanitary sewer piping shall be insulated to prevent the formation of condensation.

J. No piping except soil, waste or drain piping shall be installed in or below concrete slabs on grade.

K. Cold water and hot water plumbing piping is not permitted in exterior walls except to supply hose bibbs.

L. All main piping shall have accessible shut-off valves for isolation purposes. All branch piping from main shall have shut-off valves.

M. Floor drains connected to the sanitary sewer shall be provided in all mechanical equipment rooms, custodial closets, restrooms and locker rooms.

N. Hose bibbs shall be provided in all mechanical equipment rooms, kitchens, rooms that require wash down, and rooms with floor drains. All hose bibbs shall be provided with vacuum breakers.

O. Provide supply and waste piping riser diagrams for all multistory (more than one floor) buildings.

P. Verify with the local authority how elevator sump pump discharge shall be handled. This office prefers that pump discharge be routed to the sanitary sewer with an indirect (air-gap) connection. It is recommended that the pump also trigger an alarm to alert the building management system and/or maintenance personnel.

Q. Specify testing in accordance with the plumbing code.
SECTION 22 4500 - FUEL GAS SYSTEMS

PART 1 - GENERAL

1.1 GAS PIPING
   A. Gas piping shall comply with ANSI B36.10, ASTM A 53 or ASTM A 106 in accordance with Section 306.1, page 45 of the North Carolina State Building Code. Volume VI -Gas.
   B. Indicate the location of the gas pressure regulator(s) and the gas meter, if the meter is required. Indicate which contractor or utility will provide the regulator(s) or meter.
   C. Interior gas piping shall be painted yellow and identified or labeled “GAS” with stencils or labels in accordance with ANSI A13.1.

SECTION 22 8000 – PLUMBING SYSTEMS COMMISSIONING

PART 1 - GENERAL

1.1 Design for Construction Commissioning. The Plumbing Designer will be responsible for ensuring and developing “…a systematic process of assuring that a building (mechanical, electrical and plumbing systems) performs in accordance with the design intent and the Owner’s operational needs.” The Owner considers the following elements as a minimum requirement for building acceptance and inherently integral to the Mechanical designer responsibilities, unless specifically notified otherwise by the Owner.
   A. Installation Verification
   B. Startup and Checkout
   C. Performance Testing and Demonstration – Commissioning Agent?
   D. Training of staff responsible for building maintenance through mechanical contractor shall be specified.
   E. Closeout.

1.2 The Designer will include in bid documents the specific support and documentation required of the General Contractor, Mechanical Contractor, Electrical Contractor, Plumbing Contractor, Controls Contractor, Designer, Owner and others as applicable to ensure acceptable commissioning.

Reference Division 01 General Requirements for commissioning guidelines. Guidelines will be modified as appropriate for each project.
DIVISION 23 - HVAC

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 23 0510 - MECHANICAL GENERAL - HVAC

PART 1 - GENERAL

1.1 MECHANICAL DESIGNER:

A. Design for Maintainability. Mechanical systems and systems components shall be durable and easy to maintain. The Consultants shall incorporate into equipment and system design sufficient access and clearance for maintenance, repairs, and replacement. Incorporate instrumentation necessary for balance and initial adjustment, as well as for service and monitoring. Galvanized steel or concrete shall be used for outside mechanical equipment supports. Details of mechanical supports shall be shown on the drawings. Rooftop equipment should be minimized to reduce roof damage and access requirement. A full stairs or elevator shall be extended to roof for maintenance of major mechanical equipment such as air handlers, pumps, and rooftop package units on roof. Location of all new equipment shall be planned to allow future replacement without major building modifications.

B. Design for Reliability. Systems shall have a high degree of reliability. If an entire building system will be affected by lesser reliability of a component (for example, a pump serving building chilled water system), then a redundant piece of equipment shall be provided to increase overall system reliability. Design for parallel operation is acceptable for redundancy.

C. Design for Energy Conservation. The energy efficiency of building systems and equipment is an essential part of the University design philosophy. Any new project shall be designed with state of the art energy efficiency. Design standards published by American Institute of Architecture (AIA), American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) and the State of North Carolina shall be met or exceeded. GS 143-135.57, Energy and Water Use Standards for Public Major Facility Construction and Renovation Projects; Verification and Reporting of Energy and Water Use. Mechanical system design shall support LEED certification.

1. Major energy consuming systems and equipment shall be specified and purchased based on Life Cycle Cost Analysis. Careful evaluation of energy conservation measures shall begin early in the design phase and continue throughout the design process.

2. Building functions that require twenty-four hour a day operation, such as libraries, laboratories, computer rooms, and others as defined by the Owner shall be served by a system separate from that of offices or classrooms that are subject to different operating schedules.

3. Economizer Cycle that allows the use of outdoor air for free cooling during the winter and intermediate seasons without the use of mechanical refrigeration equipment, shall be specified. The Designer shall provide heat recovery for all systems using 100 percent outdoor air. All mechanical systems shall be controlled and monitored by a direct connection to FM Building Automation System as applicable.

4. Three phase electric motors for mechanical equipment shall be specified to be Premium Efficiency.

5. The Designer shall use variable volume air handling systems and variable volume pumping to optimize energy efficiency. Fans and pumps shall be selected with the highest efficiency available. Wire to water efficiency shall be evaluated for pumps prior to making the final selection.
6. The thickness of insulation for chilled water, hot water, steam, and condensate shall be geared toward conserving energy. Insulation thickness shall be selected for optimum cost versus efficiency. Economic evaluation is desirable.

7. Cooling towers shall be selected with fan motors or motors equipped with variable frequency drives to allow for energy efficient capacity control. Variable frequency drives will be located indoors.

8. Hydronic systems shall be designed with two-way modulating control valves without deadheading pumps to prevent energy waste.

9. The Designer shall evaluate mechanical systems energy efficiency not only at full load, but also at part load conditions using established computer models. The results shall be presented to the Owner. The Designer shall submit a report indicating energy use for new facilities expressed in BTUs per sq. ft. per year. The total energy consumption shall indicate monthly use of electricity, steam, water, cooling and heating BTU use from Regional Utility Plants and gas. These consumption categories shall be further divided to show energy use for lighting, motors, heating, cooling, production of domestic hot water, and other major energy uses that may apply. Energy use estimates shall be submitted with each design phase as well as with each alternate design proposal. The Owner can make an exception for small-scale projects. Designer will provide projected computer generated month to month usage of all different utilities for measurement and verification.

10. The Designer shall submit the attached APPENDIX A information to the Owner.

1.2 OWNER INTENT

A. HVAC Contract shall include:
   1. All heating connections and controls for domestic water heating equipment serviced by steam or heating-hot water. Domestic water heating equipment, cold water supply to this equipment and domestic hot water from this equipment, including connections and valves, shall be in the Plumbing Contract.
   2. Refrigeration and cold storage systems having capacity 15 tons and greater capacity. Systems of less than 15 tons may be placed in the General Contract.

1.3 DIVISION OF WORK

A. This section delineates the Division of Work between Division 23 (Plumbing and HVAC Contracts) and Division 26 (Electrical Contracts).

1. Specific work to be done under Division 26 is hereinafter listed or described. All other work necessary for the operation of Division equipment shall be performed under Division 23.
   a. All individual motor starters for mechanical equipment (fans, pumps, etc.) shall be furnished and installed under Division 23 unless indicated as a part of a motor control center. Motor starters for mechanical equipment provided in motor control centers shall be furnished under Division 26.
   b. Under Division 26, power wiring shall be provided up to a termination point consisting of a junction box, trough, starter or disconnect switch. Under Division 26 line side terminations shall be provided. Wiring from the termination point to the mechanical equipment, including final connections, shall be provided under Division 23.
   c. Duct smoke detectors shall be furnished and wired by Division 26, installed by Division 23. Fire alarm AHU shut down circuits shall be wired from the fire alarm control panel to a termination point, adjacent to the fire alarm control panel, under Division 26. AHU control wiring from the termination point to the equipment will be under 23.
   d. All relays, actuators, timers, seven-day clocks, alternators; pressure, vacuum, float, flow, pneumatic-electric, and electric-pneumatic switches; aquastats, freezestats, line and low voltage thermostats, thermals, remote selector switches, remote push-button stations, emergency break-glass stations, interlocking,
disconnect switches beyond termination point, and other appurtenances associated with equipment under Division 23 shall be furnished, installed and wired under Division 23.

e. All wiring required for controls and instrumentation not indicated on the drawings shall be furnished and installed by Division 23.

f. Roof exhaust fans with built-in disconnects provided under Division 23 shall be wired under Division 26 to the line side of the disconnect switch. A disconnect switch shall be provided under Division 26 if the fan is not provided with a built-in disconnect switch. In this case wiring from the switch to the fan shall be under Division 23.

g. The sequence of control for all equipment shall be as indicated on the Division 23 Drawings and specified in the appropriate section.

h. Where electrical wiring is required by trades other than covered by Division 26, specifications for that section shall refer to same wiring materials and methods as specified under Division 26. No Exceptions.

2. Many of the items covered in the mechanical guidelines pertain to those items which may be unique to The University of North Carolina at Charlotte, its mechanical systems or preference or requirements mandated by Facilities Management. Any item not specifically outlined or commented upon in these guidelines is left to the judgment of the engineering design professional to use current accepted good engineering practice. The construction documents are subject to review and comment by Facilities Management at any time during the course of design or construction of the project.

3. Deviation from concepts noted in these guidelines requires approval of the Project Manager and Facilities Mechanical Engineer for The University of North Carolina at Charlotte.

4. All floor plans and enlargements of floor plans shall bear North arrows, room numbers, and column lines conforming to the designations found on the Architectural floor plans. All floor plans and enlargements shall have the same directional orientation as the architectural floor plans. Site plans and floor plan directional orientation shall agree.

1.4 MECHANICAL EQUIPMENT ROOM DESIGN

A. New mechanical equipment rooms shall be designed to have access from the outside, via an opening large enough to facilitate the removal of the largest piece of equipment therein. It is desirable that access by truck to equipment rooms be incorporated where possible.

B. All mechanical equipment shall be within Mechanical Equipment Rooms (MER). MERs shall be large enough to allow proper servicing of equipment, allow for future growth, and include access for replacement of all mechanical equipment.

C. The Consultant shall locate the MER to protect the surrounding areas from equipment generated noise. If sensitive spaces exist above or adjacent to a MER, acoustical treatment shall be provided to maintain noise level to acceptable limits as noted in ASHRAE.

D. The layout of equipment within a MER shall allow access to all equipment components, including pulling tubes for converters, chillers, and air-handling unit coils. A minimum of 3 feet is required for access to filters, dampers, and valves and as a separation between equipment. Lifting eyes shall be provided in equipment rooms in which the moving of heavy equipment is anticipated and for above ceiling equipment, such as an environmental room compressor, that will be mounted above the room enclosure.

E. MERs shall have space allocated within for storage of air filters and miscellaneous maintenance items.

F. MERs shall be provided with sufficient lighting that is not obstructed by ductwork or piping. Column and wall-mounted lighting shall be included where necessary.

G. All MERs shall be equipped with duplex convenience outlets suitable for operating small tools and dropcord trouble lights.
H. Provisions for domestic water services for maintenance purposes shall be provided.

I. MERs located above the lowest floor shall be curbed to prevent flooding.

J. All MERs shall be provided with adequate ventilation and temperature control designed to prevent temperature buildup and freeze up.

1.5 ADDITIONAL REQUIREMENTS FOR DRAWINGS

A. Capacity of new equipment shall be described on drawings by way of equipment schedules. Equipment schedules shall indicate, in addition to technical data, the location of equipment and areas served by it. Schedules for air-handling units shall indicate minimum and maximum outdoor airflow in cubic feet per minute in addition to other information.

B. Ductwork layouts on 1/8" and 1/4" scale drawings shall be shown as a double line, drawn to scale. Single line duct layouts will be acceptable only on preliminary drawings.

C. Flow diagrams for air, water, and steam shall be shown on drawings with all piping sized. Direction of flow shall be indicated. The Consultant shall incorporate schematic piping diagrams for the following:
   1. Chilled water systems
   2. Condenser water systems
   3. Hot water systems
   4. Converters
   5. Pumps
   6. Heating and cooling coils
   7. Steam main drips
   8. Flash tanks
   9. Pressure-reducing stations
   10. Domestic hot water heaters
   11. Cooling towers
   12. Others as they may apply to a specific project

D. Piping and ductwork sizes shall be clearly indicated. All valves shall be shown, as well as volume dampers in ductwork, fire dampers, and access doors. Valves and dampers shall be placed in locations with adequate access.

E. Mechanical equipment room layouts shall be drawn in 1/4" scale or larger. As many sections as necessary shall be provided to clarify installation of equipment, piping, and ductwork, and to show clearances for service. All large valves, particularly gate valves, shall be drawn to scale showing the location of the hand wheels.

F. The automatic temperature control schematic shall be shown on drawings. Sequence of operation description shall be provided either on plans or specifications.

PART 2 - PRODUCTS

2.1 ID MATERIALS

A. Mechanical equipment shall be labeled with name, number as designated on designer’s contract documents, service and operational requirements, design capacity, and other design parameters such as pressure drop, entering and leaving conditions, rpm, etc. Ductwork shall be identified as supply, return, exhaust, intake, or relief with signs and arrows showing service and direction of flow. Pipe shall be identified with colored signs and arrows indicating its respective system and direction of flow.

B. Strap on Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed. Install tags with corrosion resistant chain.
C. Laminated Plastic Name Plates: ASTM D 709, Type I, cellulose, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore. Nameplates shall be approximately 1-1/2" x 4", 1/16" thick, and have 1/2" high lettering. Face of plastic shall be black with white letters. Fasteners shall be self-tapping, stainless steel screws or contact-type with permanent adhesive.

D. Metal Tags: Polished brass, 0.032” thick, with stamped letters; tag size minimum 1-1/2 inch diameter.

E. See Div 099000 for paints. New equipment will be pre-painted by the equipment supplier before shipment. Colors (to be submitted to Owner for approval) Colors, for equipment and piping color schedule shall be as follows. Devoe paint identification number is provided for reference only. Other manufacturers matching the paint and color should be considered.

<table>
<thead>
<tr>
<th>Piping System</th>
<th>Pipe Abbreviation</th>
<th>Paint Color (Devoe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid Waste</td>
<td>AW</td>
<td>Safety Blue (DC 9800)</td>
</tr>
<tr>
<td>Chilled Water</td>
<td>CHW (S, R)</td>
<td>Car Blue (DC4035)</td>
</tr>
<tr>
<td>Chilled Beam Water</td>
<td>CB(S, R)</td>
<td>Car Blue (DC4035)</td>
</tr>
<tr>
<td>Condenser Water</td>
<td>CW (S, R)</td>
<td>Green</td>
</tr>
<tr>
<td>DI</td>
<td>D(R)</td>
<td>Oxide Yellow (DC8800)</td>
</tr>
<tr>
<td>Hot Water (heating)</td>
<td>HW (S, R)</td>
<td>Purple</td>
</tr>
<tr>
<td>Gray Water</td>
<td>GWS/R</td>
<td>Safety Orange (DC9200)</td>
</tr>
<tr>
<td>Steam</td>
<td>S (HPS, MPS, LPS)</td>
<td>Oxide Red (DC7821)</td>
</tr>
<tr>
<td>Steam Condensate</td>
<td>LPC, HPC</td>
<td>Medium Yellow (DC 8600)</td>
</tr>
<tr>
<td>Pumped Condensate</td>
<td>CPD</td>
<td>Orange</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>GAS (FG, ID)</td>
<td>Medium Green (DC6650)</td>
</tr>
<tr>
<td>Relief Valve Vents</td>
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<tr>
<td>Duct work</td>
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<tr>
<td>Hanger Rods</td>
<td>Flat Black</td>
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<tr>
<td>Domestic Cold Water</td>
<td>DCW</td>
<td>Medium Green (DC6650)</td>
</tr>
<tr>
<td>Lab Cold Water</td>
<td>LCW</td>
<td>Light Green (DC5574)</td>
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<td>DHW</td>
<td>Light Buff (DC1810)</td>
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<td>LHW</td>
<td>International Orange (DC6900)</td>
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<tr>
<td>Lab Vacuum</td>
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<td>Blue</td>
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<tr>
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<td>LW</td>
<td>Black (DC9903/9990)</td>
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<td>TW</td>
<td>Medium Brown (DC1400)</td>
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<td>DHWR</td>
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<td>Plymouth Grey (DC2100)</td>
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<td>Nitrogen</td>
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<td>Spruce (DC5323)</td>
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<td>RH (S, R)</td>
<td>Purple</td>
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<tr>
<td>Sanitary Drain / Vent</td>
<td>SAN</td>
<td>Match Surrounding</td>
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<tr>
<td>Sprinkler / Fire Line</td>
<td></td>
<td>Safety Red (DC9000)</td>
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F. Identify piping, concealed with plastic pipe markers using the same color coding identified for exposed piping in mechanical room. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

G. Identify piping with marker system. Markers shall be "snap-on" or "strap-on" type depending on applicable pipe size.
1. For pipes up to 1” diameter, use 1 inch letters.
2. For pipes 1-1/4” to 2” diameter, use 2 inch letters.
3. For pipes 2-1/2” to 6” diameter, use 3 inch letters.
4. For pipes over 6” diameter, use 4 inch letters.

H. Identify pumps, air handlers, chillers, cooling towers, package units, heat transfer equipment, tanks, and water treatment devices with stencil painting. Small devices, such as in-line pumps, may be identified with tags.

I. Identify control panels and major control components outside panels with plastic nameplates.

J. Provide ceiling tacks on the ceiling grid for identification of equipment hidden above ceiling. Ceiling tacks shall be steel with 3/4 inch diameter color coded head. Color code as follows:
   1. Yellow - HVAC equipment
   2. Red    - Fire dampers/smoke dampers
   3. Green  - Plumbing valves
   4. Blue   - Heating/cooling valves

2.2 VALVES

A. All valves (shall be provided with 0.032” thick polished brass valve tags with the stamp-engraved piping system abbreviation and sequenced valve numbers. Valve tags shall be attached with brass chains or S-hooks. Valve numbers shall be coordinated with other trades and any existing valves to avoid duplication of numbers.

B. Valve schedules shall be mounted in glazed display frames at the facility and shall include valve number, piping system, system abbreviation (as shown on valve tag) and location of valve (room and space). Valves intended for emergency shut-off and similar special uses shall be marked by “flags” in the margin of the schedule.

2.3 UNDERGROUND UTILITIES

A. TRACER WIRE BOXES: Plastic gas and water services longer than 1000 feet in length from curb valve to meter riser must have tracer wire boxes installed in accordance with UNC Charlotte standards.

B. All underground piping and utilities (both metallic and non-metallic), except copper pipe, shall have a separate copper tracer wire and non-metallic warning tape installed above the utility line.

C. The tracer wire shall be traced for continuity prior to backfill, immediately upon completion of backfill and compaction and once again during final utility location/as-built at the end of the project. This also will include landscape irrigation mains to the points of the valves. All above ground utility features such as vaults, manholes, valves, handholds, etc to be properly labeled. Contractor shall provide an inventory of all installed outdoor utility features including type and model.

D. Identification Tape: The 1st stage of identification shall be a buried warning tape. This tape shall provide an early warning at shallow depth excavation. The tape shall be 6” wide, and buried approximately 18” to 30” above the service pipe, but a minimum of 10” below finished grade. It shall consist of multiple layers of polyethylene with an overall thickness of 3 to 5 mils. It shall be installed continuous from valve box to valve box or manhole to manhole, and shall terminate just outside of valve box or manhole wall. The black colored lettering on the warning tape shall be abrasion resistant and be imprinted on a color-coded background that conforms to APWA color code standards. The lettering on the tape should name the utility it is protecting. (i.e. Caution Buried Sewer Line Below).

E. TRACER WIRE: The 2nd stage of identification shall be a buried tracer wire. This tracer wire shall provide pipeline identification, be fully detectable from above grade utility locators, and be able to provide a depth reference point to top of pipe.

F. All pipe, including lawn irrigation lines, and metallic pipe with compression gasket fittings installed underground shall have a tracer wire installed along the length of the pipe. The wire
shall be taped to the bottom of the pipe at a maximum of 10’ intervals and not allowed to “float freely” within the backfill.

G. Tracer wire shall be single-conductor, 12 gauge minimum, copper single-conductor wire with type “UF” (Underground Feeder) insulation, and shall be continuous along the pipeline passing through the inside of each valve box. A #12 AWG or heavier (smaller AWG number), solid, insulated (RHW, THW, or polyethylene insulation is recommended); copper wire shall be taped to pipe at 10 foot intervals. Do not wrap wire around pipe. The wire must be one continuous, unbroken length. Coil tracer wire at meter location and street end with enough wire to extend a minimum of two feet above grade.

2.4 METERING

A. The University operates utility distribution systems for electricity, potable water, steam/condensate, hot water and chilled water. Natural gas is provided by Piedmont Natural Gas Co. Cost distribution for utilities is accomplished through a metering system and a prorated assignment of cost. The University of North Carolina at Charlotte is using Vykon Energy Suite (VES) as its energy profiling/analysis software tool. The VES software is currently loaded on the Facilities Management System (FMS) server. The Systems Integrator is responsible for providing license for additional VES capacity of 50 points. Ownership of VES license is The University of North Carolina at Charlotte. The SI is responsible for all VES programming associated with this project. The University is responsible for managing the allocation of the VES points and shall define the required points for this project.

1. Steam costs are generally allocated based on metering condensate returned to the central system. Each building shall be provided with a high temperature condensate meter designed for this severe service. Provide a meter of appropriate capacity on the discharge side of the condensate pump and include isolation valves, meter bypass, a square head rate cock to control flashing, and a digital pickup to interface with building automation system. Should a particular application require actual metering of the steam flow, insertion type meters of appropriate design should be provided. Meters must be approved for interface to the FM Utilities Monitoring System (Tridium VES).

2. Potable Domestic Water metering shall be by turbine or nutating disk meter with magnetic drive. Meter to be located in mechanical room, easily accessible, read in hundreds of cubic feet, and provide output to building automation. Verify adequate turn down ration is provided with the meter for measurement at low flow.

3. Non-sewer water (consumed but not returned to the sewer, e.g. irrigation, cooling tower makeup, etc.) should be metered at its source. Meter should be located in mechanical room, easily accessible, read in hundreds of cubic feet and provide output to building automation.

4. Chilled water or hot water (where pumped to another facility through a loop system) flow, temperature differential and energy consumption shall be measured and calculated for both the main building and the isolated structure. Output shall be in BTUH or Ton hours, be available at the BTU Meter, and be tied to the building automation. Flow in GPM will be monitored.

5. Natural Gas metering shall comply with all requirements of Piedmont Natural Gas, and interface to the building automation system for monitoring gas usage in Therms and CFH. Controls contractor is required to integrate the meter with building automation system. Verify if gas usage in building for certain users needs to be metered and monitored separately for billing purposes.

6. Power Monitoring Interface: The Power Measurement Interface (PMI) device shall include the appropriate current and potential (voltage) transformers. The PMI shall be certified under UL-3111. The PMI shall perform continuous true RMS measurement based on 32 samples-per-cycle sampling on all voltage and current signals. The PMI shall provide outputs to the FMS based on the measurement and calculation of the following parameters:

   a. Current for each phase and average of all three phases,
b. kW for each phase and total of all three phases,
c. power factor for each phase and all three phases,
d. percent voltage unbalance, and
e. percent current unbalance.

These output values shall be hard-wired inputs to the FMS or shall be communicated to the FMS over the open-protocol LAN. Coordinate with electrical engineer to ensure electrical specifications require correct meter to accomplish power monitoring noted above.

2.5 VARIABLE FREQUENCY DRIVES

A. Variable Speed Drive systems manufacturer shall provide a Modbus RTU, BacNet MSTP or LonWorks interface to the controls Network Area Controller (NAC). Data available to the NAC must include all commands (on, off, speed) and status, control setpoints and zone process variables, and controller alarms. Integration of data to the NAC is the responsibility of the Control Systems Integrator.

B. Variable frequency drives will be located indoors, unless approved by the University.

C. Provide a manual bypass consisting of a door interlocked main fused disconnect padlockable in the off position, a built-in motor starter and a four position AUTO/OFF/LINE/TEST switch controlling three contactors.

D. Phase loss protection modules shall monitor incoming 480V, 3-phase power and interrupt 120V control circuit. Phase loss protection shall be installed inside the VFD cabinet.

2.6 SOUND AND VIBRATION CONTROL

A. Outdoor Equipment such as Cooling Towers, fans, and Air-cooled condensers shall not produce noise levels that will be objectionable to facility occupants. The designer will specify the dB level required to meet this goal.

B. HVAC equipment located in the building shall be carefully evaluated for sound level. If sound levels are expected to be higher than recommended in ASHRAE guidelines, sound control devices are required.

C. The Consultant shall determine the type of acoustical treatment that might be required. In general, all larger air-handling units will require sound attenuators in ductwork for both the supply and return fans. Some mechanical equipment rooms might require lightweight acoustic materials for walls to isolate equipment noise from the rest of the building.

D. Acoustic lining is not an acceptable standard for duct systems. The Consultant shall provide other means of sound attenuation. Any use of acoustic lining in low pressure duct systems shall be limited to downstream of VAV boxes and will require review by the University.

E. Room terminal units such as variable volume terminals shall be selected for low sound levels. Air supply diffusers and registers shall have sufficiently low air velocity to meet low sound criteria.

F. Air noise from a supply outlet is not acceptable.

G. The Consultant shall provide vibration isolation where required. There shall be no objectionable transmission of vibration from equipment to the building structure.

H. Appropriate vibration isolation of equipment, piping and ductwork shall be specified. Attention shall be paid to the proper use of flexible duct and pipe connectors, the use of resilient pipe hangers and supports, anchors and guides, and the treatment of pipe and duct penetrations through building walls.
I. Mechanical equipment rooms shall be placed preferably at ground level and away from occupied spaces to minimize transmission of vibrations and noise into the building.

J. Fan wall system shall be utilized for critical noise and vibration isolation application.

SECTION 23 0518 – METERS AND GAUGES

PART 1 - GENERAL

PART 2 - PRODUCTS

A. Electromagnetic Flow Meter: Insertion type flow meter for monitoring chilled and hot water flow shall be similar to Onicon model F-3500. The turn down ratio will exceed 80:1.

B. Steam Flow Meter: Shall be inline style vortex flow meter. Sensor shall have no moving parts. The sensor shall utilize a separated vortex bluff body and a sensor wing with a dual piezoelectric sensing technology to ensure maximum signal to noise rejection. The piezoelectric sensor shall be removable under steam pressures of up to 750 psig without steam shutdown. The flow meter electronics shall be microprocessor based. Meter shall be similar to EMCO model PhD.

C. Glycerin-Filled Pressure Gauge: 4-1/2" dial with stainless steel or cast aluminum case, Plexiglas Lens, stainless steel movement, Polypropylene blow-out back plate, White scale with black divisions and numerals. Range for the gages shall be selected for type of service.

D. Bimetallic Thermometers: 5” Dial type thermometers with stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem. Range for the thermometers shall be selected for the type of service.

SECTION 23 0520 - HVAC PIPING, VALVES & ACCESSORIES

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. The Designer shall clearly indicate the service for which pipe is intended when specifying pipe material. A schedule shall be provided that identifies pipe material and pressure class, application, methods of joining, fittings, and other relevant information.

B. Appropriate devices for piping expansion shall be provided. Expansion joints, guides, and anchors shall be indicated on drawings. The Designer is responsible for calculating pipe stresses and location of anchors.

C. The Consultant shall provide for positive means of draining and venting the piping system. Valves shall be provided to allow for isolation of branch piping and risers.

D. Balancing valves shall be provided to facilitate system testing and balancing.

E. Pressure taps on each flow-measuring device shall be extended outside of the insulation. Measuring devices shall be clearly indicated and at least one flow meter shall be provided.
F. Welding procedures and requirements for welders’ qualifications shall be clearly described in the specification.

G. Pipe hangers and supports shall be selected to prevent pipe bending and deflection and to eliminate the transmission of vibration to the building structure.

H. Piping shall be color-coded and labeled according to ANSI A13.1 standards. Color chips shall be provided to the Owner for approval.
   1. All cold service insulated pipe (chilled water, interior condenser water lines, interior domestic cold water) to have rust inhibitive prime coat applied before insulation.
   2. All uninsulated pipe or bare metal to have rust inhibitive primer plus minimum 2 finish coats of approved color.

A. 2.2 HEATING HOT WATER AND CHILLED WATER PIPING BELOW GRADE
   A. Piping shall be factory fabricated and insulated by Rovanco, Perma-pipe or Thermacor.
   B. Carrier Pipe: Carrier Pipe will be black carbon steel pipe conforming to ASTM A-53 Grade B Schedule 40. Pipe will be joined by welding to ANSI B.31.1 Code for Pressure Piping.
   C. All pipe and fittings will be insulated with polyurethane foam.
   D. All fittings will be factory prefabricated and insulated at pre-insulators plant.
   E. Jacketing Material shall be extruded black high density polyethylene (HDPE). The jacket throughout the entire system shall incorporate electric fusion, butt fusion or extrusion welding at all fittings, joint closures or other points of connection prohibiting the ingress of water.
   F. Moisture Barrier End Seals shall be factory applied, sealed to the jacket and carrier pipe. End seals shall be certified as having passed a 20 foot head pressure test. End seals shall be high temperature mastic completely sealing the exposed end of the insulation. Field applied ends seals shall be installed at any field cut to the piping before continuing with the installation.
   G. Piping shall meet H-20 Highway loading with 24” of backfill is provided on top of pipe.

2.3 VALVES
   A. Provide a by-pass valve on high-pressure steam line isolating valves.
   B. Butterfly valves shall be of the positive shut-off type.
   C. All valves below grade with extension to grade are required to have a donut.
   D. All water valves to operate by turning the square nut clock-wise (right) to close and counter-clockwise (left) to open, as per UNCC requirements.
   E. Provide all valves below grade with extensions and donut and valve box, when grade at location is altered.

SECTION 23 0593 - HVAC TESTING, ADJUSTING & BALANCING
PART 1 - GENERAL

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 TESTING ADJUSTING AND BALANCING

A. Testing, Adjusting, and Balancing (TAB) shall be completed by an independent balancing company certified by AABC or NEBB.

B. The TAB contractor shall be a sub-contractor to the mechanical contractor.

C. TAB shall be completed and the report shall be approved by the designer before the final inspection. The approved TAB report shall be available at the final inspection for State Construction review.

D. The designer shall coordinate with the TAB contractor to spot check air and/or water flows.

SECTION 23 0700 – HVAC INSULATION

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 INSULATION FOR PIPING SYSTEMS

A. Steam and Condensate Piping above Ground: Provide fiberglass or foamglass insulation.

B. Steam and Condensate Piping in Manholes: Provide foamglass or calcium silicate insulation.

C. Heating Hot Water: Provide fiberglass insulation.

D. Chilled Water: Provide rigid foam insulation. Fiberglass insulation is not acceptable for chilled water duty.

E. Condenser Water Exposed to Weather: Provide rigid foam insulation.

F. Makeup water: Provide closed cell elastomeric insulation.

G. Refrigerant Piping: Provide elastomeric insulation (Armaflex or Equal).

PART 3 - EXECUTION

3.1 INSULATION FOR DUCT SYSTEMS

A. All supply and return air ductwork shall be insulated. It is suggested that insulation density for supply duct be not less than 3 pounds per cubic feet. Due to indoor air quality concerns, supply and return ductwork shall be wrapped with insulation, rather than internally lined. However, if noise transmission from the fan is a concern, designer may specify insulation liner only to the extent necessary to achieve the sound control desired.

B. In occupied areas without hung ceilings where insulated ductwork is visible, double wall ductwork with solid liner will be used.
C. Ductwork exposed to the weather that requires exterior insulation will be insulated with polystyrene board insulation. 0.016” thick Aluminum jacket will be provided on insulation. Fiberglass insulation will not be accepted.

D. Canvas finish on ductwork insulation shall be provided in all spaces where it might be subject to damage, such as in equipment rooms.

E. All ductwork in unconditioned spaces shall be provided with vapor-retarding finish.

F. Asbestos abatement design for renovation projects will be provided in the contract documents.

3.2 INSULATION FOR PIPING SYSTEMS

A. Provide 0.03” PVC jacket on all piping other than steam exposed to view in mechanical room and occupied spaces.

B. Provide 0.016” aluminum jacket on all insulated piping exposed to outdoors and in manholes. Provide electrical heat trace on piping prior to insulating the pipe exposed to outdoors.

C. Provide canvas jacket on steam piping exposed to view in mechanical room and occupied areas.

D. Provide aluminum jacket on steam piping in manholes.

SECTION 23 0800 - MECHANICAL SYSTEMS COMMISSIONING

PART 1 - GENERAL (LEED FUNDAMENTAL AND ENHANCED)

1.1 REQUIREMENTS

A. North Carolina General Statute 143-135.37(d) requires commissioning of major projects.

B. Performance Verification. – In order to be able to verify performance of a building component or an energy or water system component, the construction contract shall include provisions that require each building component and each energy and water system component to be commissioned, and these provisions shall be included at the earliest phase of the construction process as possible and in no case later than the schematic design phase of the project. Such commissioning shall continue through the initial operation of the building. The project design and construction teams and the public agency shall jointly determine what level of commissioning is appropriate for the size and complexity of the building or its energy and water system components.

C. Design for Construction Commissioning. The mechanical designer will be responsible for ensuring and developing “… a systematic process of assuring that a building (mechanical, electrical and plumbing systems) performs in accordance with the design intent and the owner’s operational needs.” The Owner considers the following elements as a minimum requirement for building acceptance and inherently integral to the Mechanical Designer responsibilities, unless specifically notified otherwise by the Owner.

1. Design Phase – Provide documentation to the commissioning agent for
   a. Verification of Owner’s project requirements.
   b. Commissioning reviews of design documents.
   c. Verification that training of staff responsible for building maintenance through mechanical contractor is specified.
   d. Building load data files and energy analysis data for Measurement and Verification requirement.
   e. Metering and sub metering to accomplish analysis of annual energy consumption versus projected energy consumption.
   f. Coordinate controls review with Commissioning Agent, Controls
Contractor and Designer to verify understanding of all parties as to control sequence of operation and design intent. Clarify the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.

2. Construction Phase
   NOTE: Commissioning shall in no way reduce the designer scope and responsibility for Construction Administration to include verifying quality of system installation
   a. Attend the commissioning scoping meeting and selected commissioning team meetings.
   b. Installation Verification.
   c. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
   d. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. On site observations should be completed just prior to system startup.
   e. The designers shall continue to assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
   f. Startup and Checkout.
   g. From the Contractor's red-line drawings, edit and update one-line diagrams developed as part of the design narrative documentation and those provided by the vendor as shop drawings for the chilled and hot water, condenser water, domestic water, steam and condensate systems; supply, return and exhaust air systems and emergency power system.
   h. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.

D. The Designer will include in bid documents the specific support and documentation required of the General Contractor, Mechanical Contractor, Electrical Contractor, Plumbing Contractor, Controls Contractor, Designer, Owner and others as applicable to ensure acceptable commissioning.

Reference Division 01-General Requirements for the commissioning guidelines. Guidelines will be modified as appropriate for each project.

SECTION 23 0900 - AUTOMATIC TEMPERATURE CONTROLS

PART 1 - GENERAL

PART 2 - PRODUCTS

2.1 SYSTEM
   A. Building Automation System:
      1. The control system shall be fully compatible with the existing campus Facilities Automated Controls System (FACS). The existing system is web-based Tridium. The new system shall have full control capability through the existing server. All systems must be completely and seamlessly programmable through the Tridium server. Systems that require additional computers or software to program and control will not be acceptable. The Contractor must provide the cost for the complete integration of the new system open protocol controller and / or gateway to the existing system interface, to include utilities monitoring and interface to the Tridium VES software.
B. Contact owner for updated controls integration specifications.

SECTION 23 2213 – STEAM PIPING

PART 1 - GENERAL

1.1 STANDARD
A. The University of North Carolina at Charlotte operates a Steam Plant which provides nominal 100 psig steam to the campus. Steam Plant is operational September 15 through May 20 of each year. May 20 to September 15 is reserved for scheduled maintenance and repairs of the steam system. Satellite boilers are operated during the Steam Plant shutdown to provide the minimum steam support required by the campus.

B. All 125 psig steam distribution system piping, valves, fittings, flanges, etc. shall be rated at 250 psig up to and through the first reducing valve. Steam condensate piping and fittings shall be schedule 80. Steam line gaskets shall be Flexatallic brand.

PART 2 - PRODUCTS

2.1 UNDERGROUND DISTRIBUTION SYSTEM:
A. Manholes will be a minimum of 8 ft x 8 ft internally. Wall penetrations will use high temperature Link-Seals. Drains will be provided. Provide cast iron gravity drains to the nearest storm sewer. Use sump pumps only where gravity drains are not possible. Two access points will be provided for each manhole. Provide two manhole covers (16” over sump pit and 24” over ladder) on each steam manhole for egress and ventilation. Covers shall be reinforced for vehicle loads and set at grade or provided with a minimum of 24” soil cover where required to be below grade, such as a playing field. Provide galvanized steel ladder to 6” below cover in lieu of cast-in-place steps. Show detail of knockout panel for future line connections. Run rebar through knockout panel. Indicate sump location. Provide "U" bend or mushroom-top vent to nearest protected location.

B. Replacement underground piping will be direct burial, pre-insulated steel piping. The system shall be Thermafab HT 406 manufactured by Thermacor Process, Inc., of Fort Worth, Texas, or equal, suitable for 406 degree F. Carrier pipe shall be steel ASTM A-106, Grade B seamless. Steam line shall be Sch 40, condensate line to be Sch 80 seamless. Jacketing material shall be High Density Polyethylene (HDPE) with electric-fusion pressure-testable joint closure. HDPE shall have minimum wall thickness of 150 mils. Pre-engineered systems shall be provided with all straight pipe and fittings factory pre-insulated and prefabricated to job dimensions. Expansion/contraction compensation will be accomplished utilizing factory prefabricated and pre-insulated expansion loops or elbows. End seals shall be factory applied.

2.2 STEAM VALVES:
A. Steam Service Isolation Valves (2 ½” and Smaller): Carbon steel Klinger, Bonetti or equal piston valves ANSI 300 flanged. Flanges shall be according to ANSI B 16.5, class 300.” Valves shall have extension rod adapters and extension rods to grade.

B. Steam Service Isolation Valves (3” and larger): Valves shall be Triple Offset Butterfly Valves - Quarter turn, metal to metal seated, utilizing "inclined conical sealing" to create torque seating effect. Valves shall have bidirectional bubble tight shutoff in accordance with ASME B16.34 and B31.3. Valve bodies shall be double flanged, cast steel with face to face dimensions conforming to ISO 5752, series 14, class 300. Valves discs shall be 316 SS. Valves shall be equipped with machined registered pinned brackets. Valves shall have graphite packing with
minimum of four studs for precision adjustment. Valve seat shall be a minimum of three (3) layers of stainless steel with laminated graphite between rated to 932 degrees F. Actuators shall be heavy-duty gear operators. Valves shall have extension rod adapters and extension rods to grade. Valves shall be similar to Adams, Xomax series 9000, Vanessa 3300.

C. Gate Valves for equipment isolation: Cast Steel body, CA-15 disc, bolted bonnet, rising stem, handwheel with field fabricated stem extension to grade, OS&Y, hard faced seat rings, flanged ends, 300 SWP, Crane Fig. 33 or equal

D. Gaskets: Gaskets at all flanges shall be carbon steel spiral wound with graphite filler material, Garlock Flexseal RW or equal. Gaskets are to be compressed to manufacturer’s recommendation. Bolts will be ASTM A193 GR B7, nuts will be ASTM A194 GR 2H. Provide hardened steel washers under nut and bolt shoulder. Torque to manufacturer's recommendation for 250 psig saturated steam service. Bolts, nuts, and washers are to be lubricated with non-metallic lubricant (oil and graphite). Provide documentation of manufacturer’s recommendation to University project manager.

E. Manhole Modification: Core drill roof of manhole in line with valve extensions to allow valve operation from outside manhole. Provide metal valve box with extension and seal to prevent water leakage into manhole.

F. Provide a by-pass valve on high-pressure steam line isolating valve.

G. Steam pressure-reducing stations shall be designed to be two stage. Valves and fittings rated at minimum 250 SWP shall be used upstream of steam pressure reducing valves (PRVs). All PRVs shall be selected such that generated noise does not exceed 80dba.

H. Steam condensate shall be pumped back to the steam plant. The Designer shall specify steam powered condensate pumps in all locations where HP steam is available.
E. All safety switches shall be heavy-duty type, NEMA 1 for indoor and NEMA 3R for outdoor use unless specifically stated otherwise. They shall be fused type unless specifically indicated otherwise on plans. Fused type shall be equipped with Bussmann Fusetron type fuses, or approved equivalent. Switches shall be by Square D, Cutler-Hammer, General Electric Co., or equivalent by others.

F. All safety switches, motor starters, or other boxes or panels, designated as NEMA 3R or otherwise intended for outdoor use or use in wet areas, shall use rain tight conduit hub fittings with bonding screw.

G. Control wiring shall not be installed in the same raceways as power wiring.

PART 2 - PRODUCTS

2.1 COOLING TOWERS:

A. Cooling towers shall be located in such a way as to have sufficient unobstructed space to allow for adequate air supply for tower fans. Care shall be taken to prevent possible air recirculation.

B. Cooling tower location shall be as near as practical to level conditions and as close as possible to the chillers and pumps to minimize pumping costs.

C. Tower locations shall be as far as possible from trees and other foliage. Any alterations to the campus grounds to accomplish this shall be coordinated with the FM Grounds Department.

D. Screens shall be provided on tower intakes to keep debris and leaves out of the sump. Balancing valves at hot water basins, extended lube lines and steel cold water basins are required. Provide stainless steel cold and hot water basins, sump and plenum walkway (service platform).

E. If two or more towers are operated in parallel, an equalizing line that connects the tower sumps shall be provided to balance water distribution. For towers with more than one cell, positive shut-off valves shall be provided to allow for cell isolation during maintenance shutdown. Equalizer lines are required for multiple cell towers. If control valves are used to isolate cell for water cooled equipment to operate with particular cell(s), control valves shall be provided in cooling tower supply line to isolate non-operating tower sump from the operating tower pump.

F. Provide hot water basins with dams for low flow operation.

G. Noise level shall be an important consideration in the selection of cooling towers. Provide low noise fans.

H. Cooling towers shall be selected with equipped with variable frequency drives to allow for energy efficient capacity control. All cooling towers shall be provided with appropriate ladders with safety cages, railings at the top of the tower, and access platforms for maintenance.

I. Cooling towers will be induced draft, cross flow design with gear drive or counter flow design with belt drive. Motors shall be out of the air stream if installation allows.

J. Cooling tower cold water basin shall be provided with sump sweeper piping complete with spray nozzles. Cooling tower filtration system shall be provided using the sweeper piping.

2.2 AIR HANDLING UNITS

A. The use of multi-zone air-handling units, spray coil systems, and ceiling-mounted fan coil units is not acceptable in new construction. For small renovation projects, an exception can be made if the need is substantiated. No fan coil units shall be installed concealed above ceilings without prior approval of the university Facilities Mechanical Engineer.

B. Air-handling units that use 100 percent outdoor air shall be equipped with preheat, cooling and reheat coils to allow dehumidification control. If 100 percent outdoor air is used in air-handling
units because of high exhaust requirements, such as in laboratories, heat recovery from exhaust air is required. Non-contaminating and low-maintenance heat recovery technology shall be used. Examples are ceramic heat wheels, phase change heat transfer, and coil loops.

C. Units using more than 20% outdoor air will be provided with static air blender section.

D. All large, central station air-handling units shall be equipped with stainless steel drip pans and moisture eliminators. The IAQ drain pan shall be pitched to allow for complete condensate removal and shall be accessible for maintenance.

2.3 CHEMICAL WATER TREATMENT

A. Contact university Facilities Mechanical Engineer for specific requirements.

B. Conductivity controller provided with cooling tower systems shall be Lonworks compatible and communicate on Modbus, Ethernet or Bacnet with the DDC controls system used for the project.

C. Cooling tower make up water will be metered. Verify type of water meter to be used if credit is to be claimed from CMUD.

D. Provide pot feeders for closed loop systems.

E. Provide coupon rack for cooling tower water treatment.

2.4 CHILLED WATER SYSTEMS

A. The desired cooling medium for air conditioning systems is chilled water. The University currently has two regional utility plants and some small localized central chilled water plants that support several buildings. For new construction and renovation projects, the Consultant shall verify that the existing chilled water system will support the new load. Verification may require that the designer perform a detailed building audit to identify all building loads if this information is not readily available.

B. Renovations to existing chillers and towers shall require careful and realistic scheduling in order to minimize the impact on building users.

C. The Designer shall consider using a Water Side Economizer to meet winter cooling loads in applications where the use of 100 percent outdoor air for free cooling is not possible. Plate, frame, shell, or tube heat exchangers are strongly recommended for this application.

D. Use of a side stream filter is strongly recommended for the cooling tower side of the system. It is essential that the Designer provide means to service the heat exchanger without lengthy system shutdown. To meet this requirement, a duplication of heat exchanger or a system bypass shall be evaluated.

2.5 BOILERS

A. If connecting to either the Steam Plant steam distribution system or the Regional Utility Plants hot water system is not feasible, individual boilers may be considered. Where individual boilers are required,

1. Gas fired, forced draft boilers will be utilized.
2. Electric boilers are not acceptable.
3. Temperature reset controls will be utilized on hot water systems.
4. Boiler capacities will be limited to a maximum of 10 million BTU/hr - INPUT where oil is used as the fuel.

B. Boiler gas vents / chimneys are expected to be terminated above roof. Any exceptions will have to be verified with University's mechanical engineer before incorporating into design.

C. When Fire Tube Hot Water Boilers are used they will be scotch marine wet back boilers.
1. Gas fired burner will have minimum 8:1 turn down ratio. System will maintain fuel-air ratio automatically with gas temperature minimum 68°F above dew point of flue gases at boiler outlet. The burner will be low NOx burner.

2. Combustion control: Parallel positioning type system with microprocessor controlled fuel air ratio. System to utilize linkage-less type direct servomotor control of each fuel control valve, combusion air damper and recirculation stack gas flow damper (if required). Servomotors to have repeatability accuracy of 0.1% of an angular degree and system to have a cross-limiting function for safety. System to accept 4-20mA, 0-5dcV or a digital signal from modulating temperature controller and/or an external firing rate control interface from the facility DCS system. System to utilize portable PC for the set up and monitoring, but also may have system resident configuration display with keypad for set up. Portable PC by the Owner, but all required PC software, cable, connectors and converters required for set up and service to be provided with system. System to be equal to the Honeywell R7999 or Fireye NEXUS systems or Protection Controls Inc.

3. Flame safeguard system (FSG): Honeywell RM7800L microprocessor based burner management control with UV flame scanner system, S7810M Modbus module and S7830A expanded annunciator. The Modbus module will allow burner control’s interface with building DDC system. Expanded annunciator will interpret the error codes to indicate the faults. Equal system by Fireye to consist of the E110 microprocessor burner management control with E510 display module and required software for basic monitoring. If the Fireye NEXUS system is utilized, provide the compatible Fireye “ComFire” software. Configure the FSG system for operation/sequence per specified insurance requirements and codes. All available system limits and applicable operation functions to be factory wired to FSG system for monitoring/annunciation (low water, no water flow, fuel pressure switch, high water temperature, pressure, etc.) Furnish window in control panel, or a remote display module in the main panel to view FSG status. Similar system by Protection Controls Inc. will be acceptable.

4. Provide remote start-stop relay and all components wired to panel terminal strip.

5. Provide permanently mounted and wired (6) digit non-reset elapsed time (hour) meter installed in main burner panel to initiate during active boiler use.

2.6 REFRIGERATION EQUIPMENT

A. Preference shall be given to chilled water production based on water-cooled centrifugal chillers. Other options may be considered if circumstances warrant and are approved by the Owner. Air-cooled chillers must be Life Cycle Cost justified.

B. Generally, the Designer shall select water-cooled reciprocating or rotary chillers for cooling loads up to 150 tons. For cooling loads 150 tons up to 400 tons, screw chillers shall be specified. For cooling loads 400 tons and up centrifugal chiller shall be specified.

C. Air-cooled equipment shall be used for small renovation projects where physical limitations preclude the use of chilled water. Selection shall be based on 105°F ambient temperature.

D. For water cooled machine provide head pressure control for cold start up of the machine in lieu of cooling tower bypass.

E. Manufacturer shall provide a Modbus, BacNet over Ethernet or LonWorks interface to the controls Network Area Controller (NAC). Data available to the NAC must include all chiller data read on microcomputer control center, (on, off) commands and status, set points, and alarms. Integration of data to the NAC is the responsibility of the Control Systems Integrator.

F. The Consultant shall specify chillers that utilize environmentally safe refrigerants that conform to the latest Environmental Protection Agency and OSHA requirements. Mixing of refrigerants within the same mechanical room is discouraged.

G. Ventilation of all mechanical rooms with refrigeration equipment shall be provided. Ventilation shall be accessible for activation from an emergency switch in a protected enclosure located outside any of the mechanical room access doors. Mechanical room ventilation shall be
negative to corridor or any other adjacent spaces. Ventilation and room design shall comply with the latest version of ASHRAE Standard 15. SCBA will not be installed.

H. Provide refrigerant sensing devices according to latest ASHRAE standards. Tie the alarm output to the building DDC.

I. Special attention shall be paid to evaluation of chiller noise levels. If necessary, acoustical enclosure for the chiller compressor and accessories may be specified to maintain noise levels in mechanical room within acceptable level.

J. Witness test. The Owner reserves the right to require a witness test of the machine purchased. The Owner and a representative of the Owner’s choosing will, at no additional cost to the Owner or the Owner’s representative, witness an eight hour test run of the purchased machine at the manufacturing facilities of the successful vendor. It shall be the manufacturer’s responsibility to advise the Owner ten days in advance of the test date so travel arrangements can be made.

2.7 PUMPS

A. Chilled water plants are designed with primary and secondary pumping systems. To increase overall building system reliability, each pumping system shall be specified with parallel pump operation sized for 125% of design flow.

B. For larger installations, the use of packaged pumping skids is desirable. Designer will verify adequate space is provided for maintenance of equipment.

C. Since pumps use considerable amounts of energy, it is of prime importance to select pumps with the highest efficiency available for the particular application. The designer shall evaluate the wire-to-water efficiency before the final selection is made.

D. To prevent waste of energy in Hydronic systems, three-way or bypass valves shall not be used except for “end of line” application. Use of variable frequency drives for pumps is recommended. If multiple pumps are to be used in parallel pump VFD controller is recommended to be included as part of the VFD package. Manufacturers recommended for such application are ITT B & G, Armstrong, Systecon and Synchroflow.

E. Manufacturer of VFD package shall provide a Modbus RTU, BacNet over Ethernet/MSTP or LonWorks interface to the controls Network Area Controller (NAC). Data available to the NAC must include all chiller data read on microcomputer control center, (on, off) commands and status, set points, and alarms. Integration of data to the NAC is the responsibility of the Control Systems Integrator.

F. Pumps shall be installed in mechanical equipment rooms. Outdoor pump installation shall be avoided.

2.8 AIR TERMINAL UNITS

A. Air terminal units when located above ceiling they shall be located no more than 2’ above ceiling for access to maintenance.

B. Use of fan terminal units must be preapproved by facilities engineer. If approved the filters on the units and the units must be with 2’ above ceiling to allow easy reach by campus maintenance.

SECTION 23 7000 - AIR DISTRIBUTION
PART 2 - GENERAL

PART 2 - PRODUCTS

2.1 DUCTWORK

A. Ductwork for air distribution shall be designed to yield minimum owning and operating costs by keeping the static and dynamic pressure levels of a duct as low as possible given the building's normal physical constraints.

B. Ductwork shall be free of excessive sound levels. Duct air leakage will not exceed 2 to 5 percent.

C. To allow for proper system balancing, all branch ducts shall be equipped with balancing dampers.

D. Air-measuring stations shall be provided for variable-volume systems using variable-frequency drives.

E. Ductwork fabrication and installation shall follow the latest recommendation of SMACNA.

F. The use of flexible ductwork shall be avoided. The maximum length of a flexible duct shall not exceed 5'. Avoid offsets and curves in flexible duct connections to diffusers and other terminal devices.

G. Provide access doors large enough to allow service and inspection of control dampers, reheat coils, humidifiers, fire dampers, and all applicable system components. An access door size of 24" x 24" is recommended.
SECTION 2
DIVISION 26
ELECTRICAL
DIVISION 26 - ELECTRICAL

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents

SECTION 26 0100 - ELECTRICAL GENERAL

PART 1 - GENERAL ELECTRICAL DESIGN

1.1 GENERAL REQUIREMENTS

A. Design for Safety.

B. Design for Maintainability. Electrical systems shall be durable and easy to maintain and access. The Consultant shall incorporate into equipment and system design sufficient access and clearance for maintenance, repairs and replacement. Electrical Rooms shall be a minimum of 100 SF and as close to square as possible (i.e. avoid rectangular or irregularly shaped rooms).

C. Design for Reliability and Redundancy. Ensure electrical rooms have the proper ventilation.

D. Design for Energy Conservation. Designing energy efficient building systems to LEED silver criteria is an essential part of the University’s design philosophy. Any new project shall be designed with state of the art energy efficiency. Design standards published by the American Institute of Architecture (AIA), American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) and the State of North Carolina shall be met or exceeded.

E. Major energy consuming systems and equipment shall be specified and purchased based on a Life Cycle Cost Analysis. Careful evaluation of energy conservation measures shall begin early in the design phase and continue throughout the design process.

F. It is the responsibility of the designer to provide concise, detailed, comprehensive drawings and specifications suitable for the project.

G. Coordinate with the University Project Manager and Facilities Engineer for any question and/or discrepancies with this guide.

1.2 ELECTRICAL DESIGN PROVISIONS

A. The electrical design shall be in complete compliance with the current edition of the North Carolina State Construction Office Electrical Guidelines and Policies. In addition, the following provisions shall be incorporated into the contract documents:

1. All materials shall be new, with required Third Party Agency label, and manufacturer's label or nameplate giving complete electrical data. Where a manufacturer's catalog number is used, all parts shall be furnished to make it complete and fit the construction intended.

2. The Contractor shall be responsible for the security and storage of all materials and equipment.


4. The Contractor shall secure and pay for all permits, fees, inspections, and licenses required. Upon completion of the job he shall present to the Engineer a certificate of inspection and approval from the inspection authorities.

5. The Contractor shall coordinate all necessary power outages with the University and Duke Power as required by giving a 30 day written notice to each agency. No power shall be reinstated to any facilities or equipment until an inspection and certificate is obtained from the NC State Construction Office of the Electrical Inspector.
6. The Contractor shall notify Piedmont Natural Gas and Time Warner for location of gas and TV cable prior to digging. Contractor shall notify University for location of all other underground utilities prior to digging.
7. Required excavation for installation of all electrical work shall be provided by the Electrical Contractor and replacement and compaction shall be performed according to other specifications relating to the particular type of work. All excavations must comply with OSHA guidelines.
8. In unfinished areas, such as equipment rooms, etc., exposed equipment shall be furnished with suitable factory applied finishes, i.e. standard gray enamel finish for panelboards, etc. Equipment furnished in finishes such as stainless steel, brushed aluminum, etc. shall not be painted.
9. The electrical drawings shall be diagrammatic only, and are intended to explain system function and define quality of materials and installation. They are not intended to define construction methods.
10. The Contractor shall not scale drawings for outlet and equipment locations. Unless specifically dimensioned on drawings or defined in specifications, outlets and equipment shall be located as evidently intended or as detailed on Architectural drawings. Lighting outlets are to be centered or spaced symmetrically unless they are dimensioned. Any dimensions shown on the drawings shall be verified in the field by the contractor prior to roughing. All outlet and equipment locations shall be coordinated with the other trades.

SECTION 26 0200 – SEISMIC REQUIREMENTS FOR ELECTRICAL EQUIPMENT

PART 1 - GENERAL

1.1 REQUIREMENTS
   A. Electrical installation shall meet the seismic requirements as specified by Section 1621 of the North Carolina State Building Code (hereinafter referred to as the State Building Code).

PART 2 - PRODUCTS

2.1 MATERIALS
   A. All free standing electrical equipment such as switchboards, motor control centers, transformers, generators, etc., shall be mounted on 4 inch housekeeping pads mechanically connected to the structural floor.

SECTION 26 0501 – ARC FLASH ANALYSIS

PART 1 - GENERAL

1.1 REQUIREMENTS
   A. For all new buildings and services the electrical equipment manufacturer shall provide an arc flash analysis per NFPA 70E. Analysis shall include providing all labels. The electrical contractor shall install labels in the field. Electrical contractor shall set breakers to match the associated coordination study. Provide an arc flash analysis report for review by the engineer.
   B. Review arc flash requirements with owner when adding electrical equipment to existing facilities.
SECTION 26 0502 – ELECTRICAL TESTING

PART 1 - GENERAL

1.1 INSULATION RESISTANCE

A. All current-carrying phase conductors and neutrals shall be tested as installed, and before connections are made, for insulation resistance and accidental grounds. Each fixture and item of equipment for connection under the Contract shall be tested for insulation resistance from its conductors to its grounded surface or contact. These tests shall be done with a 500 volt (minimum) high voltage "megger."

1. Minimum readings shall be one million (1,000,000) or more ohms for #6 AWG and smaller wire, 250,000 ohms or more for #4 AWG and larger wire, between conductors and between conductor and the grounding conductor.

2. The contractor shall send a letter to the engineer and the State Construction Office certifying that the above has been done and showing the tabulation of the megger readings for each panel or feeder. This shall be done at least four (4) days prior to final walk-through by engineer and the State Construction Office (SOC).

3. At final walk-through by the engineer and the SCO, the contractor shall furnish a megger and demonstrate that the panels comply with the above requirements. He shall also furnish a clamp-on type ammeter and a voltmeter to take current and voltage readings as directed by the engineer or the SCO representatives.

1.2 GROUND PATH

A. Validity of the ground path shall be assured by constant and careful attention to the thorough tightening of all couplings, connectors, locknuts, screws, bolts, etc., and by frequent checking of the path resistance with a quality low-range ohmmeter. Resistance of the path should not exceed one ohm between any two points. If a reading in excess of this is observed, it shall be discussed with the Engineer for an appraisal of the condition.

1.3 THERMOGRAPHIC IMAGING

A. A thermographic imaging survey shall be required for the following equipment installations:

1. Medium Voltage Cable terminations.
2. Pad Mount Transformer connections (primary and secondary).
4. Emergency Generator Connections.
5. Automatic Transfer Switch Connections.

B. The thermographic imaging survey shall be performed by a thermographic imaging contractor who is a level III certified Thermographer and who has received accreditation through a NETA accredited Thermography training program. The imaging contractor shall have an equipment calibration program that is traceable to the National Institute of Standards and Technology (NIST). Imaging equipment must be calibrated within the last six months. Imaging equipment shall include a Forward Looking InfraRed camera able to detect emitted thermal infrared radiation and convert the detected emissions into a visual image. The imaging contractor shall provide a test report to the engineer and owner. Deficiencies shall be addressed by the Electrical Contractor.

1.4 CIRCUIT BREAKERS

A. The following tests shall be performed on the service entrance breaker and distribution circuit breakers in the service switchboard and in service and distribution panelboards rated 1000A or higher. Tests shall be performed by a qualified factory technician at the job site. All results shall be recorded and presented to the engineer.

1. Phase tripping tolerance (within 20% of UL requirements).
2. Trip time (per phase) in seconds (delay).
3. Instantaneous trip (amps) per phase (pickup).
4. Insulation resistance (megahms) at 100-volts (phase-to-phase, and line-to-load).
5. Set final trip functions to match the engineers approved overcurrent protection device coordination and arc flash study.
6. Ground fault protection on circuit breakers shall be tested in the field in accordance with the NEC and properly calibrated and set to match the coordination and arc flash studies.
7. List all breakers settings on the as-built drawings.

SECTION 26 0519 – CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 REQUIREMENTS
A. All material shall be Third Party listed and shall be installed in conformance with the National Electrical Code.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Normal trade standard "Building Wire of copper. Aluminum conductors shall not be installed. Each conductor shall bear easily readable markings along entire length, indicating size and insulation type.
B. Conductors #10 AWG and smaller shall be solid. #8 AWG and larger shall be stranded.
C. All wire shall be new, manufactured within the last 6 months.
D. Insulation on conductors #6 AWG and smaller shall be suitable colored in manufacturing. Conductors #4 and larger may be identified with bands of proper color plastic tape near each termination and in each junction box.
E. Conductor insulation shall be as follows:
   1. Insulation on service and feeder conductor shall be 600 volt type XHHW or THHN/THWN.
   2. Branch circuit conductors shall be minimum #12 AWG, with 600 volt THHN/THWN insulation. Circuit wires carried through rows of fluorescent fixtures shall be at least Type RHHW or THHN.
   3. Conductors in any location subject to abnormal temperature shall be furnished with an insulation type suitable for temperature encountered by the NEC.
F. Type MC Cable shall not be used.
G. Fire alarm and control wiring shall have stranded copper conductors.
H. All wiring lugs including, but not limited to, breakers, panelboard / switchboard lugs, safety switch lugs, and transformers lugs, shall be rated for use with 75 degree conductors.

PART 3 - EXECUTION

3.1 INSTALLATION
A. All wiring shall be color coded:
   1. On 120/208 volt, 3 phase, 4 wire systems - phase A, black; phase B, red; phase C, blue; neutral, white. On 277/480 volt, 3 phase, 4 wire systems - phase A, brown; phase B,
orange; phase C, yellow; neutral, light gray. Ground conductor on all systems shall be green.
2. Unless noted or accepted otherwise, busses in panels and switchgear shall be considered "A", "B", and "C" from left to right, top to bottom, or front to back when facing equipment.
3. Control wiring shall not use black, red, or blue; but shall use white for neutrals and green for grounding. Any other colors may be used but the coding shall provide same color between any two terminals being joined.
4. Switch legs, including "travelers" in 3-way and 4-way switching systems, shall be same color as phase leg.
5. Conductors shall be labeled within all junction boxes, etc. using plastic "punch" tape, identifying the conductors according to circuit numbers.
6. Wires within panel boards, terminal cabinets, and similar equipment shall be neatly squared and "bunched" together and held with plastic ties.

3.2 MEDIUM VOLTAGE CABLE TESTS AND GUARANTEES
A. The cable shall be tested at the factory. The contractor shall be required to furnish a Certified Manufacturer's Test Report for the "Master Reel" of each cable length shipped, for approval by the Engineer. The test report shall include.
   1. A high voltage test (AC).
   2. Insulation resistance values.
   3. Corona test.
   4. Leakage current curves submitted for each minute up to 10 minutes at test voltage.
B. The manufacturer's test report shall be sent to the Engineer and Owner.
   1. After installation, but prior to energizing the system, the contractor shall also high spot the system in accordance with the Design Engineer’s specified testing procedure, as witnessed and "signed-off" by the Design Engineer. Copies of this test report shall be sent to the Owner, to the Engineer, and to the State Construction Office, attention Design/Review Section.

SECTION 26 0526 – GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SPECIFIC REQUIREMENTS
A. All systems and equipment shall be grounded in accordance with NEC Article 250.
B. All grounding conductors shall be contained within a raceway, unless specifically noted otherwise.
C. The raceway system shall not be relied on for ground continuity. A green grounding conductor, properly sized per the NEC shall be run in ALL raceways less than 600 volts except for telecommunications, and data raceways.
D. All systems above 600 volts shall have grounding systems.

PART 2 - PRODUCTS

2.1 GROUND RODS
A. Provide made grounding electrode in compliance with NEC.
B. Ground rods shall be copper clad 10 foot minimum length, 3/4" in diameter.
2.2 GROUNDING CONDUCTORS
   A. Grounding conductors shall be sized in accordance with the requirements of the NEC.
   B. Grounding conductors for branch circuits shall be copper Type THHN/THWN.
   C. Bonding shall be done with insulated bonding bushings and lugs.

2.3 GROUND CLAMPS
   A. Clamps for attachment of grounding conductors to water pipes, etc. shall be of bronze or brass,
      with conduit hub with insulated bonding bushings and compression type lugs.
   B. Where available on the premises, bond together the following:
      1. Metal water pipe.
      2. Building metal frame
   C. Where required by NEC Article 250, provide "made" grounding electrodes to supplement the
      above. Bond together all available and made electrodes.
   D. Service ground clamps shall be attached to cold water mains at an accessible point and before
      its size is reduced. Clamp shall be accessible after construction is complete. Grounding
      conductor shall be without splice into the service enclosure where it shall be connected to main
      service ground buss, and interconnected with system neutral.

PART 3 - EXECUTION

3.1 PAD MOUNT TRANSFORMERS, VAULTS, MANHOLES, MV SWITCHES
   A. Pad mounted transformers and medium voltage switches shall be connected to ground rods
      with copper grounding conductors. Ground rod clamps shall be accessible after construction is
      complete. Grounding conductors shall be continuous without a splice.
   B. Each manhole, hand hole and underground vault shall have a ground rod(s) installed in bottom.
      Ground rod and copper grounding conductor shall bond all metallic parts inside manhole, hand
      hole and vault. Ground rod clamps shall be accessible after construction is complete. Grounding
      conductors shall be shall be continuous without a splice.
   C. Upon completion of installation of the ground rods and bonding system for pad mounted
      transformers, medium voltage switches, manholes, hand holes and underground vaults, the
      ground resistance shall be tested with a ground resistance tester. Resistance to ground shall be
      less than 25 ohms. If test indicates a greater resistance, appropriate measures shall be taken,
      including driving additional ground rods, to reduce the resistance to less than 25 ohms.
      Contractor shall send a letter to the engineer and owner certifying that the ground resistance
      test has been performed and stating the resistance measured at each for pad mounted
      transformer, medium voltage switch, manhole, hand hole and underground vault.
   D. Bushings shall be used wherever metallic conduits stub into transformer cabinets. The bonding
      jumper shall be sized by NEC Section 250 and lugged to the box.
   E. Provide new grounding bushings and grounding conductors on the existing secondary conduits
      turning up into new pad mounted transformers

3.2 EQUIPMENT GROUNDING, ETC
   A. Ground all fixed and portable appliances and equipment connected under the project with a
      green grounding conductor. This wire shall be carried inside the raceway and flex from
      equipment to nearest grounding portion of raceway system. Connect at both ends with suitable
      lugs.
B. Each grounding type receptacle shall be grounded. Grounding may not be through the
grounding yoke.

C. Any feeder raceway anywhere in the system which enters a box or cabinet through part of a
concentric knockout shall be fitted with a bonding bushing and jumper. The jumper shall be
lugged to the box.

3.3 DRY TYPE TRANSFORMER SECONDARY GROUNDING

A. Equipment on the secondary side of transformers shall be considered "service" and be bonded
and separately grounded directly to the main service ground bus or electrode. Grounding
conductor may be run in feeder raceways back to main service enclosure.

B. In addition, transformer secondaries shall be provided with a local grounding electrode
consisting of a clamp on a local 3/4” (minimum) copper cold water pipe or a grounded member.
Grounding conductor shall be sized as shown on plans.

C. All grounding system tests shall be fully documented as to time of day, weather condition,
ground moisture, "megger" readings, etc. Submit a report in writing to Owner and Engineer.

SECTION 26 0529 – HANGARS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SPECIFIC REQUIREMENTS

A. Full and proper support shall be provided for all items of electrical equipment, raceways, etc. All
materials, whether exposed or concealed, shall be firmly and adequately held in place.
Fastening and support shall afford safety factor of three or higher.

B. All fixtures, raceways, and equipment shall be supported from the structure. Nothing may be
supported from suspended ceilings or HVAC ducts.

1.2 MATERIALS

A. Recessed fixtures shall be supported with 10 gauge steel wire or with the same type of wire
used to support the lay-in ceiling track if heaver/stronger than 10 gauge steel wire adjusted as
necessary to level fixture. Fixture shall be supported at the two opposite ends of the fixture to
the building structural frame. Attach one end of the support wire to one corner of the luminaries
and the other end to the building's structural system. The lay-in luminaire shall be screwed to
the main runners of the lay-in ceiling track at all four corners using sheet metal screws.

B. Recessed ceiling speakers, where specified with an enclosure, shall have the enclosure -
supported directly from the structure with a minimum of two 10 gauge wires run perpendicular to
the ceiling and not pulling to one side. If recessed ceiling speaker is specified without an
enclosure and is mounted in a suspended ceiling, the speaker shall be supported using T-Bar
bridges such as Soundolier No. 81-8, or other device specifically designed for such support. In
addition, each of the four corners of the ceiling grid block enclosing the speaker shall be
supported from the structure using 10 gauge steel wire run perpendicular to the ceiling plane.

C. Other devices using octagonal or 4” square ceiling boxes, such as smoke detectors, dome
lights, exit signs, etc., where installed in suspended ceilings shall be attached to the ceiling
system using Caddy, or other, hangers specifically designed for such support. In addition, each
of the four corners of the grid block enclosing the box shall be supported from the structure
using 10 gauge steel wires run perpendicular to the ceiling plane.
SECTION 26 0533 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 REQUIREMENTS

A. All material shall be U.L. listed and shall be installed in conformance with the National Electrical Code.

PART 2 - PRODUCTS

2.1 OUTLET AND JUNCTION BOXES

A. Galvanized or aluminum of gauge required by NEC.

2.2 RACEWAYS

A. Rigid metal conduit (RMC) shall be used for feeders leaving all freestanding switchboards, switchgears, and all panel feeders. Raceways used in service entrance concrete duct banks shall be PVC Schedule 40, except for the stub-ups which shall be RMC. RMC shall be used for feeder or branch circuits exposed to weather. RMC shall be used in all mechanical rooms. Use RMC anywhere conduit is exposed and subject to damage below 8 feet above finished floor.

B. Electric metallic tubing (EMT) may be used for general branch circuits. EMT shall not be installed in any location where exposed and subject to severe physical damage, severe corrosive influence, outdoors, underground, in below slab-on-grade or in earth.

C. EMT couplings and connectors shall be compression-gland type of malleable steel, galvanized or sherardized. Connectors shall be insulated-throat type. Set screw, indentor, or cast type fittings are not acceptable.

D. PVC conduit may be used under slab and underground. No exposed PVC allowed. Fittings for PVC shall be U.L. listed for the use, and shall be installed per the manufacturer's instructions. Under slab PVC conduit runs shall utilize RMC elbows and RMC up through slab, and transition to EMT or RMC in masonry walls. PVC may be used for underground outdoor branch circuits and under slab branch circuits. Bends in PVC shall be made by methods approved by the manufacturer and the NEC.

E. Galvanized "flex" in dry and "sealtite" in wet locations shall be used for connection to mechanical equipment or transformers, or for lighting fixture whips. Green ground wire shall be installed and NEC followed. Flex runs shall be no greater than six feet in length.

2.3 FASTENINGS AND SUPPORTS

A. Galvanized Steel or other non-corroding material.

PART 3 - EXECUTION

3.1 RACEWAY INSTALLATION

A. 1/2" minimum lighting fixture whips are acceptable, otherwise minimum raceway size shall be 3/4".

B. All runs of empty conduit only shall have a 100# nylon pull rope installed in the conduit.

C. Rigid metal conduit shall be made up with full threads.
D. Underground runs, except under concrete floor slabs, shall have a minimum of 24" cover. Backfill shall be made in 6" layers – tamping each layer to a density of 95% of maximum possible.

E. Raceways run external to building foundation walls, with the exception of branch circuit raceways, shall be encased with a minimum of 3" of concrete on all sides. Encased raceways shall have a minimum cover of 18", except for raceways containing circuits with voltages above 600 volts, which shall have a minimum cover of 30".

F. Branch circuit raceways run underground external to building foundation shall be run in raceways installed in accordance with the NEC, and shall be of a type approved by the NEC as "suitable for direct burial". Minimum raceway size shall be 3/4".

G. All underground raceways shall be identified by underground line marking tape located directly above the raceway at 6" to 8" below finished grade. Tape shall be permanent, bright colored, continuous printed, metal compounded for direct burial not less than 6" wide and 4 mils thick. Printed legend on tape shall indicate general type of underground line below.

H. Where underground raceways are required to turn up to cabinets, equipment, etc., and on to poles, the elbow required and the stub-up through the slab or earth to equipment shall be of rigid steel conduit.

I. Grounding type insulated bushings shall be used where raceway enters boxes with concentric or oversized knockouts. These bushings shall also be used wherever conduits stub into switchboards or transformer cabinets. Grounding type insulated bushings shall always be used on both ends of conduits feeding panelboards.

J. Provide suitable fittings where raceway crosses building expansion joints.

K. Run concealed in finished areas.

L. All PVC conduits, except those installed for services, shall contain green grounding conductor.

M. All runs exposed and all runs above accessible ceilings shall be neat and square with building structure such as walls and ceiling/roof structures. Multiple parallel runs shall use trapeze supports where possible.

N. The use of "LB's" shall be limited as much as possible.

3.2 BOX INSTALLATION

A. Outlet boxes shall be sized in accord with NEC. All lighting outlet boxes shall have fixture studs. Device boxes shall be sectional type or 4" square equipped with plaster rings as required to mount the device. Set edge flush with finished surface. Boxes may be installed at top or bottom of a masonry course.

B. Where installed in metal stud partitions, wall boxes shall be supported from two adjacent studs. Support on a single stud is not acceptable.

C. Ensure all devices meet ADA requirements and specific project requirements regarding mounting heights and locations. Coordinate questions with Architect and Project Manager:

D. The following are standard mounting heights:
   1. Switch boxes 46" from finished floor to center. Boxes beside doors shall be mounted so edge of trim plate is 2" from edge of door trim on strike side.
   2. Telephone boxes 18" from finished floor to center and vertical. Boxes for wall phones shall be 46" from finished floor and vertical.
   3. Panel cans 6" - 4" (± 4" in concrete block construction) from finished floor to top of can.
   4. Fire alarm pull stations 46" from finished floor to center.
   5. Fire alarm chimes, horns, flashing lights, etc., 80" to bottom above finished floor or 6" below finished ceiling, whichever is lower, to comply with ADA requirements.

E. Mount boxes for receptacles to receive device in a vertical position and locate:
   1. Centered 18" above finished floor.
2. Centered 6” above counters, shelves, or cabinets where apparently intended to be so placed.
3. Centered 4” above high edge of backsplashes.
4. Where devices are to be ganged, provide boxes to receive devices trimmed with a gang plate.

F. As soon as installed, all raceway openings shall be closed with plastic inserts to prevent entrance of foreign matter during construction. All enclosures shall be kept clean of any foreign matter.

G. All outlet boxes, junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match color scheme outlined in Section 260553. This includes covers on boxes above all type ceilings. In addition, the box cover shall be labeled using a permanent, black marking pen to identify circuits or systems in box.

SECTION 26 0543-UNDERGROUND DUCT BANK SYSTEM

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. System shall consist of single, round bore conduit encased in concrete. The minimum number and size of ducts shall be indicated on the drawings. Changes in direction of runs exceeding 10 degrees shall be accomplished by using special couplings or bends manufactured for this purpose. Duct lines shall be installed so that the top of concrete or future concrete as shown is not less than 30 inches below finished grade or finished grade or finished paving at any point.

B. Ducts should be pitched to drain toward manholes and away from buildings and equipment. Minimum slope shall be 4-inches in 100-feet. Where necessary to achieve this between manholes, ducts should be sloped from a high point in the run to drain in both directions.

C. Concrete encased non-metallic duct shall be supported on plastic separators coordinated with duct size and spacing. Separators shall be spaced close enough to prevent sagging and deforming of ducts. Separators to the earth and to ducts should be secured to prevent floating during placement of concrete. Steel or tie wires should not be used in such a way as to form conductive or magnetic loops around ducts or duct groups.

D. Where duct lines enter manholes or pull boxes, the conduits shall terminate in end bells. Conduit shall be thoroughly cleaned before laying. During construction and after the duct line is completed, the ends of the conduit shall be plugged to prevent water washing mud into the conduits.

E. All underground raceways shall be identified by underground line marking tape located directly above the raceway at 6 to 8 inches below finished grade. Tape shall be permanent, bright-colored, continuous printed, metallic tape compounded for direct burial not less than 6 inches wide and 4 mils thick. Printed legend shall be indicative of general type of underground line below. Where it is necessary to cut a tapered end of a piece of conduit at the site, the cut shall be made with a tool or lathe designed to cut a taper to match the taper of the particular conduit to be used.

F. All ducts should be sealed at terminations, using sealing compound and plugs, as required to withstand 15 psi hydrostatic pressure.

G. After the duct line has been completed, a mandrel not less than 12 inches long, having across section approximately one-fourth inch less than the inside cross section of the conduit shall be pulled through each conduit after which a brush with stiff bristles shall be pulled through to make certain that no particles of earth, sand, or gravel have been left in the lines.

H. The conduit furnished shall be concrete encased plastic. Concrete shall be colored red for all MV Cable Duct Banks.
I. Installation of duct banks comprising multiple single conduits: each single conduit shall be completely encased in concrete with a minimum of 3" between conduits and a minimum thickness of concrete encasement of 3" which may be increased to fit the actual shape of the trench. Spacing assembly shall be made of non-metallic, non-decaying material. Joints in conduits shall be staggered at least 6". Ducts shall be securely anchored to prevent movement during the placement of concrete.

J. Waterproof, 130 pound tensile test marking cord shall be installed (marked at least every foot), in all ducts, including spares, after thoroughly rodding, clearing and swabbing all lines free of any and all obstructions.

K. Installation of single conduit and shall be completely encased in concrete. The thickness of concrete shall be not less than 3" on the sides, bottom and top of conduit.

L. Concrete: Concrete shall be 3000 psi class. Where a connection is made to an existing duct line, the concrete encasement shall be well bonded to the existing encasement. Use 1/2" diameter stainless steel rod minimum doweled in existing duct bank for cold joints, 2'-0" into old envelope and 2'-0" beyond.

M. Connections to New Manholes: Concrete encased duct lines connecting to underground structures shall be constructed to have a flared section adjacent to the manhole to provide shear strength. Underground structures shall be constructed to provide for keying the concrete envelope of the duct line into the wall of the structure. Vibrators shall be used when this portion of the envelope is poured to assure a seal between the envelope and the wall of the structure.

N. Connections to Existing Manholes: For duct line connections to existing structures, break the structure wall out to the dimensions required and preserve the steel in the structure wall. Cut the steel and bend it out to tie into the reinforcing of the duct line envelope. Chip out the structure wall to form a key for the duct line envelope.

O. Design for spare ducts in each power duct bank as follows:
   1. 1-3 occupied ducts requires (1) additional spare duct, 4 or more occupied ducts requires (2) spare ducts minimum.

P. Coordinate number of ducts and associated spares for Telecom duct bank with the University Telecommunications Department.

PART 2 - PRODUCTS

2.1 MANHOLES/VAULTS:

A. Underground structures shall be poured in place or may be of precast construction. Horizontal concrete surface of floors shall have a smooth trowel finish. Concrete shall be cured by applying two coats of white pigmented membrane forming-curing compound in strict accordance with the manufacturer’s printed instructions, except that precast concrete may be steam cured. Curing compound shall conform to ASTM C 309. Duct entrances and windows shall be located near the corners of structures to facilitate cable racking. Covers shall fit the frames without undue play. Steel and iron shall be formed to shape and size with sharp lines and angles. Casting shall be free from warp and blow holes that may impair their strength or appearance. Exposed metal shall have a smooth finish and sharp lines and arises. Provide all necessary lugs, rabbets and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. The words “electric” and “telephone” shall be cast in the top face of all power and telephone manhole covers, respectively.

B. Medium Voltage Switch vaults shall have spring assist lids for access to termination and switching compartments.

C. Optional Precast Concrete Construction: In lieu of poured-in-place concrete manholes and hand holds, the Contractor may, at his option, provide precast concrete structures subject to the requirements specified below. Precast units shall be the product of a manufacturer regularly
engaged in the manufacture of precast concrete products, including precast manholes and handholds.

D. General: Precast concrete structures shall have the same accessories and facilities as required for poured-in-place structures. Likewise, they shall have plan area and clear heights not less than those of poured-in-place structures. Concrete materials and methods of construction shall be the same as for poured-in-place concrete construction, as modified herein. Slope in floor may be omitted provided precast sections are poured in reinforced steel forms. Concrete for precast work shall have an ultimate 28-day compressive strength of not less than 4000 pounds per square inch. Structures may be precast to the design and details shown for poured-in-place construction, precast monolithically and placed as a unit; or, they may be of assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. All structures shall be identified with the manufacturer's name embedded in, or otherwise permanently attached to, an interior wall face.

E. Structure top and bottom shall be designed for full dead, superimposed dead and live load including impact. Structure sidewalls shall be designed for lateral earth and hydrostatic pressures plus live load (H20 Truck) adjacent to structure. Tops and walls of structures shall be designed for AASHTO standard H20 highway loading, with 30 percent loading added for impact and with design load being that which produces maximum shear and moment. All dead and live loads, as well as impact loading, shall be considered in design. Walls shall be designed to withstand all soil pressures, taking into consideration the soil to be encountered and ground water level present at the site and assuming that the H20 design vehicle will operate on surfaces adjacent to the structure. Ground water level shall be assumed to be three feet below ground surface unless a higher water table is indicated in the boring logs. Design shall also take into consideration stresses induced in handling units. Lifting devices shall be provided for properly handling units. Calculations and shop drawings shall be submitted covering the design and manufacture of precast units and shall bear the seal of registered professional engineer.

F. Joints: Mating edges of precast components shall be provided with tongue and grooved joints. Joints shall be designed to firmly interlock adjoining components and to provide waterproof junctions. Joints shall be sealed watertight using preformed plastic strip conforming to AASHTO M 198, Type B. Sealing material shall be installed in strict accordance with the sealant manufacturer's printed instructions. Provisions shall be made for waterproofing cable entrances into structures and at covers in the top slab.

G. Pulling-in irons shall be steel bars bent as indicated on drawings, and cast in the walls and floors. In the floor they shall be centered under the cover, and in the wall they shall be not less than 6 inches above or below, and opposite the conduits entering the structure. Pulling-in irons shall be projected into the structure approximately 4 inches. Irons shall be zinc-coated after fabrication.

H. Cable racks, including arms shall be made from 50% glass-reinforced nylon or a non-metallic material having equal mechanical strength, thermal resistance, chemical resistance and dielectric physical properties. Cable racks, including rack arms and insulators, shall be sufficient to accommodate the cables. Racks in power manholes shall be spaced not more than 3 feet apart and each manhole wall shall be provided with a minimum of 2 racks.

1. Provide stainless steel hardware for mounting fasteners. Coat threads of anchor bolts with anti-seize compound immediately prior to installing nuts.

2. Rack arms shall be 8”, removable type, and rated capable of supporting 450 lbs working load and 1,000 lbs short term rated.

3. Rack arms shall have slots or holes for securing cables with non-metallic cable wire tires.

I. Precast Manhole/Vault Installation: Commercial precast assembly shall be set on 6 inches of level, 90 percent compacted granular fill, 3/4 inch to one inch size extending 12 inches beyond the manhole on each side. Granular fill shall be compacted by a minimum of four passes with a plate type vibrator. Drain sumps shall be provided for all precast structures.

J. Coordinate requirement for sump pumps in manholes and vaults with Project Manager.
K. Install 1/0 bars copper ground conduct around inside perimeter of manhole. Connect to 3/4” x 10’ - 0” ground rod inside manhole. Bond with #6 bare copper from ring to manhole cover frame, sump covers, etc.

SECTION 26 0553-EQUIPMENT IDENTIFICATION LABELS

PART 1 - GENERAL

1.1 NAMEPLATES
A. Furnish and install engraved laminated phenolic nameplates for all safety switches, panel boards, transformers, switchboards, motor control centers, low voltage systems and other electrical equipment supplied for the project for identification of equipment controlled or served, phase, voltage, etc.

PART 2 - PRODUCTS

2.1 MATERIALS
A. Nameplate material colors shall be:
   1. Blue surface with white core for 120/280 volt equipment.
   2. Black surface with white core for 227/480 volt equipment.
   3. Bright red surface with white core for all equipment related to fire alarm system.
   4. Dark red (burgundy) surface with white core for all equipment related to security systems.
   5. Green surface with white core for all equipment related to "Emergency" systems.
   6. Orange surface with white core for all equipment related to telephone systems.
   7. Brown surface with white core for all equipment related to data systems.
   8. White surface with black core for all equipment related to paging systems.
   9. Purple surface with white core for all equipment related to television systems.
B. All empty conduit runs and conduit with conductors for future use shall be identified for use and shall indicate where they terminate. Identification shall be by phenolic tags with wire attached to conduit or outlet.
C. All outlet boxes, junction boxes and pull boxes shall have their covers and exterior visible surfaces painted with colors to match color scheme outlined above. This includes covers on boxes above all type ceilings.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Nameplates shall be securely attached to equipment with self-tapping stainless steel screws, and shall identify equipment controlled, attached, etc. Letters shall be 1/2 inch high minimum. Embossed, self-adhesive plastic tape is NOT acceptable for marking equipment and shall not be used.

SECTION 23 0800 – BUILDING COMMISSIONING SERVICES

PART 1 - GENERAL (LEED FUNDAMENTAL AND ENHANCED)

1.1 GENERAL REQUIREMENTS
A. North Carolina General Statute 143-135.37(d) requires commissioning of major projects.
B. Performance Verification. In order to be able to verify performance of a building component or an electrical system component, the construction contract shall include provisions that require each building component and each electrical system component to be commissioned, and these provisions shall be included at the earliest phase of the construction process as possible and in no case later than the schematic design phase of the project. Such commissioning shall continue through the initial operation of the building. The project design and construction teams and the public agency shall jointly determine what level of commissioning is appropriate for the size and complexity of the building or its electrical system components.

C. Design for Commissioning. The electrical designer will be responsible for ensuring and developing “... a systematic process of assuring that a building (mechanical, electrical and plumbing systems) performs in accordance with the design intent and the owner's operational needs.” The AE designer requirements stated in Division 26 – Appendix A will be met. The Owner considers the following elements as a minimum requirement for building acceptance and inherently integral to the Electrical Designer responsibilities, unless specifically notified otherwise by the Owner.

1. Design Phase – Provide documentation to the commissioning agent for
   a. Verification of Owner's project requirements.
   b. Commissioning reviews of design documents.
   c. Verification that training of staff responsible for building maintenance through mechanical contractor is specified.
   d. Metering and sub metering to accomplish analysis of annual energy consumption versus projected energy consumption.

2. Construction Phase
   a. NOTE: Commissioning shall in no way reduce the designer scope and responsibility for Construction Administration to include verifying quality of system installation
   b. Attend the commissioning scoping meeting and selected commissioning team meetings.
   c. Installation Verification.
   d. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
   e. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. On site observations should be completed just prior to system startup.
   f. The designers shall continue to assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, drawings or equipment documentation is not sufficient for writing detailed testing procedures.
   g. Startup and Checkout.
   h. From the Contractor's red-line drawings, edit and update one-line diagrams developed as part of the design narrative documentation and those provided by the vendor as shop drawings for the fire alarm, normal power distribution and emergency power distribution systems.
   i. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.

D. The Designer will include in bid documents the specific support and documentation required of the General Contractor, Mechanical Contractor, Electrical Contractor, Plumbing Contractor, Controls Contractor, Designer, Owner and others as applicable to ensure acceptable commissioning. Reference Division 01 General Requirements for commissioning guidelines. Guidelines will be modified as appropriate for each project.
SECTION 26 1313 – MEDIUM VOLTAGE SWITCHES

PART 1 - GENERAL

1.1 MEDIUM VOLTAGE SWITCHGEAR
   A. Switchgear shall be multiple way, manually operated switches with circuit interrupters.
   B. Switchgear shall consist of a gas-tight tank containing SF6 gas, load interrupter switches with visible open gaps and integral visible grounds. Manual operating mechanisms and viewing windows shall be located on the opposite side of the tank form the bushings and bushing wells so that operating personnel shall not be required to perform any routine operations in close proximity to high-voltage elbows and cables.
   C. Switchgear shall include microprocessor-based overcurrent control to initiate fault interruption on designated ways.
   D. Switchgear shall be suitable for sub-surface installation.
   E. Switchgear may be installed either as a pad mount or vault configuration depending on the location and visibility. Coordinate requirement with Project Managers.
   F. The University prefers S&C brand Medium Voltage Switchgear. S&C brand shall be bid as a preferred alternate.
   G. Design for each medium voltage switch to be loop fed such that each switch has two independent source feeds.
   H. Pad mount switches shall be mounted on fibercrete box pads engineered and manufactured to support the particular switch.

SECTION 26 1200-DRY-TYPE TRANSFORMERS

PART 1 - GENERAL

1.1 MATERIALS
   A. Transformers shall be furnished in accordance with the following:
      1. For 60Hz service.
      2. Built in accordance with NEMA Standards.
      3. Insulation shall conform to NEMA ST 20 standards for 2200 C UL system. Transformers 25KV A and larger shall be rated for 1150 C temperature rise over 400 C ambient, provided case temperature rise shall not exceed 450 C over 400 C ambient. The transformer overload capability shall be in accordance with IEEE C57.96 for standard transformers.
      4. Transformers shall have been rated for sound level in accordance with American Standards Association Standard ASA- C89.1-latest edition. Sound rating shall be same as, or less than, maximum decibel rating recommended by the standard for transformer size and type specified. This information shall be indicated on transformer nameplate.
      5. Primary winding shall be rated 480 volts for use on a 3-phase, 4-wire system and connected delta. Furnish with full KVA rated taps of the manufacturer’s standard, but not less than two - 2 1/2% above rated voltage and 4 - 2 1/2% below rated voltage. After load is applied, set taps to deliver as near 120/208 volts as possible.
      6. The designer shall evaluate the need for K-rated transformers on case-by-case basis. Coordinate with Project Manager.
1.2 MOUNTING
A. Transformers over 15 KVA shall be floor mounted. Four vibration dampeners per transformer shall be employed as necessary to avoid transmitting vibration to building structure.
B. Transformers 15 KVA and under may be wall mounted.
C. Installation shall meet seismic requirements of Section 260200 of these guidelines.

1.3 CONDUIT CONNECTIONS
A. No conduits shall be attached directly to transformer housing.
B. Where construction permits, stub conduits up into transformer housing from beneath. Stubs shall be fitted with fiber-throated grounding bushing with suitable lug. Stubs shall be bonded together and to transformer case with ground wire of size required by N.E.C.
C. Where connection must be made to housing, provide vibration dampening assembly consisting of:
   1. Female hub-type liquid-tight connector.
   3. Short length (approximately 6") liquid-tight flexible conduit.
   4. Bonding jumper of NEC size on inside of assembly. Bond from lug to transformer case panel or switch can.
D. All transformers, in addition to having the secondary neutral grounded to the system grounding conductor, shall also have the secondary neutral grounded to a local grounding electrode as required by NEC.

SECTION 26 2413-SWITCHBOARDS

PART 1 - GENERAL

1.1 GENERAL
A. Switchboard shall be provided with painted "mimic" bus on front of enclosure to depict actual bus arrangement inside cubicles.
B. Provide a laminated drawing of the building electrical riser next to each switchboard in the main electrical room framed and mounted under glass.

1.2 BUSSING
A. All busing shall be silver-plated copper.
B. Switchboards shall have a 100% neutral bus of the same material as the main bus. A copper ground bus shall be provided in each section

1.3 METERING
A. Main section shall be equipped with a GE Power Management Power Quality Meter or equivalent device. The intent is to be able to connect to a central monitoring station PC. The Power Meter shall provide for readouts of A, V, VA, W, var, kWh, kvarh, kVAh, PF, Hz, demand W, demand var, demand A, demand VA. Values shall be in true RMS. The Power Meter shall have (4) output relays, (4) isolated analog outputs that can replace transducers.
B. The Power Meter shall be able to perform Harmonic Analysis with trigger trace memory, waveform capture, event recorder and data logger.
C. The Power Meter shall have built-in data communications to allow Multi-point communication to multiple computer workstations, programmable controllers, and other host devices, at a minimum data rate of 9600 baud. The Power Meter shall be able to communicate with the Owners Tridium Niagara Software through the Network Area Controller, NAC, Panel for building management and/or other monitoring functions. The Power Meter shall be compatible with Modbus RTU Communications.

1.4 CIRCUIT BREAKERS

A. Each circuit breaker is to be furnished with an externally operable mechanical means to trip the circuit breaker, enabling maintenance personnel to verify the ability of the circuit breaker trip mechanism to operate, as well as exercise the circuit breaker operating mechanisms.

B. Feeder breakers shall be thermal magnetic with trip ratings as shown on plans. Feeder breakers shall be bolt-in.

C. Evaluate main service breaker for applicability of rack-out type breaker. Coordinate with Project Manager.

1.5 TESTING

A. Perform the following tests on the service circuit breaker. Testing shall be performed by a qualified factory technician at the job site. All readings shall be tabulated:
1. Phase tripping tolerance (within 20% of U.L. requirements).
2. Trip time (per phase) in seconds.
3. Instantaneous trip (amps) per phase.
4. Insulation resistance (in mega ohms) at 100 volts (phase to phase, and line to load).
5. Ground fault protection on the main breaker shall be performance tested in the field and properly calibrated and set in accordance with the coordination study.

B. All tests specified shall be completely documented indicating time of day, date, temperature and all pertinent test information.

C. All required documentation of readings indicated above shall be submitted to the engineer prior to, and as one of the prerequisites for, final acceptance of the project.

SECTION 26 2416 – DISTRIBUTION AND BRANCH CIRCUIT PANELBOARDS

PART 1 - GENERAL

1.1 SPECIFIC REQUIREMENTS:

A. Equipment shall be built to NEMA Standards where such standards exist

PART 2 - PRODUCTS

2.1 MATERIALS

A. The Designer shall design all new panels to have 20 percent blank breaker spaces. The Designer shall require that the Contractor install 10 percent unassigned spare breakers in each new panel.

B. Panels shall be marked with their maximum short circuit current rating at the supply voltage and shall be Third Party listed and bear the Third Party label. When required, panels shall be suitable for use as service equipment.

C. Distribution and branch circuit panelboards shall be bolt-on type.
2.2 CABLE CONNECTIONS
   A. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Large, permanent, individual circuit numbers shall be affixed to each breaker in a uniform position.

2.3 CIRCUIT BREAKERS
   A. Panel Board Circuit Breakers
      1. Minimum interrupting capacity rating of any panel assembly shall be 10,000 amps.
      2. Branch circuit breakers shall be bolt-on, thermal-magnetic, molded case. Single pole, 15 and 20 ampere breakers intended to switch fluorescent lighting loads on a regular basis shall carry the SWD marking.
   B. Distribution Board Circuit Breakers
      1. Distribution Board Breakers shall be one, two, or three pole molded case circuit breakers rated 600VAC. Breakers shall be high interrupting construction.
      2. Breakers with frame sizes greater than 100 amperes shall have variable magnetic trip elements which are set by a single adjustment (to assure uniform tripping characteristics in each pole). A push-to-trip button shall be provided on the cover for mechanically tripping the breaker. The breaker shall have reverse connection capability and be suitable for mounting and operating in any position.
      3. Circuit breakers shall have removable lugs. Lugs shall be UL listed for copper conductors only, rated 75 degrees C. Breakers shall be UL listed for installation of mechanical type lugs.

2.4 CONSTRUCTION FEATURES
   A. Panels shall be sized so that they will pass through door openings and hatch openings, be assembled if required within the room that they are located/mounted, installed to meet NEC clearance requirements and installed for maintainability.
   B. Top or bottom gutter space shall be increased six inches where feeder loops through panel. End plates shall be galvanized Code gauge (minimum) and shall be supplied without knockouts.
   C. Covers shall be constructed of high grade flat sheet steel of Code gauge minimum with the following:
      1. Door flush with face and closed against a full inside trim stop. Hinges shall be inside type.
      2. A combination flush latch and Yale, Corbin or equivalent, tumbler-type lock, so panel door may be held closed without being locked. All such locks on same job shall be keyed alike. Plastic lock type trims are not acceptable.
      3. Finish of manufacturer's standard color of top-grade enamel over a phosphatized or other approved rust inhibitor treatment and prime coat.
      4. Four or more cover fasteners of a type which will permit mounting plumb on box. Cover shall also have inside support studs to rest on lower edge of can while being fastened.
      5. Distribution and lighting type panelboards shall be furnished with covers hinged to backbox. Hinge shall be continuous "piano" hinge type permanently spot welded to the panelboard cover. Hinge shall in turn bolt securely to the backbox.
   D. For lighting panels, breakers shall be “Quicklag" type bolted to the supply bus. Plug-in types are not acceptable.
   E. Supply lugs shall be installed on busses and neutral bar so they may be readily and securely tightened from the front with panel in place and wired. A suitable arrangement shall limit their movement out of plumb. It shall not be possible to move the lugs so that metal parts between phases are closer than 3/8".
   F. All panels shall have copper busses, with substantial connections where breakers bolt to busses.
   G. All wiring lugs in panelboards and all breakers shall be rated for use with 75 degree conductors.
H. All branch circuit panels shall be equipped with copper ground busses.

I. Panelboards shall be equipped with directory cards mounted behind heavy clear plastic shields in substantial frames attached to inside face of doors. Cards shall be a minimum of three inches wide.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation shall be as follows
   1. All unused openings shall be closed.
   2. Only one solid wire is allowable under a screw. Provide an approved lug for connecting stranded wire or more than one solid conductor.
   3. Each lighting or branch circuit panelboard mounted flush in a wall shall have a minimum of five empty 3/4" conduits stubbed out into the ceiling space above panel for future use unless all circuits in a panel are assigned. Seal ends of conduit with caps or with U.L. approved fire stopping material.

B. Labeling shall be as follows
   1. Label all equipment in conformance with documents.
   2. For branch circuit panels, directory cards shall be neatly typed to indicate load served by each breaker or fuse. Directory cards shall indicate circuits in a manner analogous to the physical circuit breaker arrangement (i.e. odd numbered circuits in one column, even numbered circuits in another). Mount cards behind heavy plastic. Panelboard directory card shall be neatly typed with circuits assigned as shown on schedules. Space typing on card so all is visible when inserted into frame. Use room names and numbers as provided by Owner, not those shown on schedule. Names and numbers on schedule relate to plans only for construction. Indicate spare breakers in pencil (not typed) so that owner can erase and change as necessary in the future.
   3. Next to each breaker within distribution panels, attach a label indicating load served. Wording shall be as shown on its diagram or schedule on the drawings. Labeling shall also be attached to separately-mounted breakers, switches, transformers, wiring gutters and controllers of all types.
   4. Centered above door on panel cover attach a label indicating panel designation-for example, “Panel A;-voltage- 120/208 VOLTS”: and from where served - “FED FROM PANEL MDP”.
   5. Interrupting capacities shall be as indicated on the panel schedules. All ratings are for fully rated panels and breakers; series ratings are not acceptable.

SECTION 26 2713 – ELECTRICITY METERING

PART 1 - GENERAL

1.1 SUMMARY

A. All new buildings (and facilities with significant electrical consumption) shall have electric meters, to be provided and installed by the Prime Electrical Contractor. If there is no Electrical Prime Contractor, the contractor with the greatest contract dollar value shall provide and install the meter.

B. All new service boards shall be equipped with electric meters.
1.2 SUB METERING
   A. The designer shall coordinate with the owner for sub metering requirements covering major mechanical equipment/systems and other tenant loads. Standby (generator) power must be sub metered.
   B. Provide sub metering to enable measurement and verification requirements for building commissioning.

SECTION 26 2726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY
   A. New receptacles are to be installed with ground pin up.
   B. Specific Requirements:
      1. Where two or more devices are indicated for gang installation, they shall be trimmed with gang type plates.
      2. Ground each receptacle by means of a separate code size ground wire (#12 minimum) connecting the receptacle ground terminal to the grounded conduit system.
      3. Designer shall evaluate the need for isolated grounding systems. Isolated ground wires shall be installed continuous from IG receptacle to the isolated ground bus in the panel. In addition, a separate ground wire shall bond the box and conduit and run with the circuit conductors to the normal ground bus bonded to panel.

PART 2 - PRODUCTS

2.1 MATERIALS
   A. All wiring devices of any one general type (i.e. all duplex receptacles, all wall switches, etc.) shall be of the same manufacturer, color and shall match throughout.
   B. All duplex receptacles shall be rated 20 Amp, NEMA 5-20R, unless otherwise noted.
   C. All safety switches shall be heavy duty.

2.2 WIRING METHOD FOR BRANCH CIRCUITS
   A. Although not prohibited by the NEC, conductors serving two separate power systems (i.e. 120/208 V and 277/480 V) shall not be mixed in the same raceway, pull box, or junction box. Exception is where control wiring is a different voltage than the power.
   B. Use dedicated neutrals in all designs. Sharing of neutrals is not allowed for single phase branch circuits.
   C. Three phase circuits shall be limited to one circuit per raceway (three [3] different phase wires and a neutral if needed).
   D. The neutral carrying all or any part of the current of any specific load or run shall be contained in the same raceway or enclosure with the phase wire or wires also carrying that current. No split neutrals permitted.
   E. Under the above requirements and with required color coding system, no feeder or branch circuit raceway will contain more than one wire of the same color, except for switch legs and control circuits.
F. Conductors feeding lighting outlets shall not be combined in the same raceway with conduit serving convenience receptacles. Lighting outlets and convenience receptacles shall not be connected on the same circuit unless specifically intended.

G. Outlets in the same general area shall be circuited together.

H. The designer shall evaluate the need for dedicated neutrals (one dedicated neutral per phase) in each project.

2.3 RECEPTACLES

A. Ground-Fault Interrupters (GFI) shall be as follows:
   1. Where indicated, provide general-duty, duplex receptacles, ground-fault circuit interrupters: grounding type UL-rated Class A, Group 1, 20 Amperes rating, 120 Volts, 60 Hz: with solid-state ground-fault sensing and signaling: with 5 milliamperes ground-fault trip level. Within the extent of applicable codes, "feed-through" GFI's may be installed.

2.4 MISCELLANEOUS

A. All receptacles on emergency or UPS power circuits shall be red in color.

B. Unless noted or specified otherwise, device trim plates shall be type 302 stainless steel to suit device. All plates in the job shall be same make and match throughout.

C. Wiring devices shall be 20 amp minimum and shall be of the grounding type, with hex-head green grounding screw, to be connected to the green ground conductor. Self grounding type is not acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Devices shall be mounted tightly to boxes and be adjusted plumb and level.

B. Two or more devices ganged shall be trimmed with gang plate.

SECTION 26 3000 - EMERGENCY POWER SUPPLY SYSTEM

PART 1 - GENERAL

1.1 WARRANTY

A. The engine generator set shall be guaranteed against defective parts or workmanship for a period of five years from the date of final inspection and acceptance. Warranty conditions shall be included in submittals. Warranty shall include all parts and labor, including travel to and from the job site and expenses and equipment necessary to perform replacement and and/or repairs.

PART 2 - PRODUCTS

2.1 ENGINE/GENERATOR SET

A. Engine generator set shall be Caterpillar, Cummins, Kohler, or approved equivalent.

B. Packaged generator set shall be third party listed. UL2200 or CSA or both.

C. The new engine generator shall be rated KW as required, continuous standby, 60 hertz, 0.8 power factor, 4-cycle diesel. The generator shall have a belly tank.
D. The generator set shall be capable of cranking and picking up the assigned loads, meeting the minimum frequency and voltage stability requirements of these specifications, within 10 seconds after loss of utility power.

E. Engine shall be water cooled, solid-injection type, either vertical in-line or v-type. The engine shall be equipped with fuel filter, lube oil filter, intake air filter, lube oil cooler, service meter, gear-driven water pump, and instruments, including a fuel pressure gauge, water temperature gauge, lubricating oil pump and pressure gauge, battery charging ammeter, and engine hour meter.

F. Engine shall be furnished with a 24 volt starting system with batteries. Batteries shall be industrial grade lead acid with current limiting battery charger. Batteries shall be oversized for proper starting in temperature extremes. The battery charging system shall be automatic, solid state, current limiting and float equalizing and shall maintain the battery at normal capacity, recharge battery after cranking and be capable or recharging a completely discharged battery within 8 hours. System shall be capable of automatically switching from one charging rate to another to meet the needs of the battery. The battery charging system shall have a 120 volt input and shall also be equipped with overload protection, voltage surge suppressors, D.C. ammeter, D.C. voltmeter, low D.C. voltage alarm relay, battery charger malfunction alarm contact and have a minimum continuous output of 10 amperes D.C. and be third party listed.

G. Engine shall be equipped with one jacket water heater with recirculating pump. Heaters and pump shall be a single assembly with a single point power feed connection.

H. Engine shall have radio frequency suppression.

I. Air flow shall be away from engine. The radiator shall be protected by a strong grille or screen guard and the fan shall be provided with a screen guard.

J. The Engine Generator must be able to meet Mecklenburg County emissions requirements (Tier 4).

K. Engine shall be equipped with an institutional grade (critical) muffler-silencer. Critical grade silencer shall be provided to reduce engine exhaust noise to a maximum dBA level of 85 at a distance of 10 feet. The Contractor shall also furnish all necessary flexible and hard exhaust piping necessary for a satisfactory installation. Terminate exhaust piping using a hinged cap on top of pipe to keep out rain. Exhaust piping and silencer shall be stainless steel to prevent rusting or be internally mounted. Exhaust pipe size shall be such that exhaust back pressure does not exceed maximum limitation required by engine manufacturer. Silencer shall provide a minimum of 32 dBA attenuation.

L. The generator set shall have a digital control panel mounted on the unit with LCD readout and controls listed by the manufacturer as standard as well as those specified herein. Controls shall provide for automatic shutdown in case of high water temperature, overspeed, overcrank, or low oil pressure. Include additional alarms for NFPA 110 and 99 compliance.

M. The generator set shall be equipped with main line circuit breakers, as required, mounted on the unit. Circuit breakers shall be adjustable electronic trip type, molded case, rated as indicated on plans, and with shunt trip for engine shut down tripping. Furnish with auxiliary position contacts. Provide generator mounted circuit breakers, molded case or insulated case construction, 3 pole, NEMA 1 P22. Breakers shall utilize a 24 VDC shunt trip. The breaker shall be UL listed with shunt trip device connected to engine/generator safety shutdowns. Breaker shall be housed in an extension terminal box mounted on the side of the generator. Mechanical type lugs, sized for the circuit breaker feeders shown on drawing, shall be supplied on the load side of breaker.

N. Provide generator set with battery-powered emergency lighting suitable for installation. The battery-powered emergency lighting shall be powered from the load side of the automatic transfer switch.

O. Generator parameters (see 2.4 C) shall be able to be monitored through the Building Automation System (BAS) via LonWorks, Modbus, or approved equal.
2.2 OUTDOOR ENCLOSURE

A. Generator shall be housed in an outdoor enclosure intended for both weather protection as well as sound reduction. Housing shall be painted aluminum, 14 gallon minimum, with access doors with panic hardware. Doors shall provide full access for operation and servicing and be lockable via in-handle lock tumblers.

B. Platforms are required for larger sized generators to enable accessibility for maintenance personnel. Evaluate need for platform with the Project Manager.

C. Acoustic insulation shall reduce engine generator noise to an average of 79 dBA at 23 feet. Air intake and discharge inlets shall be supplied. Acoustic insulation material shall consist of sound absorbing material.

D. Engine silencer shall be independently supported from the engine-generator.

E. Engine shall be provided with oil and water drains to exterior of enclosure with a bronze body ball valve installed on engine and plumbed to exterior coupling with high quality hose. Fumes disposal shall be extended to radiator discharge using an oil resistant high quality hose.

2.3 CONCRETE PAD

A. Contractor shall provide a separate concrete pad for generator enclosure. Pads shall be a minimum of 12" beyond base x 12" deep with No.6 rebar on 12" centers in a horizontal grid pattern. Rebar should clear surfaces by 3" minimum in all directions. Concrete mixture shall be a 1:2:3 mixture of cement, sand, and aggregate with maximum of 4" slump and 28-day compressive strength of 3000psi.

2.4 REMOTE MONITOR PANEL

A. Provide and install a 16-light remote monitor panel for the emergency generator and a remote alarm indicator in a location(s) as directed by the University.

B. Alarm panel shall be U.L. labeled and shall operate on 24 volts DC. Power shall be supplied from the generator starting batteries.

C. The remote alarm panel shall be designed to contain all the alarm and monitor functions for the generator individually plus alarms and indicators to the emergency system. These alarms and indications shall comply with NFPA 110 and NEC Sections 700 and 701, and shall include the following as a minimum:
1. For generator:
   a. Battery charger malfunction
   b. Low lubricating oil pressure
   c. Low coolant temperature
   d. High coolant temperature
   e. Overcrank
   f. Overspeed
   g. Generator running
   h. Generator Not in automatic
   i. Alarm buzzer and silence switch (for all alarms)
   j. Lamp test switch (for all lamps)
   k. Utility power available
   l. ATS in normal
   m. ATS in emergency
   n. Low gas pressure
   o. Enclosure breach
   p. Panel shall also include an emergency “STOP” button (mushroom type)

D. The alarm panel shall contain an alarm light and signal with silence switch to give an indication of any of the alarm conditions above, but shall not indicate them separately. In addition, it shall
indicate utility and/or emergency power "on" using a green lamp and red lamp respectively. A lamp test switch shall also be provided.

E. Panels, alarms, meters, etc., shall be appropriately labeled using laminated plastic labels, red letters on white background, professionally engraved. Contractor shall submit a drawing for approval showing layout prior to purchase or fabrication.

2.5 AUTOMATIC TRANSFER SWITCHES

A. Contractor shall furnish and install one NEMA 1 enclosed automatic transfer switch. Switch shall be 4 wire, 4 pole, 100% rated continuous. Acceptable switches are Russelectric RMTD, ASCO and Zenith. Features and functions shall be as follows:
   1. Shall be UL 1008 listed.
   2. Shall be capable of switching the load to either source under all conditions.
   5. Adjustable time delay on transfer to emergency and retransfer to Utility, adjustable from 0-30 minutes.
   6. Adjustable time delay for engine cool-down after re-transfer to normal, adjustable from 0-30 minutes.
   7. Switches shall be capable of switching the load to either source under all conditions.
   8. Switches shall have complete engine starting capability with adjustable time delay for momentary utility power outages or dips.
   9. Each transfer switch shall be equipped with a U.L. listed manual operator in the event the electrical operator should become inoperative. The manual operator shall provide the same contact-to-contact transfer speed as the electrical operator to prevent flashover, and shall be arranged so that the transfer switch can be manually operated under load, without opening the enclosure door.
  10. All solid state control circuitry.
  11. Contacts shall be silver plated copper.
  12. Shall be rated for 42,000 amps withstand current, symmetrical.
  13. Switching shall incorporate a time adjustable transition neutral position where the load is disconnected from both power sources.
  15. Controls shall be digital incorporating LCD backlit display visible while the enclosure door is closed.
  16. A selectable load/no-load digitally programmable exerciser shall be incorporated within ATS.

B. Operation of transfer switch shall be as follows:
   1. The switch shall automatically transfer to the emergency source in less than 10 seconds upon loss of utility power.
   2. When the utility source returns, switch should automatically, after a time delay, return to the utility position.
   3. Loss of utility power on any phase, or reduction of voltage on any phase below 80%, the transfer switch shall cause generator start.

C. Switch shall be equipped with overrides necessary to operate switch manually (by electric push buttons) under all conditions.
   1. Transfer switch shall be completely assembled, wired, and tested at the factory prior to shipping and installation

PART 3 - EXECUTION

3.1 INSTALLATION

A. Engine generator set shall be mounted on heavy structural steel base fastened to the concrete pad. Provide pad depth to accommodate the slope of the grade while keeping the pad a
minimum of 6” above grade. Generator set shall be mounted using heavy duty, open, stable viscous vibration dampers of the type approved for seismic areas. Vibration dampers shall be mounted between the engine/generator and base frame.

B. Supplier shall provide a competent factory trained service engineer/technician to coordinate the installation, check-out, and start-up and testing of the complete generator system.

C. On-site testing in the presence of the owner shall include testing of all safety devices and shall include a four hour running test first at 50% load for 1 hour, then at 75% load for 1 hour and last at 100% load for 1 hour. Then, after the cool down period the generator shall be started and after 10 seconds be applied 100% load for 30 minutes. The capability of the system to pick up full standby service load within 10 seconds of power outage shall also be demonstrated. Supplier shall furnish load bank.

D. Supplier shall provide complete on-site training in the operation of the systems for the Owner at times chosen by the Owner to include all work shifts.

E. Supplier shall provide, upon completion of installation but before final acceptance by Owner, three complete sets of operating instructions, maintenance manuals, and drawings, showing full details for care and maintenance of each item of equipment. In addition a simplified set of step-by-step operating instructions, encased in a suitable frame for placing at the generator location, shall be provided with the operation and maintenance manuals.

3.2 MISCELLANEOUS

A. When applicable, power elevators from the engine generator. Coordinate requirements with the University.

SECTION 26 3353 UNINTERRUPTIBLE POWER SUPPLIES

PART 1 - GENERAL

1.1 REQUIREMENTS

A. The designer shall evaluate the need for a UPS by project.

B. UPS units in excess of 150 kVA shall have an external bypass.

C. UPS units for large computer rooms shall be closed transition type.

SECTION 26 5000 - LIGHTING

PART 1 - GENERAL

1.1 GENERAL INTERIOR

A. Daylighting

1. Day lighting shall be considered in the design of new construction. Some keys to successful day lighting include:
   a. Maximize southern exposure (orient building on an east – west axis).
   b. Concentrate on the most heavily used spaces.
   c. Use roof monitors and light baffles to increase winter radiation, reduce summer radiation and eliminate glare from direct sunlight.
   d. Use glass on the roof equal to 10% to 12% of the building floor area.
B. Interior lighting control
   1. Large Classrooms and Conference Rooms shall have infra-red detectors to control
celing light fixtures when room is not occupied, unless room function dictates otherwise.
Detectors shall have manual override.

C. Suspended luminaires
   1. All pendant-style fixtures shall have screens or closed tops to prevent trash from being
thrown into the light cavities. If the specified fixtures are not manufactured with this
feature, the Designer shall provide the design for removable screens with maximum 1/8-
inch mesh to be provided, assembled and installed by the Contractor who installs the
fixtures. The contractor who installs the pendant fixtures shall install protective covers to
prevent construction dust and debris from settling inside the fixtures. The light fixtures
installer shall be responsible for cleaning dirty fixtures prior to University acceptance.

D. Recessed lighting
   1. Recessed lighting shall be installed with minimum clearance above fixture equal to
thickness of fixture to ensure maintainability and accessibility.

E. General exterior

F. Parking, roadway, and walkway
   1. Appropriate lights fixtures and poles shall be used in parking lots, streets and along
pedestrian walkways. Contact Planning Department to coordinate pole lighting
installation requirements and to obtain campus standard detail drawings.
   a. Roadway Lighting – 30’ tall round tapered aluminum poles by McGraw Edison (GR
Series), Spaulding, Hubbell, Lithonia or approved equal. Single/double head as
applicable. Malaga Green, 400WHPS.
   b. Parking Lot Lighting – 30’ tall round tapered aluminum poles by McGraw Edison
(GR Series), Spaulding, Hubbell, Lithonia or approved equal. Single/double head
as applicable. Malaga Green, 400WHPS.
   c. Walkway Lighting – Citadel fixture by Hadco (Citadel V25), AMP, Sternberg, Spring
City or approved equal. Malaga Green, 150WHPS. Coordinate pole height with
surrounding/similar areas.
   d. Charlotte Research Institute Pole: PX W19 12 S4
      1) Color: Malaga Green ; Fixture: LT30K 150S MOG ACT GR3 TV Multi-Tap
         Color Fixture: Malaga Green.

G. Temporary lighting
   1. The Electrical Contractor shall provide adequate temporary lighting at the Project site for
other contractors. If there is no electrical contractor, the prime contractor with the
greatest contract monetary value shall provide temporary lighting specified herein.

PART 2 - PRODUCTS

2.1 LAMPS
   A. The Electrical Contractor shall provide all new lamps in all lighting fixtures at date of Beneficial
Occupancy. In lieu of installing all new lamps at Beneficial Occupancy, the Contractor may
elect to warranty all lamps (for labor and material) for a period of 2 years with the requirement
that defective lamps be replaced within seven calendar days of notice. The Contractor shall
provide a 5 percent “attic stock” of all types of lamps installed by the Contractor, delivered to the
University within 14 days of Beneficial Occupancy. “Attack Stock” is not intended for use during
the 2 year Warranty Period.

B. Ballasts for T-8 lamps shall be electronic; shall be instant start; shall comply with FCC and
NEMA limits governing electromagnetic and radio frequency interference and shall not interfere
with normal operation of other electrical equipment; shall meet all applicable ANSI and IEEE
standards; shall have a total harmonic distortion (THD) of less than 20% but not less than 10%;
shall be equipped with surge protection; shall not be affected by lamp failure and shall yield normal lamp life; shall have power factor above 90%; ballast factor of .88 or .90; lamp current crest factor shall not exceed 1.7; and shall allow remaining lamp(s) to maintain full output if companion lamp(s) fail. The electronic ballasts shall be provided with end-of-life shutdown circuit. Provide with 5-year full replacement warranty for electronic ballast. Manufacturer shall have a 5-year minimum manufacturing experience. Motorola, Magnetek, Osram / Sylvania, EBT, or Advance.

C. Lamps shall be G.E., Phillips, or Osram/Sylvania. All fixtures shall be equipped with lamps.

D. Unless noted otherwise, all fluorescent fixtures shall be provided with high power factor, U.L. approved and CBM-made Class "P" ballasts, "sound rated A" and meet or exceed ANSI C82.11 requirements. HID fixtures shall be provided with constant wattage high power factor ballasts. Ballast shall be provided for proper voltage based on circuit assignment indicated on plans.

E. Ballast design shall withstand line transients per IEEE 587, Category A and shall meet FCC Rules and Regulations, Part 16.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Surface-mounted fluorescent fixtures being installed on combustible material shall be mounted at least 1-1/2" from the surface of the material; except units which are plainly marked on fixtures U.L. approved for mounting directly to such surfaces.

B. Mount all fixtures plumb and square. Keep rows in perfect line.
SECTION 2
DIVISION 27
COMMUNICATIONS
DIVISION 27 - COMMUNICATIONS

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 27 0100 – TELECOM SYSTEMS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS
   A. The Telecommunications design must be in complete compliance with the current edition of The University of North Carolina at Charlotte Telecommunications Standards, Specifications, and Procedures Manual for Campus Construction and Major Renovations.

1.2 QUALITY ASSURANCE
   A. Designer’s Telecommunications Engineer: If the Project has more than 50 telephone and data circuits, then the Telecommunications System Design must be prepared under the supervision of a Registered Communications Distribution Designer (RCDD) and all telecommunications drawings and specifications shall be sealed and signed by the RCDD. The RCDD must have sufficient experience to design and advise field forces during the installation and warranty period. The RCDD will perform site visits once a week during the construction phase to observe telecommunications installation and testing.

PART 2 - PRODUCTS

2.1 PAY TELEPHONES
   A. All new buildings and major renovations shall contain pay telephones and TTY or video phones. Install one 110v duplex electrical receptacle at each pay telephone. Consult with the University Telecommunications Engineer to determine the layout during the Design Development Phase.

2.2 CABLE TRAYS
   A. Cable trays are desired in equipment rooms which contain telecommunications equipment. Cable tray systems at other locations may be desired and the Telecommunications Designer shall meet with the UPW and the University Telecommunications Engineer to determine layout during the Design Development Phase.

SECTION 27 5313 – CLOCK SYSTEMS

PART 1 - GENERAL

1.1 REQUIREMENTS
   A. Do not add onto existing building based clock systems. All new systems shall be GPS based systems matching existing area GPS transmitter. Contact Project Manager for complete requirements.
DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

SECTION 28 0100 - ELECTRONIC SAFETY AND SECURITY GENERAL

PART 1 - GENERAL

1.1 SUMMARY
A. The following information is provided to ensure compatibility of card readers for use with UNC Charlotte’s ID Card.

PART 2 - PRODUCTS

2.1 CARD READER REQUIREMENTS
A. All card readers and supporting systems proposed for any building at UNC Charlotte must comply with the following ID Card Standards and be 100A% compatible with the existing University equipment.

B. The UNC Charlotte’s ID Card uses a standard ABA accepted CR-80 colored card stock, size 2.12 inches high by 3.375 inches long, a card thickness of 0.030 inches, and the radius of corners .125 inches. The card meets ISO standards 7810 and 7813. The stripe is a three-track ABA stripe meeting ISO specifications 7811/2, 7811/4 and 7813. The ABA stripe employs high coercivity encoding. Card holder information is encoded on Track II of the ABA magnetic stripe.

C. Card Reader Preferred Features:
1. Card readers should be specifically designed for the college and university environment, and be made of rugged, rustproof metal. Readers should not have plastic casings or moving parts which are subject to frequent replacement due to shattering and breakage.
2. Card readers should feature a continuous swipe-through style card slot with a floating read head, which reads the encoded information on Track II of the ABA magnetic stripe on the ID card.
3. Card readers should be programmable from administrative workstations linked to its access control system by authorized operators only. No card reader programming shall be done at the reader.
4. In the event of a communication disruption between the reader and its access control system, readers should be able to store a history of at least 4,000 transactions while offline, and automatically upload these transactions to the access control system when communication is restored.
5. Card readers should have their control electronics mounted remotely within the interior of the secured area.
6. Card readers should be protected against power line disturbances (i.e., have power line filter and watchdog timer circuitry).
7. It is desirable for card readers and their supporting system to:
8. Provide some sort of visual indication if card entry is valid, denied, or the card must be reinserted. (For security reasons, access control card readers should not visually indicate an offline condition.)
9. Be able to support a high security option that allows use of a downloaded cardholder privilege database for offline authorization.
10. Be able to support an optional Personal Identification Number (PIN) pad.
11. Be capable of interfacing with proximity card recognition devices and other types of door opening systems and hardware.
12. Be able to support multiple alarm inputs/outputs that will activate other types of peripheral equipment (lights, video camera, sirens, etc.)

SECTION 28 3000 - FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 REQUIREMENTS

A. Each installation shall be an addressable system with battery backup, graphic annunciator and voice evacuation.
B. Provide audiovisual speaker and light alarm devices throughout the building.
C. Provide addressable smoke detectors in the storage spaces, equipment rooms, fire alarm control panel locations and corridors. Addressable duct mounted smoke detectors will be provided for the central air handlers. Addressable heat detectors will be provided where there is cooking equipment and inside the boiler rooms.
D. Provide addressable fire alarm pull stations at the egress doors. Additional pull stations will be provided in the mechanical rooms.
E. All work shall be in accordance with the recommendations of the N.C. Department of Insurance Guidelines for Fire Detection and Alarm Systems.
F. Sprinkler System Interconnect: Flow switches shall be connected to energize the system and operate all speakers and visuals in the entire building. Valve tamper switches shall be connected to annunciate trouble signal only, both audibly and visibly.
G. Digital Communicator: Provide complete digital communicator that is directly compatible without translators to the existing Simplex campus fire alarm monitoring system.
H. Power fire alarm system with generator backed life safety circuit if available.

PART 2 - EXECUTION

2.1 INSTALLATION

A. All wiring shall be in metal raceway.
B. Access doors in ducts for duct detectors shall be installed by the mechanical contractor. Fire alarm contractor to coordinate installation with mechanical contractor.
C. Final testing of the system shall be under the direct supervision of the manufacturer's representative. The Fire Alarm System shall be fully tested and certified in accordance with NFPA 72. When manufacturer's testing is complete, a letter of certification including the NFPA 72 Record of certification shall be sent to the Owner (State Construction Office) with a copy to the Engineer stating that the system has been tested and functions as intended by all applicable Codes and these plans and specifications.
D. A demonstration of the entire system shall be provided for the Owner and Engineer upon completion of the project. Manufacturer's field engineer or technician shall be present for these demonstrations and shall assist the Contractor in performing the demonstration. Prior to the
demonstration and inspection by the Engineer, the installing contractor shall submit to the Engineer the NFPA 72 signed certification of completion seven days in advance of this requested final inspection date. Once system is operational and accepted by the Owner and Engineer, Contractor shall be prepared for a complete demonstration of the system for the State Construction Office during their inspection. The manufacturer's field engineer or technician shall also be present for this demonstration. Contractor shall arrange to have the necessary number of people, radios, etc. including the manufacturer's representative on hand for these demonstrations of the system. Again, demonstrations shall use approved smoke methods and smoke “bombs”, not magnets. Contractor shall furnish all smoke and smoke “bombs.”

E. Any modification of an existing fire alarm system requires a new certification and graphics system update.

F. All connections to the FACU and the system's programming shall be done only by the manufacturer, or by an authorized distributor that stocks a full complement of spare parts for the system. The technicians who do this are required to be trained and individually certified by the manufacturer, for the FACU model/series being installed. This training and certification must have occurred within the most recent 24 months. Copies of the technician’s certifications must be part of the Shop Drawing submittal to the engineer, prior to installation. The submittal cannot be approved without this info.

2.2 SUBMITTALS

A. Contractor shall submit for approval complete data on all proposed system components, along with detailed wiring diagrams showing color coding and wire identification, terminal numbers, raceway sizes, number of conductors, etc.
SECTION 2
DIVISION 28
VOICE EVACUATION FIRE ALARM SYSTEMS
APPENDIX
DIVISION 28-VOICE EVACUATION FIRE ALARM SYSTEM APPENDIX

PART 1 - GENERAL

1.1 SUMMARY
A. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.
B. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.
C. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
   1. Fire alarm system detection and notification operations.
   2. Control and monitoring of elevators, smoke control equipment, door hold-open devices, and other equipment as indicated in the drawings and specifications.

1.2 SCOPE OF WORK
A. Provide a complete, non-coded, addressable, microprocessor-based fire alarm system with addressable initiating devices, non-addressable emergency voice alarm notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein. System shall be fully interconnected into the UNCC campus wide fire alarm network and be compatible with the existing Simplex graphics monitoring/command unit. Full network integration providing all points of the new system into the existing network shall be provided.

1.3 ACCEPTABLE EQUIPMENT AND SERVICE PROVIDERS
A. Manufacturers: The equipment and service described in this specification are those supplied and supported by SimplexGrinnell and represent the base bid for the equipment.
   1. Subject to compliance with the requirements of this specification, provide products by one of the following:
      a. Simplex, a Tyco International Company
      b. Pre-bid approved equal

B. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.

C. Alternate products must be submitted to the Engineer two weeks prior to bid for approval. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.

D. The equipment and service provider shall be a nationally recognized company specializing in fire alarm and detection systems. This provider shall employ factory trained and NICET Level III certified technicians, and shall maintain a service organization within 100 miles of this project location. The equipment and service provider shall have a minimum of 10 years experience in the fire protective signaling systems industry.

1.4 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
B. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:
1. Division 16: "Basic Electrical Materials and Methods."
2. Division 16: "Wiring Methods."
3. Division 13: "Fire Suppression."
4. Division 15: "Fire Protection."
5. Division 15: "HVAC Systems."
6. Division 13: "Building Automation and Control."

C. The system and all associated operations shall be in accordance with the following:
7. Local Jurisdictional Adopted Codes and Standards.

1.5 SYSTEM DESCRIPTION
A. General: Provide a complete, non-coded, addressable, microprocessor-based voice fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

B. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of 100% on-site programming to accommodate system expansion and facilitate changes in operation. All programming shall be capable of being accomplished via the front panel and via a lap top computer. All software operations shall be stored in a non-volatile programmable memory within the FACP. Loss of primary and secondary power shall not erase the instructions stored in memory.

C. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. Separate alarm, supervisory and trouble logs shall be provided.

D. Wiring/Signal Transmission:
1. Transmission shall be hard-wired, using separate individual circuits for each zone of alarm operation as required or addressable signal transmission, dedicated to fire alarm service only.
2. System connections for signaling line circuits shall be Class A, Style 6 and notification appliance circuits shall be Class B, Style Y.
3. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.

E. Remote Access:
1. FACP shall have the capability to provide Remote Access through a Dial-Up Service Modem.
2. A personal computer or technician's laptop, configured with terminal emulation software shall have the ability to access the FACP for diagnostics, maintenance reporting and information gathering.

F. Required Functions: The following are required system functions and operating features:
1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority, respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
2. Non-interfering: The activation of an addressable device does not prevent the receipt of signals from subsequent activations.

3. Transmission to an approved Supervising Station: Automatically route alarm, supervisory, and trouble signals to an approved supervising station service provider if required, under another contract.

4. Transmission to existing graphic monitoring/command units: Automatically route alarm, supervisory, and trouble signals to the existing fire alarm network workstations in King Hall and in Electrical Shop 11.

5. Compatibility with outdoor Mass Notification System for UNCC campus. MNS shall have the ability to activate building voice Fire Alarm System and transmit voice messages over the building FAS.

6. Local Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote Annunciator, indicating the type of device, the operational state of the device (i.e. alarm, trouble or supervisory) and shall display the custom label associated with the device.

7. General Alarm: A system general alarm shall include:
   a. Indication of alarm condition at the FACP and the Annunciator(s).
   b. Identification of the device/zone that is the source of the alarm at the FACP and the Annunciator(s).
   c. Operation of audible and visible notification appliances until silenced at FACP.
   d. Audible Alarm Notification shall operate as a Temporal Code pattern with pre-recorded emergency voice evacuation messages.
   e. Closing doors normally held open by magnetic door holders.
   f. Unlocking designated doors.
   g. Shutting down supply and return fans serving zone where alarm is initiated.
   h. Closing smoke dampers on system serving zone where alarm is initiated.
   i. Initiation of smoke control sequence.
   j. Transmission of signal to the supervising station.
   k. Transmission to campus fire alarm network graphic workstations.
   l. Initiation of elevator Phase I functions (recall, shunt trip, illumination of indicator in cab, etc.) in accordance with ASME/ANSI A17.1, when specified detectors or sensors are activated, as appropriate.

8. Supervisory Operations: Upon activation of a supervisory device such as a tamper switch, the system shall operate as follows:
   a. Activate the system supervisory service audible signal and illuminate the LED at the FACP and the graphic Annunciator.
   b. Pressing the Supervisory Acknowledge key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
   c. Record the event in the FACP historical log.
   d. Transmission of supervisory signal to the supervising station.
   e. Transmission to campus fire alarm network graphic workstations.

9. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible alarm signals shall cease operation.

10. System Reset
   a. The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
   b. Should an alarm condition continue, the system will remain in an alarmed state.

11. Drill: A manual evacuation (drill) switch shall be provided to initiate an alarm on the FACP.
   a. Manual Control: Manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble. The "off normal"
status shall be clearly identified in plain-language on the FACP alphanumeric display.

b. Manual Bypass Control: The ability to perform a manual bypass of selected automatic functions shall be provided.

12. Circuit Enable/Disable Control: The system shall have provisions for disabling and enabling each circuit individually for maintenance or testing purposes.

13. WALKTEST: The system shall have a one person test feature. Enabling the one person test feature at the FACP shall activate the "One Person Testing" mode of the system as follows:
   a. The city circuit connection and suppression release circuits shall be bypassed for the testing group.
   b. Control relay functions associated to the testing group shall be bypassed.
   c. The FACP shall indicate a trouble condition.
   d. The alarm activation of any initiation device in the testing group shall cause the audible notification appliances to sound a code to identify the device.
   e. The control panel shall automatically reset itself after signaling is complete.
   f. Any momentary opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

G. Analog Smoke Sensors:
   1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The FACP shall determine the condition of each sensor by comparing the sensor value to the stored values.
   2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
   3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 8 sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
   4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements. The reports shall be viewed on a Maintenance Terminal CRT Display or printed for annual recording and logging of the calibration maintenance schedule.
   5. Peak Value Logging: The FACP shall log the Peak Value of smoke obscuration or degree of temperature for each individual sensor to allow system calibration for maximum response time performance without nuisance alarms based on "actual ambient conditions".
   6. The FACP shall continuously perform an automatic self-test on each sensor that will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.

H. Fire Suppression Monitoring:
   1. Water flow: Activation of a water flow switch shall initiate general alarm operations.
   2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.
3. Hood Suppression Systems: Activation of a hood system shall initiate a general alarm sequence.

I. Audible Alarm Notification: By voice/audible alarm in areas as indicated on drawings.

J. Power Requirements:
   1. The control panel shall receive AC power via a dedicated fused disconnect circuit.
   2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 15 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic. If system is connected to a remote supervising station or central supervising station for monitoring provide 60 hours of standby with 15 minutes of alarm operation.
   3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control panel.
   4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control panel. A green "power on" LED shall be displayed continuously while incoming power is present.
   5. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be indicated at the control panel.
   6. The system shall support 100% of addressable devices in alarm operated at the same time, under both primary (AC) and secondary (battery) power conditions.
   7. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.

1.6 SUBMITTALS

A. General. Submit the following according to Conditions of Contract and Division 1 Specification Sections:
   1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
   2. Wiring diagrams from manufacturer.
   3. Shop drawings showing system details including location of FACP, all devices, circuiting and details of graphic Annunciator.
   4. Graphic file layouts for integration into existing fire alarm network graphic workstations.
   5. System power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate in accordance with the prescribed backup time periods and under all voltage conditions in accordance with UL and NFPA standards.
   6. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, SLC, NAC, RAC, Sensor, and auxiliary control circuits.
   7. Operating instructions for FACP.
   8. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
   9. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
   10. Record of field tests of system.

B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of
shop drawings as required to depict component locations to facilitate review. Upon receipt of
comments from the Authority, make resubmissions, if required, to make clarifications or
revisions to obtain approval.

1.7 CAD DRAWING FILES
A. System provider to develop appropriate drawing files to be imported into the existing fire
alarm network graphic workstations. All required programming for integration of these drawing
files into the workstations is to be provided. New floor plan layouts are to be consistent with the
existing building floor plan files.

1.8 QUALITY ASSURANCE
A. Installer Qualifications: A factory authorized installer is to perform the work of this section.
B. Each and every item of the Fire Alarm System shall be listed under the appropriate category by
Underwriters Laboratories, Inc. (UL), and shall bear the “UL” label.

1.9 MAINTENANCE SERVICE
A. Warranty Maintenance Service: Provide maintenance of fire alarm systems and equipment for a
period of 12 months, using factory-authorized service representatives.
B. Basic Services: Systematic, routine maintenance visits on an annual basis at times scheduled
with the Owner. In addition, respond to service calls within 24 hours of notification of system
trouble. Adjust and replace defective parts and components with original manufacturer's
replacement parts, components, and supplies.
C. Additional Services: Perform services within the above 12 month period not classified as routine
maintenance or as warranty work when authorized in writing. Compensation for additional
services must be agreed upon in writing prior to performing services.
D. Maintenance Service Contract: No later than 60 days prior to the expiration of the warranty
maintenance services period, deliver to the Owner a proposal to provide contract maintenance
and repair services for an additional one-year term. Owner will be under no obligation to accept
maintenance service contract renewal proposal.

1.10 EXTRA MATERIALS
A. General: Furnish extra materials, packaged with protective covering for storage, and identified
with labels clearly describing contents as follows:
1. Break Rods for Manual Stations: Furnish quantity equal to 15 % of the number of manual
stations installed; minimum of 6 rods.
2. Fuses, two of each size in system.
3. Manual fire alarm stations, furnish quantity equal to 2% of each type and number of units
installed, but not less than one of each type.
4. Addressable control relays, addressable monitor modules, isolator modules, isolator
bases, furnish quantity equal to 4% of each type and number of units installed, but not
less than one of each type.
5. Indoor speaker appliances with strobe lights: Furnish quantity equal to 4% of each type
and number of units installed, but not less than one of each type.
6. Indoor Strobe only Notification Appliances: Furnish quantity equal to 4% of each type and
number of units installed, but not less than one of each type.
7. Heat Detectors or Sensors: Furnish quantity equal to 4% of each type and number of
units installed but not less than one of each type.
8. Smoke Detectors or Sensors: Furnish quantity equal to 6 % of each type and number of
units installed but not less than one of each type.
9. Sensor Bases: Furnish quantity equal to 6% of the number of units of each type installed but not less than one of each type.

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL (FACP)

A. General: Comply with UL 864, "Control Units and Accessories for Fire Alarm Systems".

B. The following FACP hardware shall be provided:
   1. Power Limited base panel with beige cabinet and door, 120 VAC, 60 HZ input power.
   2. 2000 Addressable point capacity inclusive of inputs and outputs in any combination.
   3. 2000 points of annunciation where one (1) point of annunciation equals:
      a. 1 LED output or 1 switch input on a graphic driver module.
      b. 1 LED on panel or 1 switch on panel.
   4. LED Annunciator in compliance with NCDOI requirements.
   5. Three (4) Class B, Style Y Notification Appliance Circuits (NAC; rated 2.5A @ 24VDC, resistive).
   6. One form "C" Auxiliary Output Circuits (rated 2A @ 24VDC, resistive); operation is programmable for trouble, alarm, supervisory or other selective control operations. Provide capability for switching up to ½ A @ 120VAC, inductive loads.
   7. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
   8. The FACP shall support six (6) RS-232-C ports.
   9. Supervised serial communication channel for control and monitoring of remotely located LCD annunciators and I/O panels.
   10. Network Interface for connection to the existing Simplex campus fire alarm system network.
   11. Programmable DACT for either Common Event Reporting or per Point Reporting.

C. Cabinet: Lockable steel enclosure. Arrange panel so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single panel is required to form a complete control panel, provide exactly matching modular panel enclosures.

D. Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.

E. Voice Alarm: Provide an emergency communication system, integral with the FACP, including voice alarm system components, microphones, amplifiers, and tone generators. Features include:
   1. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging.
   2. Dual alarm channels permit simultaneous transmission of different announcements to different zones or floors automatically or by use of the central control microphone. All announcements are made over dedicated, supervised communication lines. All risers shall support Class A wiring for each audio channel.
   3. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones.
F. Distributed Module Operation: FACP shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 7 (Class A) supervised serial communications channel (SLC):
   1. Amplifiers, voice and telephone control circuits
   2. Addressable Signaling Line Circuits
   3. Initiating Device Circuits
   4. Notification Appliance Circuits
   5. Auxiliary Control Circuits
   6. Graphic Annunciator LED/Switch Control Modules

2.2 NETWORK FIRE ALARM CONTROL PANEL (NODE)
   A. Network fire alarm control panels shall include all features as described in this specification for stand-alone FACPs and shall have network communication capabilities as described herein.
      1. All points monitored and controlled by a single node shall be capable of being programmed as "Public". Each point made public to the network may be programmed to be operated by any other node connected to the network.
      2. Network communications shall be capable of supporting "point lists" that can be handled as though they were a single point.
   B. The network shall provide a means to log into any node on the system via a laptop computer or CRT/Keyboard and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.
   C. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory. System shall be capable of storing dual configuration programs with one active and one in reserve. Panel shall be capable of full system operation during a new configuration download.
   D. Network communication:
      1. Network node communication shall be through a token ring, hub, or star topology configuration, or combination thereof.
      2. A single open, ground or short on the network communication loop shall not degrade network communications. Token shall be passed in opposite direction to maintain communications throughout all network nodes. At the same time the status of the communication link shall be reported.
      3. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.
      4. Fiber optics communication between buildings shall be provided via a fiber optics communication. Fiber optics communication shall multiplex digital communication via full duplex transmission over a fiber optic cable.
      5. The communication method shall be NFPA 72 style 7.

2.3 REMOTE MAINTENANCE TERMINAL (CRT) AND PRINTERS
   A. Fire Alarm Control Panel shall be capable of operating a remote maintenance terminal and/or printers; output shall be ASCII from an RS-232-C connection with an adjustable baud rate.
   B. The FACP shall be capable of supporting and supervising as many as two (2) printers, or one (1) maintenance terminal and one (1) printer.
2.4 REMOTE LCD ANNUNCIATOR

A. Provide Remote Annunciator(s) as required with the same "look and feel" as the FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs and LCD Display as the FACP.

B. Annunciator shall have super-twist LCD display with two lines of 40 characters each. Annunciator shall be provided with three (3) programmable LEDs (two selectable as red or yellow; one selectable as green or yellow).

C. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.

D. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

E. The LCD shall display the following information relative to the abnormal condition of a point in the system:

1. 40 character custom location label.
2. Type of device (e.g., smoke, pull station, waterfall).
3. Point status (e.g., alarm, trouble).

F. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP.

2.5 EMERGENCY POWER SUPPLY

A. General: Components include battery, charger, and an automatic transfer switch.

B. Battery: Sealed lead-acid type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all notification appliances in alarm or supervisory mode for a period of 15 minutes. If system is connected to a remote supervising station or central supervising station for monitoring, provide battery capacity for 60 hours of standby with 15 minutes of alarm operation.

2.6 ADDRESSABLE MANUAL PULL STATIONS

A. Description: Addressable double -action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.

B. Protective Shield: Where required, as indicated on the drawings, provide a tamperproof, clear LEXAN shield and red frame that easily fits over manual pull stations.

2.7 SMOKE SENSORS

A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:

1. Factory Nameplate: Serial number and type identification.
2. Operating Voltage: 24 VDC, nominal.
3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
4. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall
provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.

5. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.

6. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.

7. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.

8. The sensor's electronics shall be immune from nuisance alarms caused by EMI and RFI.

9. Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.

10. Removal of the sensor head for cleaning shall not require the setting of addresses.

B. Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type.

C. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.

D. Duct Smoke Sensor: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Sensor includes relay as required for fan shutdown.

1. Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct smoke sensor shall be provided by the FACP.

2. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.

3. Duct Housing shall provide a relay control trouble indicator Yellow LED.

4. Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.

5. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.

6. Duct Housing shall provide a magnetic test area and Red sensor status LED.

7. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.

8. Each duct smoke sensor shall have a Remote Test Station with an alarm LED and test switch.

9. Where indicated provide a NEMA 4X weatherproof duct housing enclosure that shall provide for the circulation of conditioned air around the internally mounted addressable duct sensor housing to maintain the sensor housing at its rated temperature range. The housing shall be UL Listed to Standard 268A.

2.8 HEAT SENSORS

A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.

B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.
C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.

D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

2.9 ADDRESSABLE CIRCUIT INTERFACE MODULES

A. Addressable Circuit Interface Modules: Arrange to monitor or control one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of AHU systems.

B. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line circuit or a separate two wire pair running from an appropriate power supply, as required.

C. There shall be the following types of modules:
   1. Type 1: Monitor Circuit Interface Module:
      a. For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. The supervision of the zone wiring will be Class B. This module will communicate status (normal, alarm, trouble) to the FACP.
      b. For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.
   2. Type 2: Line Powered Monitor Circuit Interface Module
      a. This type of module is an individually addressable module that has both its power and its communications supplied by the two wire signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACP.
   3. Type 3: Line Powered Control Circuit Interface Module
      a. This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.

D. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.10 VOICE ALARM NOTIFICATION APPLIANCES

A. Speaker: Speaker notification appliances shall be listed to UL 1480.
   1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted, shielded wire.
   2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
   3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12 kHz for General Signaling.
   4. The S/V installs directly to a 4" square, 1 ½" deep electrical box with 1 ½" extension.
B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4” square electrical box, without the use of special adapters or trim rings. V/O appliances shall be provided with different minimum flash intensities of 15cd, 30cd, 75cd and 110cd. Provide an indicator inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.

C. Speaker/Visible: Combination Speaker/Visible (S/V) units combine the speaker and visible functions into a common housing. The S/V shall be listed to UL 1971 and UL 1480.
1. Twisted/shielded wire is required for speaker connections on a standard 25VRMS or 70.7VRMS NAC.
2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12 kHz for General Signaling.
4. The S/V installs directly to a 4” square, 1 ½” deep electrical box with 1 ¼” extension.

D. Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz and operates horns with a Temporal Code Pattern operation. The circuit shall provide the capability to silence the audible signals, while the strobes continue to flash, over a single pair of wires. The capability to synchronize multiple notification appliance circuits shall be provided.

E. Accessories: The contractor shall furnish any necessary accessories.

2.11 NAC Power Extender
A. The IDNet NAC Power Extender panel shall be a stand-alone panel capable of powering a minimum of 4 notification appliance circuits. Notification appliance circuits shall be Class B, Style Y rated at 2 amps each. Panel shall provide capability to be expanded to 8 notification appliance circuits.
B. The internal power supply & battery charger shall be capable of charging up 12.7 Ah batteries internally mounted or 18 Ah batteries mounted in an external cabinet.
C. The NAC extender panel may be mounted close to the host control panel or can be remotely located. The IDNET Addressable NAC Extender Panel when connected to an addressable panel shall connect to the host panel via an IDNet communications channel. Via the IDNET channel each output NAC can be individually controlled for general alarm or selective area notification.
D. For IDNet connected NAC extender panels up to five panels can be connected on a single IDNet channel.
E. Alarms from the host fire alarm control panel shall signal the NAC power extender panel to activate. The panel shall monitor itself and each of its NACs for trouble conditions and shall report trouble conditions to the host panel.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.
B. Installation to utilize a complete conduit system in compliance with NCDOI requirements. Open cable installation is not permitted.
C. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
   1. Factory trained and certified personnel.
   2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
   3. Personnel licensed or certified by state or local authority.

3.2 EQUIPMENT INSTALLATION
A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.
B. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.
C. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.
D. Install manual station with operating handle 48 inches (1.22 meters) above floor. Install wall mounted audible and visual notification appliances not less than 80 inches (2.03 m) above floor to bottom of lens and not greater than 96 inches (2.44 m) above floor to bottom of lens.
E. Mount outlet box for electric door holder to withstand 80 pounds pulling force.
F. Make conduit and wiring connections to door release devices, sprinkler valve tamper switches, fire suppression system control panels, duct smoke detectors and other devices as indicated.
G. Automatic Detector Installation: Conform to NFPA 72.

3.3 PREPARATION
A. Coordinate work of this Section with other affected work and construction schedule.

3.4 WIRING INSTALLATION
A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).
B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.
C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.
D. Mount end-of-line device in box with last device or separate box adjacent to last device for Class "B" supervision.
3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
   1. Factory trained and certified.
   2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
   3. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pre-testing: Determine, through pre-testing, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pre-testing. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Inspection:
   1. Inspect equipment installation, interconnection with system devices, mounting locations, and mounting methods.
   2. Verify that units and controls are properly installed, connected, and labeled and that interconnecting wires and terminals are identified.

E. Acceptance Operational Tests:
   1. Perform operational system tests to verify conformance with specifications:
      a. Each alarm initiating device installed shall be operationally tested. Each device shall be tested for alarm and trouble conditions. Contractor shall submit a written certification that the Fire Alarm System installation is complete including all punch-list items. Test battery operated emergency power supply. Test emergency power supply to minimum durations specified. Test Supervising Station Signal Transmitter. Coordinate testing with Supervising Station monitoring firm/entity.
      b. Test each Notification Appliance installed for proper operation. Submit written report indicating sound pressure levels at specified distances.
   2. Provide minimum 10 days notice of acceptance test performance schedule to Owner, and local Authority Having Jurisdiction.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log. Use NFPA 72 Forms for documentation.

H. Final Test, Record of Completion, and Certificate of Occupancy:
   1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy. Provide completed NFPA 72 Record of Completion form to Owner and AHJ.

3.6 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound pressure levels and adjusting controls and
sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.7 TRAINING

A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.
   1. Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintenance of the system. Provide a minimum of 8 hours training.
   2. Schedule training with the Owner at least seven days in advance.
DIVISION 31 - EARTHWORK

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

PRIMARY GUIDANCE

1.1 Existing Topography:
   A. All new project site plans shall be developed from a new topographical map developed specifically for that project; not from “record document” information or previous project grading plans. Surveys will be conducted by a North Carolina professional land surveyor. Accurate information is essential and “special” conditions such as asbestos, lead paint, underground tank leaks, etc, shall be addressed.

SUBSURFACE EXPLORATION

1.2 Designer Responsibilities:
   A. Designer shall direct a soils exploration program (see N.C. Construction Manual, Section 204.1.c) as judged necessary in consultation with the University. The Designer shall contact the UPM and submit a Request for Proposals for soils exploration. UPM will provide names of pre-qualified testing companies. This will include investigative work and surveyor reports, laboratory tests (incl. test borings), soil analysis (incl. load bearing capabilities), and related site analysis. The designer shall study plans of existing underground utilities and shall locate borings to avoid these utilities. Bored holes are to be backfilled, finish graded, and seeded. Submit six copies of the site exploration report to the University.

1. Information To Be Included In Contract Documents:
   a. Show all boring locations, cross sections, and soil conditions. Also, show all existing conduits, drains, utility lines, sewers, tunnels, cables, trees, paving, walks, foundations, and other objects or obstructions, whether used or abandoned. Facilities Management will assist with identifying existing conditions and will provide drawings as available. Clearly indicate the project boundary.

SECTION 31 1000 – SITE CLEARANCE

PART 1 - EXECUTION

1.1 Clearing:
   A. Organic material scheduled for demolition shall be stripped. Contractor will provide option to the UPM for the re-use of this material. Debris not wanted by the university shall be promptly removed from University property.
PART 1 - GENERAL

1.1 ALLOWANCES
   
   A. Rock removal allowances shall be realistic estimates based on the subsurface exploration data. Designer is responsible for coordinating the number and locations of soil borings with the UPM to ensure sufficient geotechnical data is available (see Appendix).

PART 2 - PRODUCTS

PART 3 - EXECUTION

3.1 EXCAVATION FOR STRUCTURES
   Excavations shall not be permitted which undermine the integrity of adjacent structures, paving, or utilities.

3.2 BACKFILL
   
   A. Backfill material shall be free of debris.
   
   B. Foundation backfill under planting beds and lawn: The upper 2 feet of soil below finish grade – 90% maximum. Remainder of backfill – 95% if depth is less than 10 feet; - 100% if depth exceeds 10 feet.
   
   C. Under lawn and planting areas not adjacent to structures: The upper one foot of soil below finish grade – 90% maximum. Remainder – 95%.

3.3 GRADING
   
   A. Maintain existing grade inside drip line of trees to be saved. Do not allow open excavations adjacent to trees for longer than two days to prevent soil moisture reduction.
   
   B. Finish Grading:
      
      1. Slopes shall be flat enough to allow mowing (generally 1:3 or less); steeper slopes will be permitted only in areas where maintenance-free erosion control (groundcover planting, rip-rap, etc.) is planned. All areas disturbed by construction operations and not covered by building, paving, etc. shall be fine graded and seeded.

3.4 COMPACTION
   
   A. Soil Compaction Control:
      
      1. Compaction control shall be provided for all fill, backfill, and embankments both inside and outside the perimeter of the structure. Field compaction tests and related laboratory analysis shall be performed by a qualified independent laboratory (conforming to ASTM standards), under the supervision of a registered professional engineer specializing in geotechnical engineering. Soils proposed for fill, backfill, and embankments shall be analyzed by the geotechnical engineer to determine acceptability; no soil shall be placed until approved by the geotechnical engineer. A representative of the testing laboratory shall provide inspection during placement and compaction operations; tests shall be made in quantity that will assure uniform compaction and density of each course or lift of fill.
2. Outside of structures: Extreme care shall be taken to obtain proper compaction in areas which abut walls, curbs, adjacent slabs, and other structures where use of mechanical compactors is difficult.

3.5 FIELD QUALITY CONTROL

A. The University solicits proposals for the testing laboratory. The designer will provide the UPM with a scope of services for the Materials testing contract. Note that this construction materials testing program is different from the soils exploration program.

SECTION 31 6000 – PILE FOUNDATIONS

PART 1 - GENERAL

1.1 QUALITY ASSURANCE

A. Before a decision to use pile foundations, the designer shall make a thorough examination of structures and occupancies and equipment adjacent to the site to determine what effect vibratory forces will have. Wood piles are prohibited.

B. The designer shall devise tests of pile foundations and provide full time inspection of pile driving and caisson construction to assure conformance with the drawings and specifications.
SECTION 2
DIVISION 31
EARTH MOVING – APPENDIX
DIVISION 31 – EARTH MOVING APPENDIX

SECTION 31 2000 – EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS
A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to this section.

1.2 SUMMARY
A. This Section includes the following:
   1. Preparing subgrades for slabs-on-grade, walks, pavements, lawns and grasses and exterior plants.
   2. Excavating and backfilling for buildings and structures.
   3. Drainage course for slabs-on-grade.
   4. Subbase course for concrete walks and pavements.
   5. Subbase and base course for asphalt paving.

B. Related Sections include the following:
   1. Division 1 Section "Allowances" for quantity allowance provisions related to unit-price rock excavation and authorized additional excavation.
   2. Division 1 Section "Unit Prices" for unit-price rock excavation and authorized additional excavation provisions.
   3. Division 1 Section "01040 – Control of Blasting Operations" for additional blasting requirements.
   4. Division 2 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping topsoil, and removal of above- and below-grade improvements and utilities.
   5. Division 2 Section "Sub-drainage" for drainage of foundations, slabs-on-grade, walls and landscaped areas.
   6. Divisions 2, 15, and 16 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.

1.3 UNIT PRICES
A. Unit prices for earthwork are included in Division 1 Section "Unit Prices."
B. The following prices shown include measurement by cross section, contractor shall employ a land surveyor, registered in the State of North Carolina, acceptable to the Designer and University, to measure and seal all cross section calculations.
   1. General mass site rock disposed of offsite. Measurement shall be by cross section prior to excavation. Unit prices shall include time, labor, transportation, all offsite disposal costs, and measurement.
   2. Also included is replacement of qualified rock volume with equal volume of imported structural fill, which will include purchase, transportation, placement and compaction.
   3. Utility trench rock or pit rock used or disposed of off site. Measurement shall be by cross section of excavation. Unit price shall include removal, transportation, offsite disposal, and measurement. Also included is replacement of qualified rock volume with equal
volume of imported structural fill, which will include purchase, transportation, placement and compaction.

4. Removal and offsite disposal of unsuitable soil. Measure shall be by cross section of excavation. Unit price shall include removal, transportation, all offsite disposal costs, and measurement. Also included is replacement of qualified rock volume with equal volume of imported structural fill, which will include purchase, transportation, placement and compaction.

5. Import structural soil: Measurement shall be by cross section of excavation. Unit price shall include purchase, transportation, placement, compaction and measurement.

C. Basis of Measurement: The quantity of undercut and rock excavation shall be the number of cubic yards of rock or unsuitable material, authorized by the Geotech Engineer to be removed, measured in its original position by a land surveyor, registered in the State of North Carolina. Surveyor shall calculate actual rock quantities.

D. Basis of Payment: Payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for all materials, equipment, labor, tools and incidentals necessary to complete the item regardless of the depth encountered, only the material authorized by Geotech Engineer and Architect shall be paid for. The price includes disposal of unsuitable material off of job site. Material used to replace rock or “undercut” areas shall be obtained from approved off site borrow source or suitable on site material. Also, see 5 sketches at the end of this section describe conditions for rock payment.

1.4 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
   1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
   2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Course placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices and changes in the Work.
   2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Difficult Excavation/Weathered Rock: Material that has a density of between 100 and 200 blows per foot. This material can be excavated by a D-9 Dozer with a single or double shank ripper though production will be slow. Difficult excavation/weathered rock can be anticipated and shall be accomplished within the base bid. No unit price will be established and no additional cost will be allowed.

I. Mass rock excavation consists of the removal and satisfactory disposal off site per applicable unit price of bedrock, rock in lenses, or boulders 1 cubic yard or larger composed of hard
granite or similar material requiring the use of rock drills and specialized equipment for removal, and that is measured, in place, prior to removal. In the event rock as defined above is encountered, the contractor shall immediately notify the Geotech Engineer and the Architect. If requested, the contractor shall demonstrate that material cannot be removed by ripping with a D-9 dozer or equal equipped with a single tooth ripper or a crawler tractor rated at a penetration force of 34,000 pounds, with a pry out force of 72,000 pounds, pulling a single-tooth ripper, with ripping performed in a crisscross pattern or against the natural bedding plane. The Contractor may be required to provide equipment specification data verifying the above minimum-rated equipment will be used for demonstration purposes. The equipment is to be in good repair and in proper working condition.

1. If rock is encountered, the contract sum shall be adjusted in accordance with the unit prices submitted by the contractor after the attached Rock Excavation Approval Form is completed.

2. Upon encountering rock, the contractor shall remove all overburden from the material and notify the Geotech Engineer and Architect that the material is ready for measurement. The Geotech Engineer will then determine if the material is qualified rock, 48 hours, excluding weekends and holidays, after receipt of contractor’s notice. Once the material is judged as qualified rock, the contractor’s registered land surveyor shall survey, by cross section, the rock in place and submit the cross sections and calculations to the architect and geotechnical engineer for approval. All parties must agree, and confirm quantities, evidenced by their signature on the “rock excavation approval form,” prior to removal of rock.

3. Any material moved or removed without the measurement and approval will be considered as earth excavation. The Geotech Engineer, with concurrence from the Architect, shall be the final judge on what is to be classified as rock excavation.

4. Limit of payment shall be from top of rock to 6 inches below subgrade, as indicated on rock removal conditions 1-5 attached.

J. Trench rock excavation consists of the removal and satisfactory disposal off site of material composed of hard granite or similar material in trenches less than 10 feet wide that can be effectively removed using a 125-hp excavator with a pull of 36,500 pounds at the rate of 6 inches per 10 minutes or more or a backhoe equipped with a minimum ½ cubic yard heavy-duty trenching bucket placed on a machine capable of a lifting capacity of 7,500 pounds at a trench depth of 10 feet at the rate of 6 inches per 10 minutes or more, and that is measured, in place, prior to removal. In the event rock as defined above is encountered, the contractor shall immediately notify the soils engineer. The Contractor may be required to provide equipment specification data verifying that the above minimum-rated equipment will be used for demonstration purposes. The equipment is to be in good repair and in proper working conditions.

1. If trench rock is encountered, the contract sum shall be adjusted in accordance with the unit prices submitted by the contractor after the attached Rock Excavation Approval Form is completed.

2. Any material moved or removed without the measurement and approval will be considered as earth excavation. The Geotech Engineer, with concurrence from the Architect, shall be the final judge on what is to be classified as rock excavation.

3. Upon encountering rock, the contractor shall remove all overburden from the material and notify the Geotech Engineer and Architect that the material is ready for measurement. The Geotech Engineer will then determine if the material is qualified rock, 48 hours, excluding weekends and holidays, after receipt of contractor’s notice. Once the material is judged as qualified rock, the contractor’s registered land surveyor shall survey, by cross section, the rock in place and submit the cross sections and calculations to the architect and geotechnical engineer for approval. All parties must agree, and confirm quantities, evidenced by their signature on the “rock excavation approval form,” prior to removal of rock.
4. The trench rock payment limit shall generally be the diameter of the pipe plus 2 feet, by the depth of the pipe plus 6 inches, as indicated on attached rock removal conditions 1-5.
5. For rock excavation, a trench shall be defined as a linear excavation that is 5 feet or less in width and 2 feet or greater in depth. All other rock excavation shall be considered general mass rock excavation.
6. Trenches that are located within the limits of mass rock removal shall be classified as mass rock.

K. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

L. Subbase Course: Course placed between the subgrade and base course for hot-mix asphalt pavement, or course placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

M. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.

N. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.5 SUBMITTALS
A. Product Data: For the following:
   1. Each type of plastic warning tape.
   2. Geotextile.
B. Samples: 12-by-12-inch samples of subdrainage geotextile.
C. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
   1. Classification according to ASTM D 2487 of each on-site or borrow soil material proposed for fill and backfill.
   2. Laboratory compaction curve according to ASTM D 698 for each on-site or borrow soil material proposed for fill and backfill.

1.6 QUALITY ASSURANCE

1.7 Pre-excavation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Quality Requirements."
A. Dirt, Concrete, asphalt and rock removed as a result of earthmoving projects are not to be sent to a landfill and should either be reused on site or should be sent to a reclamation facility for screening and re-use.

1.8 PROJECT CONDITIONS
A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
   1. Notify Architect not less than two days in advance of proposed utility interruptions.
   2. Do not proceed with utility interruptions without Architect's written permission.
   3. Contact utility-locator service for area where Project is located before excavating.
B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shut off services if lines are active.
PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: ASTM D 2487 soil classification groups GC, SC, ML, MH, CL, CH, OL, OH, AND PT or combination of these group symbols. Suitable of soils shall be determined by onsite Geotechnical Engineer. Unsuitable soil shall be so classified by structure, content, unit weight less than 90 lbs., plastic soils, etc. Soils too wet or too dry will not be considered unsuitable if useable at optimum moisture. Unsuitable soil is only defined below subgrade elevations.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

J. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

K. Backfill and Fill: Satisfactory soil materials.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 No. 60 No. 70 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
   1. Survivability: Class 2; AASHTO M 288.
   2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
   3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
   4. Tear Strength: 90 lbf; ASTM D 4533.
   5. Puncture Strength: 90 lbf; ASTM D 4833.
   6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
   7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
   8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:

B. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
   2. Yellow: Gas, oil, steam, and dangerous materials.
   3. Orange: Telephone and other communications.
   4. Blue: Water systems.
   5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 2 Section "Site Clearing."

C. Protect and maintain erosion and sedimentation controls, which are specified in Division 2 Section "Site Clearing," during earthwork operations.

D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

2. Install a dewatering system specified in Division 2 Section “Dewatering” to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.

3.3 EXPLOSIVES

A. Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to project site or using explosives on project site.

1. Do not damage adjacent structures, property, or site improvements or weaken the bearing capacity of rock subgrade when using explosives.
2. Use of explosives shall be permitted only after submittal of an approved blasting plan and only as required to remove rock.
3. Coordinate with university construction manager for owner approval and notices to the campus community.

3.4 EXCAVATION, GENERAL

A. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified by the Geotech Engineer, cross sectioned by the registered Land Surveyor, and reviewed by the Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract time may be authorized for rock excavation.

1. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
   a. Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
2. Rock excavation includes removal and disposal of rock.
   a. Do not excavate rock until it has been classified by the Geotech Engineer, cross sectioned by the Surveyor, and reviewed by the Architect.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

B. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.
1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
   1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
   1. For pipes and conduit 6 inches or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe circumference. Fill depressions with tamped sand backfill.
   2. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for bedding course. Hand excavate for bell of pipe.
   1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Proof-roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
   1. Fill unauthorized excavations under other construction or utility pipe as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL
A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, sub-drainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.12 UTILITY TRENCH BACKFILL
A. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
B. Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.
C. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
D. Backfill voids with satisfactory soil while installing and removing shoring and bracing.
E. Place and compact final backfill of satisfactory soil to final subgrade elevation.
F. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL
A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.
   3. Under steps and ramps, use engineered fill.
   4. Under building slabs, use engineered fill.
   5. Under footings and foundations, use engineered fill.

3.14 SOIL MOISTURE CONTROL
A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2% of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry unit weight.
3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
   1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent. Additionally, under all site pavements and floor slabs, upper 18" of subgrade to be compacted to 100%. Under heavy duty asphalt pavements, upper 24% of subgrade to be compacted to 100%.
   2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at [95] percent.
   3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 1 inch.
   2. Walks: Plus or minus 1 inch.
   3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBSURFACE DRAINAGE

A. Sub-drainage Pipe: Specified in Division 2 Section "Sub-drainage."

B. Subsurface Drain: Place subsurface drainage geotextile around perimeter of sub-drainage trench. Place a 6-inch course of filter material on subsurface drainage geotextile to support sub-drainage pipe. Encase sub-drainage pipe in a minimum of 12 inches of filter material, placed in compacted layers 6 inches thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
   1. Compact each filter material layer to 95 percent of maximum dry unit weight according to ASTM D 698.

C. Drainage Backfill: Place and compact filter material over subsurface drain, in width indicated, to within 12 inches of final subgrade, in compacted layers 6 inches thick. Overlay drainage backfill with 1 layer of subsurface drainage geotextile, overlapping sides and ends at least 6 inches.
   1. Compact each filter material layer to 95% of maximum dry unit weight according to ASTM D 698.
   2. Place and compact impervious fill over drainage backfill in 6 inch thick compacted layers to final subgrade.
3.18 SUBBASE AND BASE COURSES
A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
   1. Place base course material over subbase course under hot-mix asphalt pavement.
   2. Shape subbase and base course to required crown elevations and cross-slope grades.
   3. Place subbase and base course 6 inches or less in compacted thickness in a single layer.
   4. Place subbase and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   5. Compact subbase and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698, ASTM D 1557.
C. Pavement Shoulders: Place shoulders along edges of subbase and base course to prevent lateral movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact simultaneously with each subbase and base layer to not less than 95 percent of maximum dry unit weight according to ASTM D 1557.

3.19 DRAINAGE COURSE
A. Place drainage course on subgrades free of mud, frost, snow, or ice.
B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Place drainage course 6 inches or less in compacted thickness in a single layer.
   2. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.20 FIELD QUALITY CONTROL
A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 4000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
   2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
   3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and re-compact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.
SECTION 2

DIVISION 32

EXTERIOR IMPROVEMENTS
DIVISION 32 – EXTERIOR IMPROVEMENTS

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

STANDARD SPECIFICATIONS AND GUIDELINES

1.1 GENERAL GUIDELINES

A. All material furnished by the contractor to be installed on the project shall conform to the minimum requirements of the latest revisions in effect on the date of the Standard Specifications published by the described organizations, unless other requirements are stated in these Specifications.

1.2 STANDARDS

A. The Standard Specifications as listed below, or the latest revisions thereof, shall govern all of the work on this project, except as where amended in the UNC-Charlotte Landscape Construction Standards.


C. North Carolina Erosion and Sediment Control Planning and Design Manual (NCDENR)

D. American National Standards Institute Safety Standards for Pruning, Trimming, Repairing, Maintaining, Removing Trees and Cutting Brush


J. American Wood Preservers Association Standards

K. Chapter 21 of City Code entitled Trees

1.3 ADDITIONAL STANDARDS

A. Other standard specifications may be combined with those listed above under a single caption whenever referred to in the Specifications as follows:

1. AAN - American Association of Nurserymen
2. AASHTO - American Association of State Highway and Transportation Officials
3. AIA - American Institute of Architects
4. ANSI - American National Standards Institute, Inc.
5. ASLA - American Society of Landscape Architects
6. ASTM - American Society of Testing and Materials
7. AWWA - American Water Works Association
8. AWPA - American Wood Preserver’s Association
9. FSS - Federal Specifications and Standards, General Services Administration
10. GS - General Statutes of North Carolina
11. ISA - International Society of Arboriculture
12. NAA - National Arborist Association
13. SPIB - Southern Pine Inspection Bureau
14. UL - Underwriters’ Laboratories

DEFINITION OF TERMS:

1.1 USAGE

A. Whenever the following terms are used in the Standard Specifications, in any of the contract documents, or in the plans, the intended meaning of such terms shall be as follows:

1. “Owner” or “Engineering Department” shall be replaced by the words “University of North Carolina at Charlotte”

2. “Engineer” or “Resident Engineer” shall be replaced by the words “Landscape Architect (University), and/or Grounds Superintendent and/or Project Coordinator or their duly authorized representative.”

The following definitions will apply:

1. **Branch Collar:** Wood tissue that forms around the base of a branch between the main stem and the branch. Usually, as a branch begins to die, the branch collar begins to increase in size.

2. **Caliper:** Diameter of a tree six inches (6”) above the ground for trees less than four inches (4”) and twelve inches (12”) above the ground for trees greater than four inches (4”).

3. **Cambium Layer:** Growing point between the bark and sapwood.

4. **Closure:** Refers to the roll of the wound wood growth around the wounded area.

5. **Critical Root Zone:** Radius of not less than one foot (1’) for every one inch (1”) of trunk diameter.

6. **Cut, The:** The exposed wood area that remains after the branch has been removed.

7. **Cut Back:** Specified reduction of the overall size of the tree or individual branches, but may include the overall reduction of the sides as well as the top of the tree.

8. **D.B.H.:** Diameter of a tree four and a half feet (4 ½’) above the average ground line.

9. **Dormant:** A condition of non-active growth. Deciduous trees are considered to be dormant from the time the leaves fall until new foliage begins to appear.

10. **Girdling Roots:** Located above or below ground level; circular growth around the base of the trunk or over the individual roots applies pressure to the bark area, thereby choking or restricting the flow of sap.

11. **Heading Back:** Cutting back the terminals of a temporary limb or branch to slow its growth while allowing it to produce food resources for the tree. This is a common nursery practice.

12. **Lifting:** The removal of lower branches for under-clearance.

13. **Parent Stem:** The main trunk system of the tree.

14. **Planting Mix:** Mix may be developed by amending the existing soil or removing the existing soil and replacing with new planting mix. It shall be of uniform composition throughout, with admixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks, and other extraneous matter.

15. **Precut or Pre-cutting:** The removal of the branch at least 6” beyond the finished cut to prevent splitting into parent stem or branch.

16. **Pruning:** The removal of dead, dying, diseased, or live, interfering objectionable and weak branches in a scientific manner.

17. **Sap Flow:** The definite course assumed by sap in its movement through a tree.

18. **Scars or Injuries:** Natural or man-made lesions of the bark in which wood is exposed.
19. **Small Tree:** Any young tree that has not had its lowest permanent scaffold limbs clearly defined or raised to 14 feet, whichever is appropriate, and with all lower temporary limbs removed.

20. **Suckers:** Abnormal growth of small branches usually not following the general pattern of the tree.

21. **Temporary Limb:** A limb left on a small tree to provide for tree growth until permanent scaffold limbs and adequate top limbs are developed. If large, they are headed back to prevent their challenging the desired terminal for dominance.

22. **Thinning Out:** The removal of live branches to reduce wind resistance and to create more space.

23. **Top Soil:** Shall be natural, fertile, agricultural topsoil, capable of sustaining vigorous plant growth.

24. **Topping:** Means the same as Cut Back.

25. **Tracing:** Careful cutting of the bark along the lines of sap flow to encourage closure and to be the outline of the wound area.

26. **Tree Training:** Pruning young trees in a specified manner to shape their growth in keeping with their genetically determined natural form and the urban requirements immediately surrounding them.

27. **Trimming:** The same as pruning.

28. **Wound Wood:** New growth made by the cambium layer around all of a wound.

**PLANS**

1.2 **MINIMUM REQUIREMENT**

A. All newly prepared site plans **must** show the following:

B. General Information (to be shown on all plans):
   1. Title block with site name and address
   2. Scale
   3. Vicinity Map
   4. North arrow
   5. Street R/W line(s)
   6. Property lines
   7. Setback/sideward lines(s)
   8. Clearly distinguish between existing and proposed conditions (i.e., contours, structures, etc.)
   9. Survey of existing trees (size and species)
      a. If trees are to be preserved, show tree protection fencing with dimensions from tree(s)
      b. Tree preservation notes on grading and erosion control plans
      c. Existing and proposed overhead and underground utilities
      d. Existing and proposed irrigation systems
   10. Planting Material Index
   11. Listing of:
      a. Designer
      b. Contact Person
      c. Address
      d. Telephone Number
      e. Fax Number

1.3 **EROSION CONTROL:**

A. Proposed erosion control measures

B. Denuded limits delineated
C. Denuded acreage listed
D. Denuded drainage areas (on and off-site)

1.4 LANDSCAPING REQUIREMENT:
A. Electrical Lines-distribution or transmission lines and poles present
B. Provide staking plan or dimension key landscape areas
C. Show and label proposed trees (small or large maturing to be planted), shrubs, ground covers, and/or grass and any other plantings and landscape materials (mulches, hardscapes, etc.)
D. Landscape notes

SECTION 32 1216 – PAVING

PART 1 - GENERAL

1.1 SUMMARY
This is a pedestrian oriented campus and, as such, designs should be prepared with pedestrian traffic (including those with mobility impairments) as the highest priority. All sidewalks associated with new building construction shall be brick. Asphalt is generally not acceptable in developed areas.

PART 2 - PRODUCTS

2.1 AUXILIARY MATERIALS
A. Curbs and Gutters: Cast-in-place concrete shall be used unless other design is required to match existing conditions.
   1. Expansion joints shall be specified and shown on the drawings.
B. All Asphalt scraps from paving or repair projects are to be recycled.

PART 3 - EXECUTION

3.1 ASPHALT INSTALLATION
Protection of asphalt surface course: After completion of surface course, no vehicular traffic or parking shall be permitted on the pavement until the surface has cured.

3.2 ASPHALT REPAIR
Repairs of asphalt paving: Depressions and abutments to existing pavement shall be repaired by cutting out the surfacing to a minimum depth of one inch with vertical cuts, filling, and rolling the areas. Feathering of patches and abutments to existing pavement is prohibited.

3.3 ASPHALT CURBS
Curbs shall pitch to catch or release water as required by adjacent paving grades.
3.4 PAVEMENT MARKING

Parking Lots Markings Spacing: All parking layout designs shall utilize dimensional requirements, (See Annex F, attached herewith). All parking spaces shall be marked with double lines per University standards.

SECTION 32 1313 – CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

This is a pedestrian oriented campus and, as such, designs should be prepared with pedestrian traffic (including those with mobility impairments) as the highest priority. All sidewalks associated with new building construction shall be brick. The University mandates brick sidewalks in the following sectors: Charlotte Research Institute, Academic Core, and Chancellor/Alumni. In other sectors, where the budget is limited, poured concrete with troweled joints, or a combination of concrete and brick may be acceptable. All sidewalk design, including coordination with street fixtures and furniture (lighting, trees, landscaping, benches, seat walls, bike racks, bollards, etc.) will necessitate coordination with the Facilities Landscape Architect.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

A. Unless specified otherwise on drawings, all reinforcing steel shall be ASTM A-615, Grade 60 and shall be fabricated and placed in accordance with ACI 301. All continuous rebar reinforcing shall be lapped as shown on the drawings.

B. If wire fabric is required, it shall be welded cold-drawn steel wire fabric, ASTM A-185.

2.2 CONCRETE

A. Air entraining admixture is required, with a minimum of 4%. THE CONTRACTOR SHALL PROVIDE THE DESIGNATED REPRESENTATIVE ALL DELIVERY TICKETS WHICH SHALL VERIFY THE ABOVE REQUIREMENTS.

B. Curing compound shall be "Clean Bond" by Guardian Chemical Company; Sealkure by Toch Brothers, Inc; or Klearseal by Penn-Dixie. (See Annex F)

2.3 ACCESSORIES

A. Expansion joint material shall be asphalt impregnated fiber board, manufactured explicitly for such use and shall comply with NCDOT Specification 420-12(c). Black "house sheathing" material is not acceptable.

B. All concrete scraps from paving or repair projects are to be recycled.

SECTION 32 1400 – UNIT PAVERS
PART 1 - GENERAL

1.1 SUMMARY

This is a pedestrian oriented campus and, as such, designs should be prepared with pedestrian traffic (including those with mobility impairments) as the highest priority. All sidewalks associated with new building construction shall be brick. The University Facilities Master Plan gives priority to brick sidewalks in existing areas of campus, especially in high-traffic, high visibility locations. The University mandates brick sidewalks in the following sectors: Charlotte Research Institute, Academic Core, and Chancellor/Alumni. In other sectors, where the budget is limited, poured concrete with troweled joints, or a combination of concrete and brick may be acceptable. All sidewalk design, including coordination with street fixtures and furniture (lighting, trees, landscaping, benches, seat walls, bike racks, bollards, etc.) will necessitate coordination with the Facilities Landscape Architect. The General Contractor is to install two sleeves, located by the Architect, underground at critical locations in coordination with existing and future work.

PART 2 - PRODUCTS

2.1 BRICK PAVERS

A. Brick Pavers, Unless noted otherwise on the drawings, shall be 2-1/4" x 4" x 8" "English Edge Pavers", repressed lugged, chamfered, Color Red, manufactured by Pinehall Brick Company, P O Box 836, Madison, NC 27025
   1. See Annex F, attached herewith.

B. All brick scrap from paving or repair projects is to be recycled.

C. Pavers in crosswalk pavers in streets shall be vehicular grade concrete "oaks blend" by Pavestone or approved equal.

2.2 SETTING BED MATERIALS

A. Fill Material Composition:
   1. If soil fill is necessary, all fill material shall be free of organic or foreign material.
   2. All fill materials shall be placed in minimum six-inch lifts and shall be compacted to 100% of maximum density by standard proctor (ASTM-D-698).
   3. The Owner may elect to test the compacted soil, (testing shall be done at the Owner's expense).

B. Felt Underlayment:
   1. 30-pound asphalt roofing felt.

C. Expansion Joint Material:
   1. Asphalt impregnated fiber board, manufactured explicitly for such use and shall comply with NCDOT Specification 420-12(c). Black "house sheathing" material is not acceptable.

D. Sub-Base Material (Setting Bed):
   1. Quartz sand or hard rock screenings as described by NCDOT Specification 1012.1C3.

E. Mortar Sand screenings to fill the vertical gaps between bricks shall meet the requirements of Standard Specifications for aggregate for Masonry Mortar (ASTM-C-144-81).

F. Aggregate Base Course:
   1. "Type A, Aggregate Base Course" as defined by NCDOT Specification 1010.2. (See Annex F).
SECTION 32 8410 – LANDSCAPE IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
The general provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK:
Work included in this Section Work of this section shall consist of providing and installing the underground sprinkler system as specified on the drawings and as specified herein.

1.3 MANUFACTURING QUALIFICATIONS:
Provide underground sprinkler system as a complete unit produced by a single manufacturer for all portions of work, including heads, valves, piping circuits, controls, and accessories; unless otherwise noted specifically on the drawings.

1.4 SUBMITTALS:
Product Data: Submit manufacturer’s technical data, cut sheets, and installation and maintenance instructions for underground sprinkler system.

1.5 EXISTING CONDITIONS:
Verification of Underground Utilities: The Contractor shall be responsible for verifying the exact location of all underground utilities prior to any excavation.

1.6 ALTERNATE IRRIGATION
A. Desire to conserve water and use alternate methods of irrigation whenever possible.

PART 2 - PRODUCTS

A. PVC Pipe and Fittings: Pipe specified shall be virgin high-impact Polyvinyl Chloride (PVC) pipe having a minimum working pressure rating of Class 200 up to and including 1 ¼” and Class 160 or pipe above 1 ¼”. All PVC pipe shall be continuously and permanently marked with manufacturer’s name, material size, and schedule. Pipe shall conform to US Department of Commerce Commercial Standard CS207-60 or latest revision. Material shall conform to all requirements of Commercial Standard (CS256-63), or latest revisions(s). All fittings to be used on specified PVC pipe shall be Schedule 40 PVC, Type 1, and must made in the USA. All fittings shall be identified as to pressure rating or schedule. Solvent for use on PVC pipe and fittings shall be of a type approved by the manufacturer of the pipe. Primer shall be purple primer by same manufacturer as solvent.

B. Risers and Swing Joint Nipples: All pipe risers ¾” to 1” shall be un-plasticized polyvinyl chloride, Schedule 80 threaded pipe. Fittings on risers shall be PVC Schedule 80 threaded elbows. If the plan shows a non-PVC riser, compatible fittings to the riser specified shall be used.

C. Irrigation Valves: Irrigation valves shall be molded valves with 24 volt solenoid as per the Equipment List noted on the drawings. Valves shall be globe type operated by low-voltage solenoids normally closed, manual flow adjustment.
D. Backflow Preventer: Backflow preventer shall be the responsibility of the Irrigation Contractor. Irrigation point of connection is downstream side of the meter. Backflow preventer shall be installed by a licensed plumber or utility contractor and shall comply with state and local codes. All backflow prevention valves installed in public Right – Of – Way shall be installed above grade in an insulated enclosure. Installation is to meet or exceed local and state codes, and manufacturer’s recommendations. In no case shall the degree of protection be less than a double check valve backflow preventer.

E. Meter: Irrigation Contractor shall coordinate with Facilities Management/HVAC Supervisor for the installation of the irrigation meter(s) and shall be responsible for all costs and fees associated. All meters & valves installed in public Right – Of – Way shall be installed below grade. Meter size(s) shall be as indicated on the plan.

F. Sprinkler Heads: All full and part circle sprinklers shall be of the fixed spray or gear driven variety as is specified on the plans. These sprinklers shall be of the pop-up type with spring retraction. The sprinkler shall be easily serviced from the top. It shall have an accessible screening device and shall perform to the manufacturer’s specifications with regard to the diameter of throw and applied volume at a given pressure. Spacing of heads shall not exceed the manufacturer’s maximum recommendation. No over spray shall be allowed to encroach on roadways or sidewalks. All pipes crossing under any streets shall be enclosed in a PVC sleeve as noted on plan. Pipe shall be Schedule 80 PVC, Type 1, and must be made in the USA.

G. Valve Covers, Sleeves, Boxes: Fiberglass or concrete boxes with fiberglass or equal covers capable of withstanding lawn tractor traffic, and as specified in the Equipment List on the drawings. Ametek or approved equal. All systems shall be approved by Grounds Superintendent and installed to prevent unnecessary watering after substantial rainfall.

H. Drainage Backfill: NCDOT number 78M washed stone.

I. Automatic Control System: Furnish automatic controller as specified in the Equipment List, including 24 volt timer and all connection devices. Electrical hook-up to the controller shall be by others unless specifically noted otherwise on the plan or Equipment List.

J. Exterior Control Enclosure: Manufacturer’s standard weatherproof enclosure with locking cover, complying with the NFPA 70 (National Electric Code) and according to the Equipment List shown on the Drawings.

K. Control Lines Hydraulic: All control tubing shall be polyethylene tubing. All control tubing shall be rated for a minimum continuous working pressure of 200 psi and have a ¼” O.D. + .003”. All tubing connections shall be brass compression couplings or tees utilized self-aligning brass ferrules, secured by ¼” plastic retainers.

L. Electrical Installation: Electric control lines from each controller to the automatic valves shall be direct burial UF wire of a different color than the black and white wires used on the 115 volt A.C. power. All 24 V.A.C. single strand wire shall be a minimum of 14-gauge direct burial. Where multi-connector wire is used; it shall be a minimum of 18-gauge. Manufacturer’s recommendations shall be followed concerning waterproofing all connections. The joining of all underground wires shall be by the use of direct burial splice kits. All Splices shall be waterproof. In all cases wire shall be adequately sized to avoid excessive voltage drop.

M. Quick Coupling Valves and Keys: Quick coupling valves and keys shall be as specified on the drawings. Mount on galvanized pipe triple swing joints. A minimum of two keys with swivel ell adapters will be given to the Grounds Superintendent. All quick couplings shall be stacked with a ¼ inch steel bar and secured with minimum two (2) hose clamps.

PART 3 - EXECUTION

3.1 INSPECTION

Inspection of Work in Progress: The Landscape Architect shall make frequent observations of the Contractor’s work while such work is in progress. The Landscape Architect/Project
Coordinator shall bring to the attention of the Contractor any work which does not meet the specifications of the contract and the Contractor shall correct such work as brought to his attention.

3.2 STAKING OF SPRINKLER LOCATIONS:
A. Staking of sprinkler locations shall be done by the Contractor and approved by the Engineer. Location shall be according to plans provided with field modifications to adjust to local conditions and actual plant locations.

3.3 EXCAVATION:
A. The Contractor shall notify NC ONECALL at 1-800-632-4949 48 hours prior to beginning trenching. The Contractor shall exercise care to avoid causing damage to any and all underground utilities and structures. The Project Coordinator shall advise the Contractor of any underground utilities or structures of which he is aware; however, it is the Contractor’s responsibility to locate and to protect all utilities including irrigation. Any damage to utilities including irrigation shall be corrected and paid for by the Contractor. *Damage must be repaired within forty-eight hours of occurrence. All excavation shall be unclassified and shall include all materials encountered. The minimum depth of cover for piping 6” and larger shall be 18”. The minimum depth of cover for piping less than 6” shall be 12”. On existing sodded areas, sod shall be removed, preserved, and replaced to its original state once backfilling is accomplished. Root damage within the critical root zone in violation of specifications will result in monetary damages being assessed based on loss of utility and shortened life of the tree. If trenching is necessitated through existing asphalt roadways, the Contractor shall saw cut asphalt to the width of the trench plus one foot (1’) each side prior to trenching unless noted otherwise on the plan. Removal of cut asphalt and replacement of all asphalt shall be the responsibility of the Contractor. Repair will be made with full depth asphalt or as directed by the engineer.

3.4 BORING:
See Section 01000 – Tree Preservation and Protection, Part 03 A.

3.5 BACKFILLING:
Backfill material shall be select backfill obtained from Quarry near Concord, NC, commonly named Concord Pit Gravel free from rocks, large stones, and other unsuitable substances which could damage the pipe or create unusual settling problems. Backfilling will be done in 6” layers and tamped after each layer is put in to prevent excessive settling. Backfilling of trenches containing plastic pipe shall be done when pipe is cool to avoid excessive contraction in cold weather. Such backfilling can be done in early morning hours or the pipe may be water cooled prior to backfilling procedures.

3.6 INSTALLATION OF SYSTEM MAIN:
Installation of the system main shall be in accordance with the manufacturer’s instructions and shall proceed from the point of connection of supply for the system pumping station, reservoir, water meter, or existing line. All ring type or gasketed pipe shall be thrust blocked at all tees, elbows, and end caps per manufacturer specifications. The main and laterals shall be flushed and pressure tested for 24 hours prior to making any head connection.

3.7 INSTALLATION OF LATERAL LINES:
Lateral lines may be installed by standard trenching techniques or by “pulling in” pipe. If the “pull in” method is used, the pipe “plow” shall be a vibratory type and equipped with a turf roller device to prevent tearing of the turf. The Mole or Bullet which precedes the pipe and is used to
form the opening for the pipe shall be not less than 1” larger in diameter than the outside diameter of the pipe. Starting and finishing holes shall not exceed a 2 foot square opening, with the sod removed from such holes to be preserved and replaced. Lateral pipes and fittings shall be installed in accordance with the manufacturer's recommendations, including the snaking-in of the PVC pipe to prevent excessive strain when contracting in cold weather. All lateral lines shall be thoroughly flushed prior to the installation of any automatic valves or sprinkler heads.

3.8 SPRINKLER HEADS:

All sprinklers shall be installed on pop-up risers or as shown on the drawings. The sprinkler head shall be installed so that the top is ¼” above the finished grade level. If finished grade has not been established, the sprinkler will be extended a minimum of 4” above existing level and marked with a stake to prevent damage by equipment. Backfill around the swing joint and sprinkler shall be free of large rocks, roots, or foreign debris. Matched precipitation will be required on all full and part circle sprinklers operating on the same zone. Mount stationary riser sprinklers on three schedule 80 PVC 90 ells FPT x FPT to make up the three elbow swing joint. Mount pop-up sprinklers with an 18” minimum length of 2” polyethylene tubing. Tubing to withstand 400 psi burst test and shall have a wall thickness of 0.1”. Fittings for tubing shall be compatible and made by the same manufacturer.

3.9 CONTROL LINES:

All control lines shall be installed in a neat and orderly fashion and may be installed either in the main and lateral trenching or in their own separate trench. The lines shall be bundled together and taped every 10’. Control line connections shall be as approved in a proceeding section of these specifications. All wire shall be furnished in minimum 2,500’ reels and spliced only at valve or tee locations. Wire sizing shall be as specified on the plan. The joining of all control wire will be by the use of wire nuts installed in Scotch DBY or DBR or an approved equal direct bury splice per installation instructions provided by manufacturer. A minimum of 18 inches of additional wire shall be looped up at each control valve or head. Control tubing and wire runs shall be installed with enough slack and/or occasional loops to prevent excessive strain due to thermal contraction.

3.10 CONTROL EQUIPMENT:

All automatic valves and controllers shall be installed following the recommendations of the manufacturers of said equipment, and more specifically, in accordance with the drawings accompanying the contract. The location of all controllers shall be approved by the Landscape Architect before the actual installation of said controllers.

3.11 QUICK COUPLING VALVES:

All quick coupling valves shall be mounted on galvanized pipe triple swing joints.

3.12 VALVE BOXES, DRAINS, ETC:

All valve boxes or any other miscellaneous marker or access box shall be installed so the top of said structure is flush with finished grade. Valve boxes shall be installed so that no portion of the box rests directly on any section of the systems piping. Valve boxes shall be installed so that the top of control valves are easily accessible for maintenance. All extensions of valve boxes necessary to reach proper grade shall be made with extensions approved for that particular brand. Any valve box located within the sidewalk shall be concrete.

3.13 MATERIALS:

Flow sensor: Toro IR 220P
Controller: Sentinel Controller
Meter: Rainbird for Neptune T-10 with Tricon/S Register (located upstream of the controller). Ideally we would like the meter installed in the building.
Master Valve: standard irrigation valve put in after the backflow.
Backflow: sized per project – reduced pressure backflow.

3.14 TESTING AND ACCEPTANCE OF SYSTEM:

A. Testing System: Upon completion of the irrigation system and after sufficient time has been allowed for solvent weld joints to cure, the entire system shall be tested for proper operation. All air will be flushed from the system and all components will be checked for proper operation by the Contractor. Balancing and Adjustment: The Contractor shall balance and adjust the various components of the sprinkler system so that overall operation of the system is most efficient. This includes a synchronization of the controllers, adjustments to pressure regulators, pressure relief valves, part circle sprinkler heads, and individual station adjustments on the controllers.

B. Operational Testing: Perform operational testing after hydrostatic testing, backfill is in place, and sprinkler heads are adjusted to final position. Demonstrate to Landscape Architects representative that the complete system meets coverage requirements and that automatic controls function properly.

C. Final Grades at Heads: After completion of sodding, planting and mulching and settlement with establishment of the final grades, carefully adjust all irrigation equipment so it will be flush with or not more than ¼” above grade.

D. Notice of Completion: When the Contractor is satisfied the system is operating properly, and all work and clean-up is completed, then he shall issue the notice of completion to the Engineer. The notice of completion shall include the request for final inspection. Final Inspection with Landscape Architect/Grounds Superintendent/Project Coordinator; The Landscape Architect/Grounds Superintendent/Project Coordinator will respond to the notice of completion by the Contractor and shall appear at an agreed upon time for the final inspection. Any inconsistencies to the plans or specifications shall be noted by the Landscape Architect and a written copy of corrections shall be given to the Contractor. Record Plan Acceptance: Acceptance of the system is based on the furnishing, by the Contractor, of a completed record plan, which is acceptable to the Owner and/or the Engineer.

E. Training of Maintenance Personnel in Operation and Maintenance System: The Contractor’s responsibility of training maintenance personnel in the operation and maintenance of the system shall not be waived due to acceptance of the system. In addition, the Contractor shall provide the Owner with available parts list, trouble-shooting list, and specification sheet. If this responsibility is not fulfilled, the cost of obtaining the training by the Grounds Superintendent shall be shown as a deduction in the final payment.

3.15 GUARANTEES:

The work included under this contract shall be guaranteed by the Contractor against all defects and malfunctions due to faulty workmanship or defective material for a period of one year from the date of final acceptance by the Project Coordinator. Upon being informed by the Project Coordinator of any defects or malfunctions; the Contractor shall affect all necessary repairs and/or replacements in a reasonable expedient manner at no additional cost to the Project Coordinator. Emergency repairs, when necessary, may be made by the Grounds Superintendent without relieving the Contractor of his guarantee obligation. The Contractor shall be obligated to repair any settling of backfilled trenches which may occur during the guarantee period. The Contractor is also obligated to restore any and all damaged plantings, paving, or improvements due to trench settlement or repairs within the year period. If the Contractor does not respond to the Project Coordinator’s request for repair work within a period of 5 days, the Project Coordinator may proceed with such necessary repairs and charge the Contractor for all expenses incurred in the repair work.
3.16 RECORD DRAWING:

The Contractor shall provide and keep up to date a complete set of record drawings which shall be corrected daily to show changes in sprinkler locations, controller locations, piping locations, pipe sizes, and any deviations from the original irrigation design drawing as provided to him. All isolation valve locations, backflow prevention, water meters, and quick couplers shall be shown with actual measurements to reference points so they may be located easily in the field. Upon completion of the work, the Contractor shall furnish the Landscape Architect/Grounds Superintendent with two complete sets of record drawings showing the irrigation system as installed.

SECTION 32 8420 – LANDSCAPE GRADING AND DRAINAGE

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Related Documents:
   1. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
   2. Description of Work:

B. Work Included in This Section:
   1. Stripping, stockpiling, and redistribution of topsoil, rough grading, rock removal, and excavation of the site.

C. Related Work Specified Elsewhere:
   1. NCDOT Division 2 – Earthwork

D. Existing Conditions:
  1. Contractor shall accept actual conditions at the project site and do work specified without additional compensation for possible variation from grades and conditions shown, whether surface or subsurface. All grading work shall be unclassified except for rock removal as described herein.

E. Protection:
  1. Benchmarks and Monuments: Maintain carefully all benchmarks, monuments and other reference points. If disturbed or destroyed, replace as directed. If found at variance with the drawings, notify the Project Coordinator before proceeding to lay out work.
  2. Protection of Existing Work Remaining: All existing curbs, sidewalks, driveways and paving damaged in performance of this work shall be restored without additional cost to the Owner in the manner prescribed by authorities having jurisdiction.
  3. Tree Preservation and Protection: During all phases of earthwork and site grading, the Contractor shall comply with Section 01 5635, 01 5637 and 01 5639.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil and Planting Mix:

B. Non-woven Filter Fabric: Fabric for wrapping perforated pipe and washed stone shall be the non-woven filter type, Mirafi 140NL, Webtec NO-4, Linq 130 EX, or an approved equal.

C. Surplus Material: Contractor shall remove unsuitable materials and surplus excavated materials from the site and legally dispose of it.
PART 3 - EXECUTION

3.1 INSPECTION:

A. Examine the areas and conditions under which earthwork and site grading is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

B. Testing:
   1. Laboratory: The Owner shall employ services of a testing laboratory to perform tests required under this section.
   2. Quality Control Testing during Construction: It is the responsibility of the Contractor to notify the Engineer at appropriate times when Testing is required. Field density tests shall be performed in accordance with ASTM D-698

C. Soil Preparation
   1. Soil Test: A sample of the proposed organic mix shall be submitted to the Grounds Superintendent 14 calendar days prior to installation and be approved prior to delivery to the site. Organic mix will be defined as organic/humus such as sawdust or leaf mold that has completed the decomposition process.
   2. Soil preparations for planting areas are divided into two categories depending on the situation.
      a. Type I
         1) The “Type 1” planting bed preparation is intended for areas in which the existing soil is of sufficient quality that it can be retained and amended to achieve the plant mix specification.
         2) Existing vegetation shall be removed by scraping away the top 3” of existing grade. Subsoil to 12” remove rocks (including gravel) and debris and remove from the site.
         3) This material shall be hauled away and disposed of in accordance with the contract provisions.
         4) The contractor shall install a sufficient quantity of soil and soil amendments to achieve the desired/specified final grade and soil specification. Soil shall be added in an amount sufficient to account for natural consolidation of the final soil product. Unless otherwise specified, the plant bed shall be graded as follows:
            a) Roadway medians 2” to 4” above top/curb at center of median
            b) Sidewalk planting strips-achieve positive drainage from front of walk to back of curb
            c) All soil amendments shall be mixed thoroughly and completely with the existing soil.
         5) All stone and debris is to be removed from the median areas and shoulder of the roadways. Especially from phase # 7 (apartments) to the Mary Alexander Road intersection. No further work (any new material added) is to proceed until this stone and debris is removed. Hand raking is strongly recommended.
         6) There is to be no damage to the existing trees or their root systems during this work. All damages will be the responsibility of the contractor to correct or replace at the direction of the Grounds Superintendent or representative. All turf work is to be outside of the mulch ring areas.
      b. Type 2
         1) The “Type 2” planting bed preparation is intended for areas in which the existing soil is to be removed to a depth of 18” and replaced with soil meeting the plant mix specification. This preparation also includes the tilling or loosening of the material from 18” to 36” deep in order to provide aeration and lessen the compaction.
2) Existing soil shall be removed and disposed of in accordance with the contract provisions. The existing layer of soil between 18" and 36" deep shall be tilled in place and inspected by Landscape Architect/Grounds Superintendent prior to plant mix/soil being added to reach final grade.

3) The contractor shall install a sufficient quantity of approved plant mix to achieve the desired/specifed grade. Soil shall be added in an amount sufficient to account for natural consolidation. Unless otherwise specified, the plant bed shall be graded as follows:
   a) Roadway medians & planting beds – 12” above top/curb at center of median, 2” above top/curb at curb
   b) Roadway plant strips-achieve positive drainage from front of walk to back of curb
   c) Plant beds in turf areas or around buildings – 12” above surrounding grade at center of bed, 2” above grade at edge of bed

4) All planting beds and areas to be mulched shall have a 4” V-cut trench installed at the perimeter of the planting bed and adjacent to concrete walks, curbing, and grassed areas. The V-cut trench shall form the bed line edge. Trench depth and width shall be consistent and uniform throughout the installation.

5) All work shall be achieved from the sides of the planting bed areas. The contractor shall not allow equipment to operate on the loosened soil or plant mix.

D. Drainage:
   1. Subsurface drainage shall be installed in all medians where drain lines can be tied into the existing storm drain system. A 4 inch slotted, corrugated drain pipe shall be installed along each edge of the median in the bottom of the planting area. Drain pipe shall be laid in the specified non-woven geotextile fabric, then covered with a minimum 6 inches of #57 washed stone, then wrapped with the specified non-woven geotextile fabric. Special care shall be exercised when filling medians with soil so as not to crush or damage the drainage system.

SECTION 01 5635 – PRUNING AND REMOVAL OF EXISTING TREES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
   The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK:
   Provide all supervision, labor, tools, equipment, services and expertise required to perform tree maintenance work as specified herein. Where extent of pruning is not quantified in the construction drawings, bids shall be based on unit prices and extent of pruning will be field determined after the award of contract.

1.3 QUALITY ASSURANCE:
   Bidding on this contract shall be limited to individuals, partnerships and corporations actively engaged in the field of arboriculture. Bidders shall derive a majority of income from arboriculture work. Bidders shall demonstrate competence, experience, and financial capability to carry out the terms of this contract. The University may require proof of these qualifications.
PART 2 - PRODUCTS

2.1 BIDDING:
   A. All bidders must have in their possession or available to them by formal agreement at the time of bidding, trucks, devices, chippers, stump grinders, hand tools, aerial and other equipment and supplies which are necessary to perform the work as outlined in these specifications.
   B. Yard Waste to be mulched (on-site or hauled to a grinding facility) unless diseased or contaminated with chemicals.

PART 3 - EXECUTION

3.1 SAFETY STANDARDS:
   A. All equipment to be used and all work to be performed must be in full compliance with the most current revision of American National Standards Institute, Standard Z-133.1 (Safety Requirements for Pruning, Trimming, Repairing, Maintaining, and Removing Trees and for Cutting Brush). These standards are made part of this contract by this reference. The Contractor shall be solely responsible for pedestrian and vehicular safety and control within the work site and shall provide the necessary warning devices, barricades, and ground personnel needed to give safety protection, and warning to persons and vehicular traffic within the area.
   B. Cleanup: All debris from tree trimming, tree removal, and stumping operations shall be cleaned up each day before the work crew leaves the site, unless permission is given by the University to do otherwise. All lawn areas shall be raked, all streets and sidewalks shall be swept, and all brush, branches and logs shall be removed from the site. Areas are to be left in a condition equal to that which existed prior to the commencement or arboriculture operations. It shall be the responsibility of the Contractor to remove and to dispose in a proper and acceptable manner all logs, brush, and debris resulting from the tree maintenance operations at no additional cost to the University.
   C. Supervision: This contract will be under the direct supervision of the University or its authorized representatives. Any alterations or modifications of the work performed under this contract shall be made only by written agreement between the Contractor and the University authorized representatives and shall be made prior to commencement of the altered or modified work. No claims for any extra or materials shall be allowed unless covered by written agreement.
   D. Work Crew Supervision: The Contractor shall provide qualified supervision of each crew at all times while working under this contract. Each supervisor shall be authorized by the Contractor to accept and act upon all directives issued by the University. Failure for the supervisor to act on said directives shall be sufficient cause to give notice that the Contractor is in default of the contract unless directives would create potential personal inquiry of safety hazards.
   E. Large Tree Pruning: Cutting back or topping shall not be permitted. Pruning will be done under the supervision of a certified Arborist according to the latest revision of Standards of the National Arborist Association for Shade Trees and made a part of these specifications attached. The pruning class requirement will be a Medium Pruning as outlined in these documents except where tree training is prescribed for small trees.

1. Generally, the pruning will consist of primarily a Class II, Medium Pruning, unless specified otherwise; and lifting the lower bottom branches of trees for under-clearance as directed by the University. In some cases there is the need to control extended growth. To remedy this, where noted in the field a drop-crotch / canopy reduction pruning will be used. In no case will trees be topped or rounded over. Trees to receive the drop-crotch treatment will be flagged or identified in the field prior to the work beginning. No more than 1/3 of the total live canopy will be removed. The Grounds Superintendent or representative will / must be present for this work to proceed.
F. Under-clearance pruning to provide for pedestrian and vehicular clearance shall be done to provide clearance as directed by the University.
   1. Pruning is to be performed by tree workers who, though related training and on the job experience, are familiar with the techniques and hazards of this work including trimming, maintenance, repairing or removal, and equipment used in such operations.
   2. The use of climbing spurs or irons is not approved in pruning operations on live trees.
   3. This type of work is a potentially hazardous occupation and is to be undertaken only by trained personnel or under the supervision of trained personnel, all of whom are covered with workers compensation, property damage, public liability, and completed operations insurance.

G. Medium pruning shall consist of the removal of dead, dying, diseased, interfering, objectionable and weak branches on the main trunks as well as those within the leaf area. An occasional branch up to one inch in diameter may remain within the main leaf area where it is not practical to remove it. The following specifications shall apply:
   1. All cuts shall be made sufficiently close to the trunk or parent limb, without cutting into the branch collar to leaving a protruding stub, so that closure can readily start under normal conditions. Clean cuts with sharp tools shall be made at all times.
   2. All cuts at the trunk are to be made with a pruning saw. Heading back large limbs may be done with loppers, pole pruners, or power equipment.
   3. Where branches are too heavy to handle, to prevent slipping or peeling the bark, it is necessary to precut these branches. Where necessary, to prevent tree or property damage, branches shall be lowered to the ground by proper ropes or equipment.
   4. On trees known to be diseased, tools are to be disinfected with a 20% Clorox solution after each cut and between trees, which there is known to be a danger of transmitting the disease to the tools.
   5. Old injuries are to be inspected. Old wounds that are not closing properly and where the callus growth is not already completely established should be traced where appropriate.
   6. All branches are to cut back to a live lateral, which shall be at least 1/3 diameter of the severed branch. Heading back limbs as part of tree trimming pruning is accepted.
   7. All girdling roots visible to the eye are to be reported to the GS.
   8. The presence of any structural weaknesses, disease condition, decayed trunk or branches, split crotches or branches should be reported in writing to the GS, and corrective measures recommended.
   9. All stubs not callused over shall be pruned in the same manner as outlined above in this action. Care shall be taken so as to not damage the callousing tissue.
   10. Cutting back or topping shall not be permitted.

H. Tree Removal:
   1. Trees shall be removed in accordance with accepted industry standards and procedures and in accordance with the following minimum requirements.
   2. Extreme care shall be taken so as to prevent limbs, branches and trunks from falling and creating damage to adjacent homes, driveways, sidewalks, trees, shrubs, streets and other property, both public and private. Debris and logs shall not be left on the public right-of-way overnight. It shall be the responsibility of the Contractor to remove and dispose in a proper and acceptable manner all logs, brush and debris resulting from the tree removal operation unless otherwise directed by the University. Removal of such debris shall be performed daily so as to not disrupt the work of the Contractors on the site.

I. Stump Grinding:
   1. Work shall include, but is not limited to, all labor, equipment, and material necessary to grind all stumps identified in the contract and those identified in the field by the Engineer.
   2. All exposed portions of the stump (including root flare) shall be ground to a depth of 12 inches below the surrounding average grade.
   3. All grindings shall be removed from the site. The resulting hole shall be back-filled with dry soil free from stones, dirt clods, roots, root mats, and other unsuitable material.
4. The resulting hole shall be back-filled in two six-inch lifts. The first six-inch lift shall be compacted to a 65% compaction. The final six-inch lift shall be hand tamped and graded to drain.

5. Those that are affected by the stump grinding shall be seeded and mulched per Project Special Provisions, “SEEDING AND MULCHING”.

J. Measurement:
1. The stump grinding measurement will be the length measurement of the root flare added to the width measurement of the root flare and divided by two. All measurements will in inches. There will be no other measurement for payment. The PC/GS will determine the measurement for payment at each location.

SECTION – FERTILIZATION OF EXISTING TREES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Related Documents:
1. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:
1. Work Included in This Section:
2. Provide all supervision, labor, tools, equipment, and materials necessary to fertilize existing trees to remain as designated on the plans.

C. Related Work Specified Elsewhere:
1. Tree Planting (9320)
2. Pruning and Removal of Existing Trees (5635)

D. Quality Assurance:
1. Provider of this service shall be individuals, partnership or corporation actively engaged in arboriculture, horticulture, or a related field.
2. Contractor shall have in his possession or available by formal agreement at the time of bidding, all equipment and supplies necessary to perform the work as specified.

PART 2 - PRODUCTS

2.1 FERTILIZER

A. All fertilizer shall have a minimum analysis of 30-9-4.

B. Eighty percent of all nitrogen will be slow release by means of organic breakdown

C. All fertilizer shall be manufactured such that it can be applied in the fashion described.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

A. Installation of the fertilizer will be the high-pressure liquid fertilizer method. A hydraulic pump capable of delivering an agitated fertilizer with water as the carrier (with the ability to pump the material at the pressure of 150 psi) will be utilized. A soil spear designed for fertilizing applications will be used.
B. Injection of the fertilizer shall start 2 to 3 feet from the root flare and be 2 to 3 feet apart continuously to the edge of the limb spread or edge of construction, whichever is less.

C. Injection will be 10 to 12 inches deep. Rate of application will be determined by a measurement of the diameter of the trunk 4 2 feet above ground line. Fertilizer will be applied at a rate of 2 pound per inch diameter of actual nitrogen.

D. Soils must be moist prior to application.

SECTION – TEMPORARY TREE PROTECTION AND TRIMMING

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Related Documents

The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

Purpose: The purpose of this section is to provide protection for existing trees on Campus property during University sponsored construction projects.

C. Work Included in This Section:

D. Construction of Tree Protection Barricades, Replacement of Damaged Trees, Pruning, Curb and Gutter Repair Replacement and Construction, Sidewalk Repair and Construction

E. Related Work Specified Elsewhere:

1. Landscape Grading and Drainage
2. Pruning and Removal of Existing Trees
3. Fertilization of Existing Trees

PART 2 - PRODUCTS

2.1 MATERIALS

A. Woven Textile Fabric: Woven geotextile fabric with a minimum tensile strength of 200 lbs. shall be used under 6 inches of washed stone or suitable alternative whenever construction traffic must pass over the root systems of existing trees in unpaved areas.

B. Tree Protection Barricades: Barricades shall be constructed of wood, in accordance with of these specifications. Orange safety fencing, 3’ high or suitable alternative may be used in lieu of wood rails. The installation of orange construction fencing in the right of way shall not inhibit driver and/or pedestrian vision at driveways and/or street intersections.

PART 3 - EXECUTION

3.1 GENERAL

A. Trees located on University property shall be protected from damage and/or removal and this includes the following: storm drainage, underground utilities, driveways, sidewalks, etc.

B. The designer will provide the same level of protection for private property trees on all University funded and/or sponsored projects. The Landscape Architect or Grounds Superintendent must be consulted during the planning of the project to determine impacts to the trees based on
proposed construction. Alternative alignments, construction methods, tree replacement, etc. shall be considered during that period.

C. Boring and Trenching:
   1. Open trenching, including pilot and/or receiving holes:

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<tr>
<th>TREES DIAMETER (D.B.H.) LESS THAN 6</th>
<th>RADIAL DISTANCE (FEET) LIMB SPREAD</th>
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<td>6&quot; - 9&quot;</td>
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<td>15&quot; - 19&quot;</td>
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<td>20&quot; - 30&quot;</td>
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<td>Over 30&quot;</td>
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   2. Holes or trenches closer to a tree than noted above will be considered harmful to the trees unless a boring construction method is performed. Any exceptions must be approved by the Landscape Architect in coordination with the Grounds Superintendent. Utilities may be tunneled in the root zone at a 24” minimum depth providing that plans are approved showing the location and method.

D. Curb and Gutter Repair and Construction:
   1. When working within 20 feet of any tree (12 inches or larger in diameter), plywood forms or suitable alternative will be used. Clearing, grading, or digging will not be allowed beyond 6 inches from the proposed back of curb unless the Landscape Architect/Grounds Superintendent has provided approval.

   2. Root pruning will be in accordance with Section entitled Root Pruning. If any portion of the trunk and/or root flare extends over the section being replaced, it cannot be damaged during construction even if a small portion of the old structure must be left in place.

E. Sidewalk Construction /Repair
   1. When working within 20 feet of any tree 12 inches or larger in diameter, plywood forms or suitable alternative will be used. Clearing, grading, or digging will not be allowed beyond 6 inches from the proposed edge of the sidewalk unless the Landscape Architect/Grounds Superintendent has provided approval.

   2. Root pruning will be in accordance with Section entitled Root Pruning. If any portion of the trunk and/or root flare extends over the section being replaced, it cannot be damaged during construction even if a small portion of the old structure must be left in place.

   3. Narrow sections of sidewalk will be constructed in accordance with directions from the Landscape Architect and no less than 40 inches in width. Bridging of large roots.

F. Barricades:
   1. Barriers shall extend around. They shall encompass the trees with a radius of not less than one foot (1’) for every one inch (1”) of trunk diameter (critical root zone) unless otherwise detailed.

   2. Barricade will be a minimal of six feet (6’). Deviations from this must be approved on an individual basis by the Landscape Architect and the Grounds Superintendent.

   3. All tree protection barriers shall be installed prior to any grading or other land disturbing activity. They shall be constructed from any material substantial enough to designate the protected area and to protect the roots, trunk, and crown of the tree.
      a. Example: 2 x 4 standards and 1 x 4 rails; 3’ high orange safety fencing, etc.

G. Trunk Protection:
   1. Batter boards and sand bags will be installed when working within 20 feet of any tree 12 inches or larger. The purpose of these items will be to protect the trunk or root flare from drainage during construction.

H. Temporary Access:
   1. It is recommended that when crossing a critical root zone, mulch 8 to 12 inches deep with woven geotextile fabric with a minimum tensile of 200 lbs. strength laid underneath shall
be required in these areas to act as a cushion to prevent soil compaction. Mulch and fabric shall be removed after construction is complete.

2. Do not store materials or machinery in any portion of the critical root zone.

I. Fill Around Existing Trees to Remain:
1. Fill dirt deeper than two inches (2”) may be allowed over the critical root zone of the tree. This work shall be performed under the supervision of the Grounds Superintendent.

J. Clearing Within Critical Root Zone:
1. In the critical root zone, the removal of any portions of old sidewalk, driveway, and/or curb shall be done with extreme care so as not to damage any portion of the branches, trunk or roots.
2. In the critical root zone any stumps, dead trees and shrub growth to be removed shall be cut flush or ground out. Stump grinding will be accomplished with equipment and methods acceptable in normal arboriculture operations.
3. All holes will be backfilled completely the same day of the operation. Stumps to be ground out will be designated by the Grounds Superintendent. No grubbing is permitted in the root zone areas.

K. Tree Damage:
1. Climbing irons, spurs or spikes shall not be used on trees to be pruned.
2. Any tree damage caused by the Contractor is to be repaired immediately at no additional expense and to the satisfaction of the University.
3. Any damages resulting in the disfigurement and/or shortened life expectancy of a tree will be evaluated by the Grounds Superintendent. The entire value of the tree will be pro-rated by the loss of life expectancy and that value assessed to the Contractor.
4. Trees damaged beyond repair, as judged by the Grounds Superintendent, are to be removed at no expense to the University, and replaced by trees of size and species designated at no additional expense to the University; or the dollar value of such damaged trees as determined by the Grounds Superintendent is deducted from the monies owed the Contractor.
5. The tree values will be determined by using the guidelines in the Tree Evaluation Guide by The International Society of Arboriculture.
6. A MINIMUM FINE OF $50 WILL BE ASSESSED FOR EACH INCIDENT OF BARK AND CAMBIUM DAMAGE OF 4” WIDTH OR LESS WHERE RESTRICTIONS ARE VIOLATED. IF DAMAGE IS LARGER, DAMAGES WILL BE ASSESSED USING I.S.A. TREE EVALUATION GUIDE PROCEDURES.

L. Discontinuance of Work:
1. Any practice obviously hazardous to people or harmful to the trees, as determined by the University, shall be immediately discontinued by the Contractor upon receipt of either written or oral notice to discontinue such practice.

M. Root Pruning:
1. Root pruning shall be kept to an absolute minimum. In no case shall any root be pruned that is 1 ½ inches in diameter or greater without the express permission of the Grounds Superintendent.
2. All roots proposed to be cut shall be located in advance at a point 6-12” outside the proposed cut by using a shovel, a probe, a high-pressure stream of water, or other convenient method. The cut is to be made no more than 6” behind the back of the curb, wall, or other structure to be built. The cut shall be made only to the minimum depth required for the structure.
3. The roots shall be cut cleanly leaving a smooth surface.
4. Root pruning equipment shall be kept sharp to ensure that roots are cut cleanly and are not broken or torn by dull or unsuitable equipment.
5. Root pruning shall be done with the approval of the Landscape Architect or the Grounds Superintendent.

N. Pruning and Thinning of Existing Trees:
1. All pruning shall be in accordance with this manual.

O. Tree Preservation:
1. Large or rare trees shall be highlighted by the designer. The Grounds Superintendent must approve all tree removals.

P. Clean Up:
1. Remove all barriers upon completion of project and fill the holes with suitable soil to restore area to original condition.

3.2 TREE PROTECTION
A. It is desirable to save trees whenever possible. During design, the Designer should identify specifically those trees to be saved and those which must be removed. Trees which must be damaged by construction to the point that they have little chance to survive should be considered for removal.

1. All trees to remain shall have protective barriers set outside the drip line of the tree. Barriers shall be installed prior to any construction and shall remain until construction and site cleanup is complete. The barriers shall be of substantial material: 4 x 4 posts with 2 x 6 rails set at a minimum height of four feet. No construction material, debris, or excavated material shall be stored within the barricade area.

2. Protect root system from flooding, erosion, and noxious materials in solution from spillage of construction materials.

3. Excavation around trees:
   a. Excavate within drip lines of trees only where indicated on plans.
   b. If excavation will damage trees extensively, the trees should be removed.
   c. Where trenching for utilities is required within the drip line, tunnel under or around roots by hand digging. Do not cut main lateral or tap roots. Cut smaller roots with a sharp pruning tool; do not chop or break.
   d. Do not allow exposed roots to dry out while exposed; provide temporary earth or moist burlap cover.
   e. Any tree to remain that has had excavation within the drip line shall be pruned by a professional arborist according to the National Arborist Association Standards Class IV- Cutting Back or Drop Crotch Pruning.

4. Grading: Maintain existing grade outside drip line of trees, unless otherwise indicated on plan. Do not leave open excavations in the vicinity of protected trees for longer than 2 days to prevent soil moisture reduction.

5. Fertilization:
   a. Where tree roots within the drip line will be covered with asphalt or concrete, feeders shall be installed as recommended by the National Arborist Association Standards.
   b. Install extended feeders where construction of walls is required within drip line.
   c. The design must provide a yard hydrant, irrigation system, or other convenient water source adjacent to trees that remain.
   d. The specifications shall define proper fertilization and the contractor will fertilize affected trees during construction.

6. Repairs to Damaged Trees:
   a. Repairs to damaged trees shall be performed by a professional arborist following the preceding instructions for pruning.
   b. Trees damaged beyond repair or that do not survive will be removed by the contractor. A replacement cost will be determined by the designer and paid by the contractor. The University will reserve the option of having the contractor replace the tree with one of equal size and quality.

3.3 TREE PRUNING
A. For Grounds Maintenance Levels I, II & III. This is a highly skilled procedure that must be supervised by a qualified and professionally trained arborist. This will insure that all trees are
pruned according to their natural growth habit to evenly form and balance the tree to promote proper health and growth, and prevent interference with pedestrian and vehicular traffic.

1. Prune to remove dead, damaged, diseased or structurally weak limbs.
2. Removes branches that extend over buildings, endanger roofs, eaves or windows, or hang over walkways, parking lots or driveways. Provide clearance for buses, moving vans, delivery trucks, and similar vehicles along streets.
3. Cut back branches that overhang or grow into power lines. Anticipate the effects of wind on branches or trees which might fall on power lines and remove growth to prevent these problems: shapes entire tree through selective pruning rather than a “hat racking” method and prevents growth of small trees in front of windows and over entrance ways or walks which will obstruct vision at street intersection. Prune according to National Arborist Association standard for pruning and maintaining shade trees.
4. Tree pruning shall be performed in accordance with the following specific requirements:
   a. Remove crossed or rubbing limbs or branches.
   b. Make all cuts close to parent stem to promote healing. All limbs, 2 inches in diameter and over must be precut to prevent splitting.
   c. Lower to the ground with ropes all branches three inches or more in diameter and other branches being removed that would cause damage in falling.
   d. Cut off all low hanging branches to a minimum clearance height of 14 feet over roads and to a minimum clearance height of 8 feet over sidewalks.
   e. Cable and/or bolt any branches that are structurally weak, split crotches, or branches that are dangerous but worth saving. Guying shall be accomplished in accordance with National Arborist Association Standard for cabling, bracing, and guying for shade trees.

SECTION 32 9210 – LAWNS AND GRASSES

PART 1 - GENERAL

A. WARRANTY
   1. Guarantee: The contractor shall guarantee a live stand of permanent grass consisting of 95% coverage minimum for seeded grass with no bare spots greater than 1 square foot. Acceptance will be made after the grass has been mowed at least once and shows sufficient stand and cover as specified.

PART 2 - PRODUCTS

2.1 SEED

   A. Seed: All seed used shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act, and approved by the North Carolina Department of Agriculture. All seed shall be furnished in sealed standard containers. Seed which has become wet, moldy or otherwise damaged in transit or in storage will not be acceptable. The seed quality requirements for this project are as follows:
   1. Seed shall be entirely free from bulblets or seed of Johnson Grass, Nutgrass, Sandbur, Wild Onion, Wild Garlic, Witchweed and Crotalaria.
   2. Seed shall not contain more than 2%, singly or collectively of crop seed other than the kind or kinds of seed specified.
   3. Minimum guaranteed germination rate for all seed shall be 85%.
   4. The Crop Seed quality requirements are: Minimum 80% pure live seed; maximum 1% total weed seed; maximum 2% total other crop seed; maximum 100 restricted noxious weed seed per pound.
2.2 SOIL AMENDMENTS

A. Lime: Lime shall be ground limestone containing not less than 85% of total carbonates and shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and at least 90% will pass through a 20-mesh sieve. Coarser will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the 100-mesh sieve, but no additional payment will be made for the increased quantity.

B. Superphosphate: Finely ground phosphate rock containing minimum 18% available phosphoric acid.

2.3 FERTILIZERS

A. Fertilizer: Fertilizer shall be the product of an approved commercial fertilizer manufacturer and shall be 10-10-10 grade, uniform in composition, free-flowing material suitable for application with approved standard equipment. The fertilizer shall conform to the applicable State fertilizer laws and shall be delivered to the site in bags or other convenient containers each fully labeled and bearing the name, trademark and warranty of the producer.

2.4 SOILS

A. Topsoil: Topsoil shall be from stockpiles created from stripping and required excavation. Should additional topsoil be required in excess of that obtained from stripping and excavation, the Contractor shall obtain the material from sources (approved by the UPM) off the site. The topsoil shall be natural, friable soil, possessing characteristics of representative soils in the vicinity which produce heavy growths of crops of grass. It shall be obtained from naturally well-drained areas, shall be reasonably free from subsoil, brush, objectionable weeds and other litter and shall be free from toxic substances, clay lumps, stones, roots and other objects larger than 1 inch in diameter, or any other material which might be harmful to plant growth or be a hindrance to grading, planting and maintenance operations.

B. A soil analysis shall be prepared by a testing agency approved by the designer. The contractor shall provide all elements recommended by the analysis.

2.5 MULCHES

A. Mulch: Mulch shall be salt hay, clean threshed straw of oats, wheat, barley or rye. Materials for securing mulch may be one of the following:
   1. Matting: Plain open weave jute rolls, 18 inches wide. Jute yarn shall be loosely twisted construction not varying in thickness more than 1/2 its normal diameter, and having 76 to 80 warp ends per 18 inches width, 40 to 42 weft ends per yard length.
   2. Mat anchors: Baling twine and soft-wood pegs 1/2" x 1" x 12" long.

PART 3 - EXECUTION

3.1 MAINTENANCE

A. Landscape Management:
   1. Increased development of the campus creates the greater demand for efficient landscape planning. The introduction of new signage, plant materials, benches walks, lights, etc. into the landscape all affect long-term maintenance. Therefore it is necessary to develop guidelines that must be reviewed by anyone involved in the planning and design of elements. Long term plans for walkways, roads and buildings must be considered when locating signage, benches or plant materials in proposed designs.
      a. Turf strips less than two feet between walkways, curbs or buildings will not be allowed.
      b. Planting beds shall have large sweeping edges for ease of lawn mower cutting.
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c. Place signs, lights and other permanently installed objects in mulch or planting beds when possible for ease of lawn maintenance. This will also protect these objects from mower and weed eater damage.
d. Select ground covers, shrubs and trees for natural size and habit for an area to avoid overgrowing and unnecessary pruning.
e. Do not plant low branching trees in turf areas.

B. Turf Maintenance

1. Level I. Turf maintained at this level is highly maintained turf which is mowed, fertilized, edged, with pre and post emergent herbicides utilized to prevent/eliminate all broad leaf weeds and weedy grasses. These areas exist at various locations throughout the campus proper. Mowing frequency is based on weather conditions.
   a. Fescue turf is maintained at a mowing height of 3 to 3-1/2 inches.
   b. Bermuda at “to 1” and over seeded rye at 1-1/2 to 2” inches.
   c. Leaves are vacuumed, blown and removed from these turf areas during the fall season.
   d. Turf areas receive three applications of dry turf grade homogenous 18-5-9 or 23-5-9 fertilizer per year (March, June and October) at rate of 1 lb. Nitrogen/1000 sq. ft. All turf fertilizer is slow release nitrogen type 50% WSN, 50% WIN with minor elements. Over seeded rye lawns will be mowed twice monthly (Dec.-March)
   e. Sidewalks and curbs are maintained by edging.

2. Level II. Turf maintained at this level is mowed weekly during the growing season, normally April 1 - December 1. These turf areas exist around residence halls, campus buildings, common campus areas, park areas, road shoulders and parking lots.
   a. Leaves are vacuumed, blown and removed during the fall season.
   b. Sidewalks and curbs are to be mechanically edged.
   c. Turf areas to receive three applications of dry turf grade homogenous 18-5-9 or 23-5-9 fertilizer per year (March, June & October) at rate of 1 lb. Nitrogen/1000 sq. ft. Fertilizer type it as in TM Level I.

3. Level III. Turf maintained at this level relates to slopes and banks too steep to mow including fences guardrails, ditches and similar areas. These areas will be maintained using string trimmers.
   a. Turf/ground cover height will be maintained at 3-4 inches.
   b. Areas are to receive three applications of turf grade homogenous 18-5-9 fertilizer (March, June, and October) at rate of 1 lb. Nitrogen/1000 sq. ft. Fertilizer types it as in TM Level I. Adjacent walkways/curbs will be kept free from weeds, litter and other debris.

C. Edging

1. Edging shall be performed in a manner that is free of scalping, rutting, bruising, and uneven and rough cutting.
2. Vegetation shall not be cut back more than 1 inch from pavement.
3. Edging of sidewalks, driveways, curbs, and other paved surfaces and around gardens and other cultivated areas shall be performed as follows:
4. Level I, II & III: Edging shall be done so that there is no vegetation growing over pavement.

D. Trimming

1. For Grounds Maintenance Level I and II, trimming shall be around trees, shrubs, cultivated areas, fences, poles, walls, fire hydrants, sprinkler heads, valves, and other similar objects. Trimming shall be done in such a way as to avoid damaging the trunk, bark or roots or trees and shrubs. After trimming, all cuttings and debris shall be collected and disposed of in a mulch pile/compost area. Trimming within any given parcel shall be completed within one day of each mowing.

SECTION 32 9220 – SEEDING, SODDING & SPRIGGING OF TURFGRASS
PART 1 - GENERAL

A. Related Documents:
1. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:
1. Work Included in This Section:
2. Seeding, Sodding and Sprigging of new areas.

C. Substitutions:
1. The species or varieties, materials, products or sizes specified herein by botanical and common name, shall be provided as specified.
2. Substitutions will be permitted only upon written application by the Contractor to the LA/GS, and when approved by said LA in writing.
3. Request for permission to substitute will not be entertained unless adequate evidence substantiating the unavailability of the specified item accompanies the request for substitution.

PART 2 - PRODUCTS

2.1 TOPSOIL:

A. Topsoil shall be natural, fertile, agricultural topsoil, capable of sustaining vigorous plant growth. It shall be of uniform composition throughout, with admixture of subsoil. It shall be free of stones, bumps, live plants and their roots, sticks, and other extraneous matter. Topsoil shall not be used while in a frozen or muddy condition.

B. Unless otherwise specified in the contract documents the topsoil shall contain the following specified percentages of constituents:
1. CLAY – Minimum 10% - Maximum 30%
2. SILT – Minimum 30% - Maximum 50%
3. ORGANIC MATERIAL – Minimum 3% Organic Material is defined as compost/humus such as sawdust or leaf mold that has completed the decomposition process. Percentage of organic matter shall be determined by loss on ignition, of moisture free samples dried at 65 degrees.
4. PERMATILL or approved equivalent- recommended -  5% to 12.5% a. (16% maximum)
5. SAND – Balance of mix.

C. Topsoil shall have an acidity range of ph 5.5 to 7.0.

2.2 SOIL AMENDMENTS: - UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS.

A. Gypsum: Gypsum shall be pelletized Gypsum.

B. Fertilizer: The following is a list of acceptable starter fertilizers for new seeding:

<table>
<thead>
<tr>
<th>ANALYSIS</th>
<th>APPL.</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-25-12</td>
<td>340 lbs./acre or 8 lbs/1000 ft.</td>
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</table>

1. Or, equal fertilizer (approved equivalent) approved by the GS.
2. Commercial fertilizer applied at seeding time shall be per analysis listed above in which 50% of the nitrogen is slowly available. All fertilizer shall be uniform in composition, dry, free flowing and shall be delivered to the site in the original unopened container, each
bears the manufacturer’s guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged will not be accepted.

2.3 GRASS SEED:
   A. Grass seed shall be turf type tall fine fescue grass as specified on plans with a 95% minimum purity and 85% minimum germination, and be free of noxious weed seeds, as certified by the North Carolina Co-op Improvement Association or its approved equivalent by the GS.
   B. Seed shall be delivered to the site in sealed standard size containers, showing weight, analysis, name of vendor and germination test. Seed, which has become wet, moldy, over one year old, or otherwise damaged, will not be accepted.
   C. Approved turf type tall fine fescue cultivars: ‘Millennium’ – or approved equivalent by GS.
   D. Approved annually by GS.
   E. New cultivars will be considered for review. Following test information from TCNC/N.C. State University/Extension Service or approved authority.

2.4 LAWN MULCH:
   Lawn mulch shall be cleaned threshed wheat or oat straw from the latest available harvest crop and shall be free of noxious weed seeds and foreign material.

2.5 TURF GRASS SOD:
   Variety of sod, where shown, shall be as specified on plan. Sod shall be two years old minimum thickness of 1/2 to 5/8 inch depending on type plus thickness of top growth and thatch.

PART 3 - EXECUTION

3.1 TURF AND LAWN SEEDING:
   A. Soil Testing: Testing shall be requested 14 working days prior to delivery of topsoil or planting mix shall be corrected by the Contractor. Retesting cost shall be at the Contractor’s expense.
   B. Preparation of Seed Bed: Unless otherwise approved by the GS/PC, all other site work required by this contract shall be complete and in place before grassing operations are begun.
   C. Work may be completed in parts if so requested by the Contractor and approved by the GS/PC. Prior to seeding operations, all proposed lawn areas shall be scarified to 6” depth and pulverized until the surface is smooth, friable and of a uniformly fine texture. Remove stones and foreign material over one inch in diameter and grade for positive drainage as required to prevent ponding of water. Finish grade will be made by hand raking (all seeded areas).
   D. Lime shall be broadcasted and worked into the soil at all areas at the rate dictated by the soil test that will provide a PH level of 6.5 to 7.0.

3.2 SEEDING AND FERTILIZING:
   A. The following schedule will be required for seeding.
      
      | TYPE OF SEED               | DATE               |
      |----------------------------|--------------------|
      | Turf Type Tall Fine Fescue | See previous schedule. |
      
   B. Tall fine fescue may be seeded year round, however any variance in the above seeding schedule will require at least one over seeding application after September 15 to ensure 90%
coverage. This over seeding is considered incidental and there shall be no separate measurement or payment for over seeding.

C. Written requests for a variance must be approved by GS.

D. At seeding time add fertilizer at a rate of 250 lbs. per acre to all areas.

E. Apply tall fescue at the rate of 8 lbs. per 1000 square ft. for new areas, 3 to 5 lbs. per 1000 square ft. for overseeded areas.

F. Mulch shall be spread uniformly at the rate of 1-2 bales (90 pounds) per 1,000 square feet.

G. Tacking of mulch shall be necessary on all roadway projects using liquid asphalt applied at 150 to 300 gallons per acre depending on conditions. Refer to plan for specific details.

3.3 HYDROSEEDING

A. Hydraulic Mulching: Hydraulic mulching shall consist of the mixing of wood fiber mulch, grass seed, fertilizer and/or other additives with water. It shall be mixed in standard hydraulic mulching equipment to form homogenous slurry. This slurry shall be sprayed, under pressure, uniformly over the soil surface at the material application rate recommended by the manufacturer. The hydraulic mulching equipment shall contain a continuous agitation system that keeps all materials in uniform suspension throughout mixing and distribution cycle.

B. Application: Using standard hydraulic mulching equipment, the wood fiber mulch, seed and fertilizer slurry shall be applied evenly over the soil surface in a one-step operation.

<table>
<thead>
<tr>
<th>TERRAIN</th>
<th>MULCH APPLICATION RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flat soil surfaces</td>
<td>(minimum) 1,500 lbs. per acre</td>
</tr>
<tr>
<td>Slope 3 to 1 or steeper</td>
<td>2,000 lbs. per acre</td>
</tr>
<tr>
<td>Critical areas*</td>
<td>2,500 lbs. per acre</td>
</tr>
</tbody>
</table>

*Potential slope instability, extreme low moisture availability or high intensity of rainfall.

C. The mulch material shall consist of virgin wood fibers manufactured expressly from whole wood chips. The chips shall be processed in such manner as to contain no growth or germination inhibiting factors. (Fibers shall not be produced from recycled material such as sawdust, paper, cardboard, or residue from pulp and research paper plants).

D. The wood cellulose fibers of the mulch must maintain uniform suspension in water under agitation. Upon application, the mulch material shall form a blotter-like mat covering the ground. This mat shall have the characteristics of moisture absorption and percolation and shall cover and hold grass seed in contact with the soil.

E. The wood fiber mulch shall conform to the following specifications.

- Percent moisture content: 10.0 % ± 3.0%
- Percent organic matter (wood fiber): 99.2 % ± 0.8% oven dried beans
- Percent ash content: 0.8 % ± 0.2% oven dried beans
- PH: 4.8 % ± 0.5
- Water holding capacity (minimum): 1,000 grams of water per 100 grams of fiber
3.4 SODDED / SPRIGGED AREAS:

A. Soil Testing: Testing shall be requested 30 working days prior to delivery of topsoil or planting mix or the work site. Deficiencies in the topsoil or planting mix shall be corrected by the Contractor. Retesting cost shall be at the Contractor’s expense.

B. Preparation of Bed: Unless otherwise approved by the LA/PC, all other site work required by this contract shall be complete and in place before grassing operations are begun.

C. Work may be completed in parts if so requested by the Contractor and approved by the LA/PC. Prior to planting operations, all proposed lawn areas shall be scarified to 6” depth and pulverized until the surface is smooth, friable and of a uniformly fine texture.

D. Remove stones and foreign material over one inch in diameter and grade for positive drainage as required to prevent ponding of water.

E. Pre-emergent Herbicide: A pre-emergent herbicide and fertilizer combination (oxadiazon + fertilizer, or approved equal) shall be broadcast according to label recommendations.

F. Sod / Sprig Planting: Prepare sub-grade as specified above. Allow for thickness of sod to finished grade.
   1. Turf types for sod or sprigs to be used will be specific to that given job / project. To be approved by the LA / GS prior to installation.
   2. Where Bermuda sod or sprigs are to be used – ‘Tifway 419’ Bermuda or approved equivalent will be used as specified by LA / GS.
   3. Lay sod within 24 hours from time of stripping. Protect any sod stored on site from damage due to weather. Do not lay sod on frozen ground.
   4. Sprigs should be fresh used within 24 hours from digging.
   5. Soil should be moist, but not wet, prior to laying sod. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. Stagger strips to offset joints in adjacent courses. Work from boards to avoid damage to sub-grade or sod. Tamp or roll lightly to ensure contact with sub-grade. Work sifted soil into minor cracks between pieces of sod, and remove excess to avoid smothering of adjacent grass.
   6. Anchor sod on slopes with wood pegs to prevent slippage. Lay sod perpendicular to slope directions.
   7. Sprigged areas will be rolled with 250pd. rolled weight. Sprigs must be pushed into the ground with a grooved roller.

3.5 MAINTENANCE / ESTABLISHMENT OF PLANT MATERIALS:

A. Prior to acceptance:

   The Contractor shall be responsible for all maintenance of plants, turf and facilities until final acceptance. This includes all necessary watering, application of appropriate fertilizer, based on planting season, and the appropriate application of fungicides and insecticides necessary to maintain plants free from disease and insect activity.

B. Seeded Areas:
   1. Maintenance of seeded areas shall consist of fertilization, erosion repair, reseeding and incidental operations as necessary to establish a vigorous, healthy and uniform stand of specified grass. All areas which fail to show a uniform stand of grass for any reason shall be treated properly until a uniform stand of at least 90% coverage is attained with no bare areas.
   2. Grass mowing operations shall be performed by the Contractor until final acceptance of the work. Trash and debris shall be removed prior to mowing. Mowing shall be performed only when the grass is dry. Mowing of Fescue shall be performed whenever grass height is 5”. It shall be cut to a height of 3” to 4”. All maintenance performed prior to acceptance shall be considered incidental to the project and no separate payment shall be made.

C. Sodded / Sprigged Areas:
1. Contractor shall maintain sodded / sprigged areas as follows:
   a. Watering: Water sod / sprigs immediately after installation. Soak sod / sprigs
      thoroughly enough to penetrate soil below the newly installed sod / sprigs. Then
      water as follows:
      
      - 0-14 day’s: 170 gallons/1,000 s.f. every day
      - 15-28 days: 225 gallons/1,000 s.f. every other day
      - 29-42 days: 340 gallons/1,000 s.f. every three days
      - 43-84 days: 680 gallons/1,000 s.f. once per week
      - After 84 days: As needed to maintain acceptable turf
   b. In the event the project is accepted prior to the watering requirements being
      fulfilled, the contractor will be required to provide water up to 90 days after sodding
      / sprigging.

2. Fertilizing Sodded / Sprigged Areas: Fertilizing will be specific to the given job or as
   follows:
   a. Fertilize sod 2 to 3 weeks after laying sod with high phosphorus fertilizer. Apply a
      complete nitrogen fertilizer every three weeks until the sod has achieved
      satisfactory establishment.
   b. As a follow-up for Bermuda sod / sprigs, the contractor or University (applicator
      is to be specified in the contract) will apply ½ pd. of Nitrogen from Ammonium Nitrate
      (34-0-0) or Ammonium Sulfate (28-0-0) within 4 weeks of the initial installation.

3. Mowing Sodded / Sprigged Areas: Mowing will be specific to the given job or as follows:
   a. Grass mowing operations shall be performed by the Contractor until final
      acceptance of the work.
   b. Trash and debris shall be removed prior to mowing.
   c. Mowing shall be performed only when the grass is dry.
   d. Mowing of Fescue shall be performed whenever grass height is 5”. It shall be cut
      to a height of 3” to 4”.
   e. All maintenance performed prior to acceptance shall be considered incidental to
      the project and no separate payment shall be made.

4. Fertilizer Top-Dressing: Where directed by Engineer, Contractor shall top-dress lawn
   areas as described in Section 886 of NCDOT Standard Specification for Roads and
   Structures.

SECTION 32 9310 – EXTERIOR PLANTS: SHRUB AND GROUNDCOVER PLANTING

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents
   1. The General Provisions of the Contract, including General and Supplementary Conditions
      and General Requirements, apply to the work specified in this Section.

B. Description of Work:
   1. Work Included in This Section:
      a. The work required under this Section consists of all preparation, planting and
         related items necessary to complete the work indicated as described in the
         Specifications.
      b. Supply all plants specified on plant list.
      c. All planting shall be executed during the planting season (October 15 thru April
         15), unless exceptions are made in writing by the Landscape Architect/Grounds
         Superintendent.
      d. All plant species, sizes, form, shapes, and locations will be subject to approval by
         the Landscape Architect/Grounds Superintendent.
C. Substitutions:
1. The species or varieties, materials, products or sizes specified herein by botanical and common name shall be provided as specified. Only upon written application by the Contractor to the Landscape Architect, and when such application is approved in writing by said Landscape Architect in coordination with Grounds Superintendent, will substitutions be permitted.
2. Request for permission to substitute will not be entertained unless adequate evidence substantiating the unavailability of the specified item accompanies the request for substitution.
3. If proof is submitted, substantiated in writing, that any plant specified is not obtainable, a proposal will be considered for use of the nearest available size or similar variety with a corresponding adjustment of the contract price.

D. Energy And Water Efficient Landscaping:
1. Buildings shall be landscaped for energy efficiency and water conservation. Bushes and large trees provide shading and act as a wind breaks.
2. Definition of Xeriscaping: The word "Xeriscape" is derived from the Greek word xeros meaning dry, and scape, the last syllable of landscape. Xeriscape refers to an attractive water-conserving landscaper designed to harmonize with the existing environment.
3. Seven Principles of Xeriscaping
   a. Water conserving design
   b. Low water use/drought tolerant plants
   c. Reduction in turf
   d. Water harvesting techniques
   e. Appropriate irrigation method
   f. Use of mulches
   g. Proper maintenance practices
4. Xeriscape promotes water conservation by using drought-tolerant plant materials that thrive in the environment, within a landscape carefully designed for maximum use of rainfall runoff and minimum care. By limiting landscape water needs, which often account for 30%-50% of home water use, xeriscaping principles can significantly reduce water use and save money.
5. More than just strategy to save water and money, xeriscape principles also stress the aesthetics of using native vegetation. Xeriscape gardening recognizes that native vegetation is visually and aesthetically pleasing, even in landscaped areas
   a. Xeriscaping can save millions of gallons of water simply by planting shrubs, plants, and flowers that are native indigenous and thrive better in the heat and dry summer months of North Carolina while using less water than higher maintenance, higher water consuming grasses.
   b. Xeriscaping reduces requirements for mowing and fertilizing.

PART 2 - PRODUCTS

2.1 PLANTING MIX:
A. Planting mix may be developed by amending the existing soil or removing the existing soil and replacing with new planting mix. It shall be uniform composition throughout, with a mixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks and other extraneous matter. Planting mix shall not be used while in a frozen or muddy condition.
B. Unless otherwise specified in the contract documents the planting mix shall contain the following specified percentages of constituents.
   1. CLAY – Minimum 10% - Maximum 20% clay
   2. SILT – Minimum 30% - Maximum 50%
   3. ORGANIC MATERIAL Minimum 5% - Maximum 8%
a. Organic Material is defined as compost/humus such as sawdust or leaf mold that has completed the decompression process. Percentage of organic matter shall be determined by loss on ignition, of moisture free samples dried at 65 degrees.

4. PERMATILL* or approved equivalent - Minimum 12.5%-Maximum 25%**

5. SAND – Balance of mix

6. PLANTING MIX- shall have an acidity range of pH 5.5 to 7.0.

7. ELEMENTS – The planting mix shall have the following nutrients at the specified percent base saturation, to be determined by soil test conducted by the University of North Carolina at Charlotte.
   a. Calcium – 55% to 80%
   b. Magnesium – 10% to 30%
   c. Potassium – 5% to 8%

8. A sample of the proposed planting mix shall be submitted to the LA/GS 30 calendar days prior to installation and be approved prior to delivery to the site.

2.2 PLANT MATERIALS:

A. Plant Approval Process:
   1. Representative samples of each plant type shall be submitted to the LA/GS for approval. This approval process will require 7 working days. Clear, high quality photographs may be accepted in lieu of actual samples at the discretion of the LA/GS.

   2. No plants shall be delivered to the project site, except for required samples, until inspection has been made in the field or at the nursery, or unless specifically authorized in writing by the LA/GS. Inspection of plants to be balled and burlapped must be made, and plants must be approved by the LA/GS before they are planted. Inspection shall be for quality, size and variety only, and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the work.


B. Supply all plants as specified in plant list as shown on drawings. Plants shall be typical of their species and variety, have normal growth habits, have well-developed branches, be densely foliated, be vigorous, and have fibrous root systems.

C. No plants will be accepted unless they show healthy growth and satisfactory foliage conditions.

D. Size of plants, spread of roots and size of balls shall be in accordance with American Standard for Nursery Stock 260.1-1990 or latest revision, as published by the American Association of Nurseryman, Inc. All plants of each particular variety shall be uniform in size and configuration, and shall be labeled with correct plant name and size.

E. Balled and burlapped plants shall be nursery grown and freshly dug. Burlap shall be untreated and biodegradable. Nursery grown plants shall have been transplanted or root pruned at least once in the past three (3) years. No plants showing evidence of “made” root balls will be accepted.

F. Containerized plants shall have a root system sufficient enough in development to hold the soil intact when removed from the container. The root system shall not be root bound a condition where the root system is dense in mass, excessively intertwined, and has established a circular growth pattern.

G. Labels shall be attached securely to all plants, bundles and containers of plant materials delivered. Plant labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process lettering. These labels shall be removed by the Contractor after the final acceptance.
   1. Plants shall conform to measurements specified in the plant lists, except that plants larger than specified may be used if approved by the LA & GS.
   2. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant in accordance with the American Standards of Nursery Stock.
2.3 SHIPMENT AND DELIVERY:
A. The Contractor shall promptly notify the LA & GS, at least three days in advance, when the approved plant material is to be delivered, the nursery source, and the manner of shipment. The Contractor shall furnish therewith an itemized list of the actual species, variety, quantity and sizes.
B. The Contractor shall deliver the necessary inspection certificates to accompany each plant or shipment prior to acceptance and planting.
C. When shipment is made by open truck, pack all plants material to provide adequate protection against climate and breakage during transit, and tie to prevent whipping. The tops shall be covered with tarpaulin to minimize wind-whipping and drying.
D. Exercise care at all times during handling operations to prevent damage to bark, branches, and root system. Employ a suitable method of handling to insure the careful, workmanlike delivery of heavy balled plants to preclude loose or crushed plant balls. All balled and burlap plants shall have wire baskets.
E. Plants shall be free from defects and injuries, and shall be certified by the State and Federal Departments of Agriculture to be free from plant diseases and insect infestations.

2.4 LANDSCAPING DESIGN:
A. Refer to the University Landscape Architect for assistance. Plant lists shall contain both common and technical names, quantities, and plant delivery method (B & B, bare roots, etc.

2.5 PLANTS (SHRUBS AND TREES):
A. Shall be provided as shown on the Drawings. All plant material furnished shall be well branched and proportioned, full-foliaged, and in a healthy condition, free of disease and insect infestation. There shall be no substitutions without express written permission of the Grounds Superintendent. The following requirements pertain to all plant material:
B. Quality: Unless specifically noted otherwise, all plants shall be of specimen quality, exceptionally heavy, symmetrical, thickly branched, so trained or treated in their development and appearance as to be unquestionably of first quality in form, branch structure, buds, fruit, compactness and symmetry.
C. Nomenclature: The scientific names of plants listed in the Plant List conform to that of "Standardized Plant Names" (the latest edition) prepared by the American Joint Committee on Horticultural Nomenclature.
D. Standards: Requirements for definitions, grading tolerances, balling and burlapping, container grown plants and bare-root plants shall be in accordance with the "USA Standard for Nursery Stock," latest edition, adopted by the American Association of Nurserymen, Inc. Plants shall be measured before pruning with branches in normal position, and any necessary pruning shall be performed at time of planting. Where plant sizes are given in a range, the plants provided shall average the median of the range or better.
E. Inspection: The Owner has the right to inspect the plants and trees at their place of growth, but such inspections shall not preclude the right of rejection at the site. The Owner shall be notified as to the location of plant material for inspection.
F. Certificates of Inspection: The Contractor shall obtain all necessary certificates of inspection required by law for the transportation or shipments of plants to the project site, and shall maintain files of all certificates.
G. Disease and Damage: All plants shall be free of disease, insect infestations, eggs or larvae; and shall have thickly developed, well proportioned and healthy root systems. Plant material shall be free from physical damage or conditions that prevent the desired quality appearance and growth characteristics; or inhibit the plants thriving ability, hardiness, or adaptability.
2.6 **SOIL PREPARATION**

Prior to completing the project, there shall be a 6-inch layer of organic top soil across the site in areas where any planting is to occur. If there is top soil on site, the Contractor may store it within the Project Limit or at a location away from the University. This work shall be included in the Base Bid.

2.7 **SOIL AMMENDMENTS** shall be horticultural dehydrated cow manure composed of not less than 90% decomposed organic matter by weight on an oven dried basis. Organic matter shall be delivered in a workable condition, free of lumps, containing not more than 35% moisture or ash, by weight.

2.8 **FERTILIZER** shall be commercial nursery slow-release granular fertilizer: STA-green nursery special or approved equal. Fertilizer shall be delivered to the site in original bags bearing the manufacturer’s guaranteed analysis of 12-6-6 or 14-7-7 of which 50% of the nitrogen is derived from urea formaldehyde.

A. Fertilizer for Shrubs and Groundcovers:
1. The fertilizer shall be one from the following listed below or equal fertilizer approved by the LA/GS.
2. The fertilizer shall have 50% water insoluble nitrogen. The chlorine content is not to exceed 5%.

B. Shrubs and Groundcovers:

<table>
<thead>
<tr>
<th>FERTILIZER PRODUCT</th>
<th>ANALYSIS</th>
<th>APPL. RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornamental plant fertilizer</td>
<td>12-6-6</td>
<td>2 lbs/100 Sq. Ft.</td>
</tr>
<tr>
<td>Ornamental plant fertilizer</td>
<td>14-7-7</td>
<td>2 lbs/100 Sq. Ft.</td>
</tr>
</tbody>
</table>

2.9 **PLANTING SOILS** shall be classifiable as a loam, silt loam, silt clay loam, or clay loam, as determined from the U.S. department of agriculture triangular soil chart. The topsoil shall have a pH range of 6.0 to 7.0 when tested in accordance with the current methods of testing of the association of official agricultural chemists. The organic content shall not be less than 3% or more than 20% as determined by the wet-combustion method (chromic acid reduction) test. The topsoil shall be free from subsoil, stumps, roots, clods, stones, brush, weeds, building materials, or other debris inclusive of refuse, or any material toxic to plant growth.

2.10 **MULCH** shall be free of debris and wood chips. It shall be aged shredded bark free of excess tannic acid. A sample of bark mulch shall be provided for the grounds superintendent's approval prior to delivering the mulch. The owner reserves the right to reject any mulch which is considered to be unsuitable.
1. Mulch shall consist of pine bark mulch, double hammered pine bark, pine needles, shredded hardwood bark or other mulch as specified on the plans.
2. All mulches shall be free of any foreign materials, pieces larger than 6 inches, and/or green wood.

2.11 **WATER**

A. Water: Water shall be free from oil, acids, alkalis, salts or any other substance that is toxic or otherwise harmful to vegetation.
2.12 MISCELLANEOUS

A. Anti-Transpirant: An emulsion which provides a protective film over plant surfaces, sufficiently permeable to permit controlled transpiration, and shall be administered according to the manufacturer's recommendations. Anti-transpirant shall be "Vapor-Gard" as manufactured by Miller Chemical and Fertilizer Corporation, Hanover, Pennsylvania, 17331, or Wilt-Pruf, or approved equal.

B. Pre-emergence Herbicide
1. "Eptam", granular form, as manufactured by the "Stouffer Chemical Company", or Ronstar "G", or Treflan granular, or approved equal, consistent with pesticide label for recommended plant material.

C. Bracing Materials
1. Utilize #9 gauge galvanized steel wire: 3/4" diameter reinforced rubber hose of suitable length; treated guy stakes 2" x 4" x 36" long, guy wire flags of yellow plastic standard surveyor's flagging, capable of lasting through the bracing period.

PART 3 - EXECUTION

3.1 PLANTING PREPARATION

A. Herbicides: Three (3) working days prior to the planting of shrubs and groundcovers, but subsequent to planting bed preparation, the GS shall be notified and be on hand when the pre-emergent is applied to the planting project. The first application of the chemical trifluralin, oryzalin, or approved substitute by the GS should be applied per labeled instructions. (See instructions under Mulching for Application Rate).

B. Plant Protection on Site: Protect plants at all times from sun or drying winds. Plants that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet wood chips, or other acceptable material and shall be kept well watered.
1. Plants remaining unplanted for longer than 3 days after delivery may be deemed unacceptable after inspection by LA & GS. Plants shall not be bound with wire or rope at time so as to damage the bark or break branches. Plants shall be lifted and handled using suitable support of the ball to avoid damage to the root ball, trunk, or branches.
2. Before excavations are made, cover the surrounding turf, if existing, in a manner that will satisfactorily protect all turfed areas that are to be driven over, and upon which soil is to be temporarily stacked pending its removal or reuse. Barricade existing trees, shrubbery and beds that are to be preserved in a manner that will effectively protect them during planting operations or as specified on the plans.

C. Subsurface Improvements: The contractor shall observe proper precautions so as not to disturb or damage subsurface improvements.
1. Prior to excavations, Contractor shall notify North Carolina One-Call-Center, Inc. a. 1-800-632-4949 to ascertain locations of electrical cables, conduits, utility lines, oil tanks, supply lines, subsurface drainage, and irrigation lines, etc. Notify the Engineer should the above-mentioned subsurface improvements present an obstruction in locations designated for planting. In such situations, proceed after an alternate location has been approved by the LA/GS. Damages caused by the Contractor shall be the responsibility of the Contractor to repair in a timely manner (not to exceed 48 hours) to the satisfaction of the Owner.

3.2 PLANTING PROCEDURE:

A. Locations of Plants: The Contractor shall stake out or paint locations for plants and outlines of areas to be planted, and obtain approval of the LA & GS before excavation is begun. A minimum of 30% total planting must be staked before inspection will be made.
B. Excavation: No excavation or planting shall be done in soil that, in the opinion of the LA/GS, is too wet, too dry or not properly conditioned as provided in these specifications. All excavations shall be in accordance with Typical Planting Detail Sheet included in the Landscape Construction Standards Manual or as otherwise specified. During working hours the LA/GS may designate holes to be barricaded if holes are determined to present a pedestrian hazard.

C. Detrimental Soil Conditions: The Contractor shall notify the PC in writing of all soil and drainage conditions which the Contractor considers detrimental to growth of plant material. State condition and submit proposal in writing to the PC for correcting condition.

D. Obstructions: If rock, underground construction work, tree roots, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the LA/GS. Where locations cannot be changed as determined by the LA/GS, remove the obstructions to a depth of not less than 6 inches below the required pit depth. Proceed with work after approval of the LA/GS.

E. Plant Installation:
   1. Planting Beds: The extent of the planting bed shall be as indicated on the construction plans. The planting bed for shrubs, groundcover plants, and trees shall be prepared wide enough to accommodate all roots without crowding or twisting.
   2. Planting beds shall be prepared in accordance with Section 0200, Type 1 or Type 2 in accordance with the plans or specifications.
   3. Backfilling of Balled and Burlapped Plants:
      a. Backfilling shall be done in accordance with the following steps;
         1) Place root ball 2” above adjacent grade- see detail 40.05 A&B
         2) When partially backfilled and compacted, cut away the ball ties and cut and improve any wire loops that may protrude above the surface of the soil at any time. Cut and remove all wires, rope, burlap, or other ball wrapping materials from the top 1/3 of the root ball. Cut or adjust to prevent the formation of air pockets. No burlap shall be pulled from under the balls.
         3) Backfill one-half (2) of remaining hole with planting mixture specified, and water thoroughly. Backfill rest of hole with planting mixture. Firm down, eliminating all air pockets. Do not pack.
         4) Build a four-inch (4”) high berm around the edge of the root ball to form a basin for holding water. The bottom of the basin shall be at surrounding finish grade.
   4. Watering: Containerized plants shall be watered thoroughly prior to planting so as to provide adequate moisture to the plant during the planting process.
      a. The Contractor shall thoroughly water all plants immediately after planting. This shall mean full and thorough saturation of all backfill in the pits and beds during the same day of planting.
      b. Apply water only by open-end hose at a very low pressure to avoid air pockets and injury to the roots. When planted, watered, and fully settled, the plants shall be vertical and the top of the root ball shall not be below the existing grade.
      c. Fill basin with water, being careful not to break down berm with hose stream, or to gouge out holes in the backfill.
   5. Pruning: No pruning is to done except to remove broken branches, street/sidewalk obstructions, and for correcting irregularities including removal of soft wood or sucker growth and/or broken or badly bruised branches.
      a. This pruning shall be done at the direction of the GS.
      b. Prune with harp tools; make cuts even and clean.
   6. Mulching Applications: Within two (2) days after planting, mulch all planting areas, entire shrub and groundcover beds with a four-inch (4”) layer of mulching material. Taper mulch to ground level at the trunk. Do not allow mulch to pile up against the trunk.
      a. Prior to mulching, apply trifluralin, oryzalin pre-emergent herbicide or approved equal as specified by GS to surface according to label directions. Then apply a second application after mulching. Application shall not proceed without the presence of a representative of the GS.
7. Name Tag Removal: The contractor shall not remove nametags attached to installed plants prior to final inspection. The contractor shall remove all nametags from installed plants within 2 weeks after final inspection.

8. Abandoned Plant Pits: When utility lines or other unsuitable subsurface conditions are encountered in plant pits, the LA/GS will direct that plants be relocated in satisfactory locations. The Contractor shall backfill-abandoned pits with suitable topsoil to compacted finished grade. Unsuitable material shall be removed from property by Contractor. These areas shall be reseeded as specified with the turf and lawn specifications contained herein.

3.3 MAINTENANCE/ESTABLISHMENT OF PLANT MATERIALS:

A. Prior to acceptance:

The contractor shall be responsible for all maintenance of plants and facilities until final acceptance. This includes all necessary watering, application of appropriate fertilizer, based on planting season, and the appropriate application of fungicides and insecticides necessary to maintain plants free from disease and insect activity.

B. Watering After Acceptance:

In order to properly establish the plant material, watering of plant material shall be the responsibility of the Contractor until the expiration of the one-year warranty period. The Contractor shall perform watering operations only at intervals approved by the GS and shall notify the GS at least 24 hours prior to commencing watering operations so that a representative of the GS may be on hand.

1. The GS reserves the right to direct the schedule of watering operations. When so directed by the GS, the Contractor shall commence watering operations within 24 hours.

2. Watering shall be applied at a rate specified by the GS or in accordance with the contractor documents. The Contractor shall be responsible for all necessary traffic control during watering operations.

3. The quantity of the water to be paid for will be the actual number of 1,000 gallon units of water which have been furnished and applied to plants during the establishment period. Measurements of water will be made by means of an approved metering device at the source of supply, or by determining the volumetric capacity of tank trucks used to deliver water to the project and recording the number of loads delivered by each truck.

4. The quantity of water, measured as provided above will be paid for at the contract unit price for “Watering after Acceptance”.

5. Plant Materials shall be watered as described by the following ratios:

<table>
<thead>
<tr>
<th>TREE CALIPER</th>
<th>GALLONS OF WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 1&quot;</td>
<td>5</td>
</tr>
<tr>
<td>1 – 1(\frac{1}{2})&quot;</td>
<td>5 - 10</td>
</tr>
<tr>
<td>2&quot;</td>
<td>10 - 15</td>
</tr>
<tr>
<td>2 – 2 (\frac{1}{2})&quot;</td>
<td>15 - 20</td>
</tr>
<tr>
<td>3 – 3 (\frac{1}{2})&quot;</td>
<td>25 - 30</td>
</tr>
<tr>
<td>3 (\frac{1}{2})&quot; +</td>
<td>(Shall be monitored and receive water in an amount and frequency to maintain soil moisture).</td>
</tr>
</tbody>
</table>

6. Execution: watering is to be done a minimum of once per week. Watering shall begin approximately April 15 and continue until November 1, unless otherwise directed by the GS/PC. A set weekly schedule is to be established and maintained by the contractor, and adequate notice given of any change. The Engineer will notify the contractor to omit watering when he determines there has been adequate rainfall the previous week. The contractor shall notify the GS/PC of the completion of each watering cycle.
GROUND COVER AND SHRUBBERY  GALLONS OF WATER
Per Square Foot (1" of Water)  1.6

C. Cleanup:
1. During the installation, the Contractor will be required to keep all areas clean.
2. At the time of final inspection of work and before issuance of the final payment, the Contractor shall clean paved areas thoroughly by sweeping and/or washing. Any defacement of stains caused by the work of this Section shall be removed.
3. The Contractor shall remove construction equipment, excess materials, tools, and all debris and rubbish from the site. All dirt and debris shall be legally disposed of by the Contractor in areas approved by the GS/PC.

D. Final Acceptance:
1. Upon completion of all planting operations, including cleanup, the Contractor shall notify the LA/PC/GS and accompany him or her on inspection of planting. Any items found to be unsatisfactory shall be corrected prior to approval for final acceptance. The one-year guarantee period shall begin on the date of final acceptance.

E. Name Tag Removal: The contractor shall not remove the nametags attached to installed plants prior to final inspection. The contractor shall remove all name tags from installed plants within 2 weeks after final inspection.

F. Guarantee and Replacement:

G. The Contractor shall guarantee all plants (shrubs and ground covers) and all other materials and workmanship for a period of twelve (12) months from the date of final acceptance by the GS/PC/LA. The Contractor shall replace any plants that have more than one third die-back, or any other portion of the project that fails due to faulty materials or workmanship. All plants shall be insect and/or disease free. Plants damaged by pathogen activity through the warranty period shall be replaced. A six (6) month and eleven (11) month inspection will be held during the warranty period. Damage prior to final acceptance shall be the responsibility of the Contractor.
1. Plant replacements shall be the same as specified in the plant list. Replacement plant sizes shall be the same as other existing plants of the same species on the project. Plants, plant soil mix, fertilizer and mulch etc., shall be replaced as originally specified.
2. During the warranty period any plant that is dead or not in satisfactory growth, as determined by the PC/GS/LA, shall be removed from the site. These and any missing plants shall be replaced as soon as conditions permit, but during the normal planting season. If plant(s) is (are) not removed within five (5) days of notice from PC/LA/GS, the Owner will remove dead plant(s), dispose of it (them), and charge the contractor for the cost of removal and disposal.
3. Plants and items repaired or replaced shall have an extended warranty period of twelve (12) months from the date of acceptance of the repaired item.

3.4 MAINTENANCE

A. Landscape Management:
1. Increased development of the campus creates the greater demand for efficient landscape planning. The introduction of new signage, plant materials, benches walks, lights, etc. into the landscape all effect long-term maintenance. Therefore it is necessary to develop guidelines that must be reviewed by anyone involved in the planning and design of elements. Long term plans for walkways, roads and buildings must be considered when locating signage, benches or plant materials in proposed designs.
   a. Turf strips less than two feet between walkways, curbs or buildings will not be allowed.
b. Planting beds shall have large sweeping edges for ease of lawn mower cutting.
c. Place signs, lights and other permanently installed objects in mulch or planting beds when possible for ease of lawn maintenance. This will also protect these objects from mower and weed eater damage.
d. Select ground covers, shrubs and trees for natural size and habit for an area to avoid overgrowing and unnecessary pruning.
e. Do not plant low branching trees in turf areas.

B. Levels Of Landscape Management:
   a. Internal standards included to illustrate level of care required if contractor is responsible for maintaining a landscaped area on campus for the duration of a project:
      b. Level I:
         1) This designation is used for areas requiring the highest level of maintenance. Areas requiring this level of maintenance and landscaping will be limited to high visibility areas such as, but not limited to: Main entrance, North, East and West entrance, Belk Tower Quad, East Quad, West Quad, 49er Island, all Classroom buildings, Administration buildings, Residence Halls, Student Activity Center, Belk Gymnasium, Parking Decks, Belk Track & Field Pavilion and Wachovia Field House.
         2) Trees and shrubs planted at new and renovated landscaped sites are to be properly fertilized twice a year (March 1 and June 1) with a 12-6-6 slow release fertilizer with a urea form nitrogen source 50% WSH and 50% WIN such as “STA-Green” brand. If soil tests are conducted fertilizer schedules and mixtures may be amended.
         3) Plant material is to be pruned in late February and early June and treated with necessary pesticides to maintain plant material insect and disease free and plant beds free of all weeds/grasses.
         4) Plant beds and trees are mulched in spring (March - May) with approximately 3 inches of aged shredded pine bark. All plant beds will be maintained using a 4” depth “V” trench, border method edging to retain bark mulch neatly. Leaves are removed from beds in late fall.
         5) Newly installed ground covers and shrubs are to be watered via irrigation systems if available, or hand watered weekly during the first year growing season, which includes dry winter periods.
         6) Newly installed trees are to be watered via irrigation systems if available, or hand watered at least twice a week during dry periods the first year growing season, which includes winter.
   c. Level II:
      1) This designation is used for areas normally defined as “semi-improved grounds” which include existing trees and shrubs around parking lots, some campus lawn areas, parks, natural areas and walkways.
      2) The lawns and shrubs/trees are fertilized in March and June similar to plant material in Grounds Maintenance Level I.
      3) Shrubs are pruned in same manner referred to in G.M. Level I and trees are pruned periodically as required to remove dead/diseased trees and limbs and maintain sound structural/aesthetic integrity. Shrubs and trees are fertilized in the same manner referred to in G.M. Level I.
   d. Level III.
      1) This designation is used for areas normally defined as unimproved grounds. These areas will require only minimal levels of work that will include grass and weed control, perimeter fencing, immediate removal of dead trees, tree pruning, brush clearing and removal and other ground cover in low visibility areas or areas that impair safe sight distance for security or vehicular purposes.
C. Ground Cover Cutting: (e.g., lawn areas, grass/weeds/other vegetation). Ground cover areas shall be maintained in a manner that promotes proper health, growth, rich natural green color and neat appearance.

1. Lawn areas are to be free of broad leaf weeds, weedy grasses that present an unsightly appearance, dead vegetation, and debris.

2. All surface disruptions (e.g., rodent and insect mounds), are to be raked level and any resulting holes filled prior to mowing.

3. Grass cutting is to be accomplished in a manner such that it is free of scalping, rutting, bruising, and uneven or rough cutting. Grass clippings shall be either mulched or removed immediately after mowing. Where practical, each successive mowing shall be at approximate right angles to the previous mowing.

4. Prior to mowing, all refuse, debris, leaves, rocks, paper, and other portable objects shall be removed within the maintenance area lodged in shrubs, hedges, fences, and along foundation walls.

D. Plant and Shrub Pruning: For Grounds Maintenance Level I and II, all shrubs, bushes, hedges, and other cultivated plants shall be pruned according to their natural growth habit, for proper health, attractive appearance and to prevent interference with pedestrian and vehicle traffic. Pruning is to be done in a manner that:

1. Prevents growth in front of windows, over entrance ways and walks; prevents obstructing vision at street intersections; removes dead, damaged, or diseased wood, and naturally forms and balances the shrub, bush or plant.

2. With the exception of flowering plants, shrubs, and ornamentals, which shall be pruned to accommodate their flower cycle, pruning of the entire plant or shrub shall be performed not less than once per year to maintain their established shape and appearance.

3. Prune to maintain the plants natural habit except for formal hedges. Prune back to an outward facing bud.

4. Prune to prevent safety hazards, and to maintain pathways and walks.

5. All pruning shall be performed according to applicable N.C. Cooperative Extension standards.

SECTION 32 9320 – EXTERIOR PLANTS: TREE PLANTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

B. Description of Work:

1. Work Included in This Section: The work required under this Section consists of all preparation, planting and related items necessary to complete the work indicated as described in the Specifications, in addition to supplying all plants specified on plant list.

2. All planting shall be executed during the planting (October 15 thru April 15), unless exceptions are made in writing by the Engineer.

3. All plant species, sizes, forms, shapes, and locations will be subject to approval by the LA/GS.

C. Substitutions:

1. The species or varieties, materials, products or sizes specified herein by botanical and common name, shall be provided as specified. Only upon written application by the Contractor to the LA, and when such application is approved in writing by said LA in coordination with GS, will substitutions be permitted.

2. Request for permission to substitute will not be entertained unless adequate evidence substantiating the unavailability of the specified item accompanies the request for substitution.
3. If proof is submitted, substantiated in writing, that any plant specified is not obtainable, a proposal will be considered for use of the nearest available size or similar variety with a corresponding adjustment of the contract price.

PART 2 - PRODUCTS

2.1 TOPSOIL:

A. Topsoil shall be natural, fertile, agricultural topsoil, capable of sustaining vigorous plant growth. It shall be of uniform composition throughout, with admixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks, and other extraneous matter. Topsoil shall not be used while in a frozen or muddy condition.

B. Unless otherwise specified in the contract documents the topsoil shall contain the following specified percentages of constituents:
   1. CLAY – Minimum 10% - Maximum 30%
   2. SILT – Minimum 30% - Maximum 50%
   3. ORGANIC MATERIAL – Minimum 3% - Maximum 7.5%.
      a. Organic Material is defined as compost/humus such as sawdust or leaf mold that has completed the decomposition process. Percentage of organic matter shall be determined by loss on ignition, of moisture free samples dried at 65 degrees.
   4. PERMATILL or approved equivalent- Minimum 12.5%-Maximum 25%*
   5. SAND – Balance of mix.
   6. Topsoil shall have an acidity range of pH 5.5 to pH 7.0.

2.2 PLANTING MIX:

A. Planting mix may be developed by amending the existing soil or removing the existing soil and replacing with new planting mix. It shall be uniform composition throughout, with admixture of subsoil. It shall be free of stones, lumps, live plants and their roots, sticks, and other extraneous matter. Planting mix shall not be used while in a frozen or muddy condition.

B. Unless otherwise specified in the contract documents the planting mix shall contain the following specified percentages of constituents:
   1. CLAY – Minimum 10% - Maximum 20% clay
   2. SILT – Minimum 30% - Maximum 50%
   3. ORGANIC MATERIAL – Minimum 5% - Maximum 7.5%.
      a. Organic Material is defined as compost/humus such as sawdust or leaf mold that has completed the decomposition process. Percentage of organic matter shall be determined by loss on ignition, of moisture free samples dried at 65 degrees.
   4. PERMATILL or approved equivalent- Minimum 12.5%-Maximum 25%*
   5. SAND – Balance of mix.
   6. Planting mix shall have an acidity range of pH 5.5 to pH 7.0.
   7. *Unless specific for that contract
   8. ELEMENTS – The planting mix shall have the following nutrients at the specified percent base saturation, to be determined by soil test conducted by the University of NC at Charlotte.
      a. Calcium – 55% to 80%
      b. Magnesium – 10% to 30%
      c. Potassium – 5% to 8%
   9. A sample of the proposed planting mix shall be submitted to the LA/GS 30 calendar days prior to installation and be approved prior to delivery to site.

2.3 PLANT MATERIALS:

A. Plant Approval Process:
1. Representative samples of each plant type shall be submitted to the LA/GS for approval. This approval process will require 7 working days. Clear, high quality photographs may be accepted in lieu of actual samples at the discretion of the LA/GS.

2. No plants shall be delivered to the project site, except for required samples, until inspection has been made in the field or at the nursery, or unless specifically authorized in writing by the LA/GS. Inspection of plants to be balled and burlapped must be made, and plants must be approved by the LA/GS before they are planted. Inspection shall be for quality, size and variety only, and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the work.

3. Supply all plants as specified in plant list as shown on drainage. Plants shall be typical of their species and variety, have normal growth habits, have well-developed branches, be densely foliated, be vigorous, and have fibrous root systems. No plants will be accepted unless they show healthy growth and satisfactory foliage conditions. Size of plants, spread of roots and size of balls shall be in accordance with American Standard for Nursery Stock 260-1-1990 or latest revision, as published by the American Association of Nurserymen, Inc. All plants of each particular variety shall be uniform in size and configuration, and shall be labeled with correct plant name and size.

4. Balled and burlapped plants shall be nursery grown and freshly dug. Burlap shall be untreated and biodegradable. Nursery grown plants shall have been transplanted or root pruned at least once in the past three (3) years. No plants showing evidence of “made” root balls will be accepted.

B. Tree Root Ball Specifications:
1. Trees supplied must have been properly planted and grown in the nursery. The original root crown (also called the trunk flare) shall be evident near the top of the ground. Any excess soil, up to and including 3 inches covering the root crown will have to be removed carefully by hand, in order to prevent root scrapes. The tree is then to be planted with the root crown in the proper relation to the surrounding grade. Any trees with more than 3 inches of soil on top of the root crown will be rejected. The nursery owners may dig oversize balls and remove the soil in order for the root system diameter (which is the required root ball diameter) to meet the specification for the trunk caliper required. (see detail 40.09)

2. Ball and burlapped (B & B) plants must have firm, natural balls of earth, of diameter not less than recommended in the “Tree and Shrub Transplanting Manual”, and be of sufficient depth to include the fibrous and feeding roots. Plants moved with a ball will not be accepted if the ball is dry, cracked, or broken before or during planting operations.

3. Containerized plants shall have a root system sufficient enough in development to hold the soil intact when removed from the container. The root system shall not be root bound a condition where the root system is dense in mass, excessively intertwined, and has established a circular growth pattern.

4. New trees must have straight trunks with a single leader intact, unless multi-stem trees are specified. Bark shall be free of abrasions, and all cuts shall be completely callused over. Trees will not be accepted which have had their branches shortened, leaders cut or which have leaders damaged so that cutting is necessary. Unless otherwise specified, large maturing trees shall be free of branches up to six feet (6') from top of ball, well branched, and have straight stems.

5. Labels shall be attached securely to all plants, bundles and containers of plant materials delivered. Plant labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process lettering. These labels shall be removed by the Contractor after the final acceptance. Plants shall conform to measurements specified in the plant lists, except that plants larger than specified may be used if approved by the Engineer. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant in accordance with the American Standards of Nursery Stock.

C. Shipment and Delivery:
1. The Contractor shall promptly notify the LA/GS, at least three days in advance, when the approved plant material is to be delivered, the nursery source, and the manner of shipment.
2. The Contractor shall furnish therewith an itemized list of the actual species, variety, quantity and sizes. The Contractor shall deliver the necessary inspection certificates to accompany each plant or shipment prior to acceptance and planting.
3. When shipment is made by open truck, pack all plant materials to provide adequate protection against climate and breakage during transit, and tie to prevent whipping.
4. The tops shall be covered with tarpaulin to minimize wind-whipping and drying.
5. Exercise care at all times during handling operations to prevent damage to bark, branches, and root system. Employ a suitable method of handling to insure the careful, workmanlike delivery of heavy balled plants to preclude loose or crushed plant balls. All balled and burlap plants shall have wire baskets.
6. Plants shall be free from defects and injuries, and shall be certified by the State and Federal Departments of Agriculture to be free from plant diseases and insect infestations.

D. Fertilizer for Trees:
1. No fertilizer is to be applied at time of planting.
2. The tree fertilizer is to be applied at the 6 month or 12 month warranty inspection time; whichever is closer to early spring beginning of growth.
3. The fertilizer shall be one from the following listed below or equal fertilizer approved by the Engineer.
4. The fertilizer shall have 50% water insoluble nitrogen. The chlorine content is not to exceed 5%.
   a. Trees
      1) Application shall be at a rate .16 lb. minimum to .20 lb. maximum nitrogen/inch caliper of tree. Source of nitrogen shall be Urea Formaldehyde or a similar slow release source approved by the Engineer. In addition to the nitrogen, the following shall be used, .05 lb. phosphorous and .05 lb. of pot ash per inch caliper.
      2) EXAMPLE OF TREE FERTILIZATION: 1 cup of 31-7-7 analysis fertilizer or 2 cups of 12-6-6-analysis fertilizer per inch caliper.

E. Mycorrhizal Fungi: All trees will be treated/inoculated at the root zone with mycorrhizal fungi for root growth stimulation using either ecto and/or endo mycorrhizal fungi: dependent on the particular tree species as approved by the GS, who may appoint a representative to oversee the inoculation of these rootballs.

F. Mulch (Trees): Mulch shall consist of pine chips and bark or hardwood bark as specified on the plans. Pine bark chips shall be 1/8-inch nominal thickness with at least 50 percent having an area of not less than 1 square inch and no piece having an area of more than 6 square inches. All mulches shall be free of any foreign materials, pieces larger than 6 inches, and/or green wood.

G. Water: Water shall be free from oil, acids, alkalis, salts or any other substance that is toxic or otherwise harmful to vegetation.

PART 3 - EXECUTION

3.1 PLANTING PREPARATION

A. Plant Protection on Site: Protect plants at all times from sun or drying winds. Plants that cannot be planted immediately on delivery shall be kept in the shade, well protected with soil, wet wood chips, or other acceptable material and shall be kept well watered.
1. Plants remaining unplanted for longer than 3 days after delivery may be deemed unacceptable after inspection by Engineer. Plants shall not be found with wire or rope at any time so as to damage the bark or break branches. Plants shall be lifted and handled using suitable support of the ball to avoid damage to the root ball; trunk, or branches.
2. Before excavations are made, cover the surrounding turf, if existing, in a manner that will satisfactorily protect all turfed areas that are to be driven over, and upon which soil is to be temporarily stacked pending its removal or reuse. Barricade existing trees, shrubbery and beds that are to be preserved in a manner that will effectively protect them during planting operations or as specified on the plans.

B. Subsurface Improvements: Observe proper precautions so as not to disturb or damage subsurface improvements.

1. Prior to excavations, Contractor shall notify North Carolina One-Call Center, Inc. at 1-800-632-4949 to ascertain locations of electrical cables, conduits, utility lines, oil tanks, supply lines, subsurface drainage, and irrigation lines, etc. Notify the PC should the above-mentioned subsurface improvements present an obstruction in locations designated for planting. In such situations, proceed after an alternate location has been approved by the PC. Damages incurred by the Contractor shall be the responsibility of the Contractor to repair in a timely manner (not to exceed 48 hours) to the satisfaction of the Owner.

3.2 PLANTING PROCEDURE

A. Locations of Plants: The Contractor shall stake out or paint locations for plants and outlines of areas to be planted, and obtain approval of the LA/GS before excavation is begun. A minimum of 30% total planting must be staked before inspection will be made.

B. Excavation: No excavation or planting shall be done in soil that, in the opinion of the LA/GS is too wet, too dry or not properly conditioned as provided in these specifications. All excavations shall be in accordance with Typical Planting Detail Sheets included in the Landscape Construction Standards Manual or as otherwise specified. Tree pits shall not be excavated more than 24 hours prior to tree installation. Holes left open after working hours shall be completely barricaded and clearly marked by the Contractor. During working hours the LA/GS may designate holes to be barricaded if holes are determined to present a pedestrian hazard.

C. Detrimental Soil Conditions: The Contractor shall notify the PC in writing of all soil and drainage conditions which the Contractor considers detrimental to growth of plant material. State condition and submit proposal in writing to the PC for correcting condition.

D. Obstructions: If rock, underground construction work, tree roots, or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Engineer. Where locations cannot be changed as determined by the Engineer, remove the obstructions to a depth of not less than 6 inches below the required pit depth. Proceed with work after approval of the Engineer.

E. Tree Installation:

1. Planting Beds: The extent of the planting bed shall be as indicated on the construction plans. The planting bed for shrubs, groundcover plants, and trees shall be prepared wide enough to accommodate all roots without crowding or twisting.
   a. Planting beds shall be prepared in accordance with Section 02000, Type 1 or Type 2 in accordance with the plans or specification.

2. Backfilling of Balled and Burlapped Plants:
   a. Backfilling shall be done in accordance with the following steps;
      1) Set rootball 2” (no more) above adjacent grade-see detail 40.01
      2) When partially backfilled and compacted, cut away the ball ties and cut and remove any wire loops that may protrude above the surface of the soil at any time. Cut and remove all wires, rope, burlap, or other ball wrapping materials from the top 1/3 of the root ball. Cut or adjust to prevent the formation of air pockets. No burlap shall be pulled from under the balls.*
      3) Backfill one-half (2) of remaining hole with planting mixture specified, and water thoroughly.
4) Backfill rest of hole with planting mixture. Firm down, eliminating all air pockets. Do not pack.

5) Build a four-inch (4") high berm around the edge of the root ball to form a basin for holding water. The bottom of the basin shall be at surrounding grade.

3. Watering: Containerized plants shall be watered thoroughly prior to planting so as to provide adequate moisture to the plant during the planting process.
   a. The Contractor shall thoroughly water all plants immediately after planting. This shall mean full and thorough saturation of all backfill in the pits and beds during the same day of planting. Apply water only by open-end hose at a very low pressure to avoid air pockets and injury to the roots. When planted, watered, and fully settled, the plants shall be vertical and the top of the root ball shall not be below the existing grade.
   b. Fill basin with water, being careful not to break down berm with the hose stream, wash away any mulch, or to gouge out holes in the backfill.

F. Pruning: No pruning is to be done except to remove broken branches, street/sidewalk obstructions, and for correcting irregularities including removal of soft wood or sucker growth and/or broken or badly bruised branches. This pruning shall be done at the direction of the Arborist/Horticulturist. Prune with sharp tools; make cuts even and clean.

G. Wrapping: There is to be no wrapping of the tree trunk. Any wrapping from the nursery to protect the trees in transit shall be left on the trunk until it is planted, and then all tree wrapping must be removed.
   1. Brown or gray plastic tree trunk protectors shall be installed on all single trees in turf areas as directed by the GS. Do not lock the ends together.

   *Mycorrhizal fungi shall be placed in the root zone between the rootball and the backfill.

H. Staking: There is to be no staking until examination by the LA/GS 2-3 weeks after planting, and then stake only the trees, which they specify. Staking, using as many stakes as necessary, will only be used to straighten a leaning tree. Use only ¾ inch green nylon strap with a slip knot and a stop knot 3-6 inches larger than the tree trunk to allow for growth. No cord, rope, wire, or hose will be allowed. Dig the root ball loose only if necessary. Do not stomp the root ball to straighten the tree.
   1. If oversize planting pits are specified and the soil is loosened to 18 inches, use stakes long enough, up to 36 inches, to achieve a solid anchor. Drive the stakes in line with the strap, with the stake point directed away from the tree. In place of wood stakes, use #40 duck bill anchors for trees 2.50 inches in caliper and under. Use #68 duck bill anchors for trees larger than 2.50 inches in caliper. Set the anchors well before strapping to the tree. If trees begin to lean, within three weeks after staking is completed, turnbuckles will be required at the expense of the contractor.
   2. Where required, wrap or cover straps with fluorescent flagging.

I. Mulching Application: Within two (2) days after planting, mulch all planting areas, individual tree pits, and entire shrub and groundcover beds with a four inch (4") layer of mulching material. Taper mulch to ground level at the trunk. Do not allow mulch to pile up against the trunk.

J. Name Tag Removal: The contractor shall not remove name tags attached to installed plants prior to final inspection. The contractor shall remove all name tags from installed plants within 2 weeks after final inspection.

3.3 RELOCATION OF TREES:

A. Scope: Provide materials, equipment, and labor to relocate trees from areas to be cleared on site.

B. Execution: Trees to be relocated shall be as shown on the drawings and specified herein. Trees are to be relocated in areas staked by the LA/GS.
1. Trees shall be removed with a root ball sized in proportion to their calipers. Root balls shall be 12” in diameter for each 1” of tree caliper. Trees 4” in caliper and smaller are to be measured 6” from the ground. Trees 4”-8” calipers are measured 12” from the ground, trees 8” caliper or larger are measured from breast height.

2. Trees which are to be relocated in areas which do not require grading are to be placed directly into their new location and installed in accordance with the installation specifications contained herein.

3. Trees transplanted off site in full leaf shall be covered entirely with a protective cloth covering prior to transporting. Trees transplanted on site do not require the covering.

4. Trees which are to be relocated in areas to be graded are to be stockpiled in an area or areas identified by the PC/GS. Stockpiled trees shall be well heeled in and protected from excessive wind and sun. Stockpiled trees shall be installed in their final position according to other provisions of Planting Preparation or Planting Procedure: The Contractor shall provide water to maintain a healthy condition.

5. All transplanted trees shall be maintained and guaranteed throughout the project and until final acceptance. Replacement trees shall be provided by the Contractor at no additional cost to the City and shall be of the same caliper, species, and form. Exceptions for replacement stock from the site may be made by the LA/GS.

C. Abandoned Plant Pits: When utility lines or other unsuitable subsurface conditions are encountered in plant pits, the LA/GS will direct that plants be relocated in satisfactory locations. The Contractor shall backfill-abandoned pits with suitable topsoil to compacted finished grade.

1. Unsuitable material shall be removed from property by Contractor. These areas shall be reseeded as specified with the turf and lawn specifications contained herein.

3.4 MAINTENANCE / ESTABLISHMENT OF PLANT MATERIALS:
A. Prior to Acceptance:

The Contractor shall be responsible for all maintenance of plants and facilities until final acceptance. This includes all necessary watering, application of appropriate fertilizer, based on planting season, and the appropriate application of fungicides and insecticides necessary to maintain plants free from disease and insect activity.

B. Watering After Acceptance:
1. In order to properly establish the plant material, watering of plant material shall be the responsibility of the Contractor until the expiration of the one-year warranty period. The Contractor shall perform watering operations only at intervals approved by the GS and shall notify the GS at least 24 hours prior to commencing watering operations so that a representative of the GS may be on hand. The GS reserves the right to direct the schedule of watering operations. When so directed by the GS, the Contractor shall commence watering operations within 24 hours.

2. Watering shall be applied at a rate specified by the GS or in accordance with the contract documents. The Contractor shall be responsible for all necessary traffic during watering operations.

3. The quantity of water to be paid for will be the actual number of 1,000 gallon units of water which have been furnished and applied to plants during the establishment period. Measurement of water will be made by means of an approved metering device at the source of supply, or by determining the volumetric capacity of tank trucks used to deliver water to the project and recording the number of loads delivered by each truck.

4. The quantity of water, measured as provided above will be paid for at the contract unit price per 1,000 gallons for “Watering after Acceptance”.

5. All trees shall be watered to the following specifications after installation, as part of routine maintenance and Watering after Acceptance.
6. Trees shall be watered as described by the following ratios:

<table>
<thead>
<tr>
<th>CALIPER</th>
<th>GALLONS OF WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 1&quot;</td>
<td>5</td>
</tr>
<tr>
<td>1 - 1½&quot;</td>
<td>5 - 10</td>
</tr>
<tr>
<td>2”</td>
<td>10 - 15</td>
</tr>
<tr>
<td>2 - 2 ½&quot;</td>
<td>15 - 20</td>
</tr>
<tr>
<td>3 – 3 ½&quot;</td>
<td>25-30</td>
</tr>
<tr>
<td>3 ½&quot; +</td>
<td>Shall be monitored and receive water in an amount and frequency to maintain soil mixture.</td>
</tr>
</tbody>
</table>

7. Execution: Watering is to be done a minimum of once per week. The beginning shall be approximately April 15 and continue until November 1, unless otherwise directed by the LA/GS. A set weekly schedule is to be established and maintained by the contractor, and adequate notice given of any change. The LA/GS will notify the contractor to omit watering when he determines there has been adequate rainfall the previous week. The contractor shall notify the LA/GS of the completion of each watering cycle.

3.5 CLEANUP:
   A. During the installation, the Contractor will be required to keep all areas clean.
   B. At the time of final inspection of work and before issuance of the final payment, the Contractor shall clean paved areas thoroughly by sweeping and/or washing. Any defacements or stains caused by the work of this Section shall be removed.
   C. The Contractor shall remove construction equipment, excess materials, tools, and all debris and rubbish from the site. All dirt and debris shall be legally disposed of by the Contractor in areas approved by the PC/GS.

3.6 FINAL ACCEPTANCE:
   A. Upon completion of all planting operations, including cleanup, the Contractor shall notify the PC/LA/GS and accompany him or her on inspection of planting. Any items found to be unsatisfactory shall be corrected prior to approval for final acceptance. The one-year guarantee period shall begin on the date of final acceptance.
   B. At the end of the one-year guarantee period, and upon written notice submitted by the Contractor at least ten days before the anticipated date, an inspection will be made by the PC/LA/GS and the Contractor. At this one-year inspection, the Contractor shall remove all tree guys, guy collars, and guy stakes from all guyed plants. Guys and staking may also be removed at any time after the 6-month warranty check, after approval by the GS.
   C. Name Tag Removal: The contractor shall not remove name tags attached to installed plants prior to final inspection. The contractor shall remove all name tags from installed plants within 2 weeks after final inspection.

3.7 GUARANTEE AND REPLACEMENT:
   A. The Contractor shall guarantee all trees and all other materials and workmanship for a period of twelve (12) months from the date of final acceptance by the PC/LA/GS. The Contractor shall replace any plants that have more than one third die-back, or dead central leader if single stem tree, or any other portion of the project that fails due to faulty materials or workmanship. All plants shall be insect and/or disease free. Plants damaged by pathogen activity through the warranty period shall be replaced. A six (6) month and eleven (11) month inspection will be
held during the warranty period. Damage prior to final acceptance shall be the responsibility of
the Contractor.

B. Plant replacements shall be the same species as specified in the plant list. Replacement plant
sizes shall be the same as other existing plants of the same species on the project. Plants, plant
soil mix, fertilizer and mulch etc., shall be replaced as originally specified.

C. Any plant that is dead or not in satisfactory growth, as determined by the LA/GS, shall be
removed from the site. These and any plants missing shall be replaced as soon as conditions
permit, but during the normal planting season. If plant(s), dispose of it (them), and charge the
contractor for the cost of removal and disposal.

D. Plants and items repaired or replaced shall have an extended warranty period of twelve (12)
months from the date of acceptance of the repaired item.

SECTION 0600 – MISCELLANEOUS – PARK BENCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:
The General Provisions of the Contract, including General and Supplementary Conditions and
General Requirements, apply to the work specified in this Section.

1.2 DESCRIPTION OF WORK:
The work in this section is the furnishing and installation of specially selected pieces of
equipment.

1.3 SUBSTITUTIONS:
The Contractor shall bear the burden of proof for substitutions offered.

1.4 SUBMITTALS:
Contractor shall submit for approval three (3) sets of shop drawings, fully describing product
and installation for all equipment. Prior to ordering any equipment, Contractor shall receive
approval of shop drawings and any substitutions submitted.

PART 2 - PRODUCTS

2.1 PARK BENCHES:

A. Regular and handicap benches shall be as shown on the standard detail.

B. Regular bench available from:
   1. Iron Mountain Forge #338-6GU
   2. Gametime #3P-285
   3. J.E. Burke P – 26 – 1
   4. Playworld Systems #00-6
   5. Miracle #1236 (treated wood only)
   6. OR AN APPROVED EQUAL

C. Handicap benches may be constructed by fabricating arms to fit regular benches. All seat and
back boards are to be #1 southern yellow pine treated with chromated copper arsenate at a rate
of 0.25 lbs. per cubic foot, left unpainted. All seat boards shall be turned cupped side down to
prevent water retention
PART 3 - EXECUTION

3.1 INSTALLATION:

Manufacturer’s installation instructions, as approved by the Engineer and details in these documents shall be ordinated to complete the installation of the specified equipment.
SECTION 2
DIVISION 33
UTILITIES
DIVISION 33 - UTILITIES

Note: This is a guide for Designers only. Contents shall not be used in lieu of specifications as part of the Designer’s contract documents.

PRIMARY GUIDANCE

1.1 SUBSURFACE EXPLORATION:
   A. Designer Responsibilities:
      Designer shall direct a soils exploration program (see N.C. Construction Manual, Section 204.1.c) as judged necessary in consultation with the University. The Designer shall contact the UPM and submit a Request for Proposals for soils exploration. UPM will provide names of pre-qualified testing companies. This will include investigative work and surveyor reports, laboratory tests (incl. test borings), soil analysis (incl. load bearing capabilities), and related site analysis. The designer shall study plans of existing underground utilities and shall locate borings to avoid these utilities. Bored holes are to be backfilled, finish graded, and seeded. Submit six copies of the site exploration report to the University.

   B. Information To Be Included In Contract Documents:
      Show all boring locations, cross sections, and soil conditions. Also, show all existing conduits, drains, utility lines, sewers, tunnels, cables, trees, paving, walks, foundations, and other objects or obstructions, whether used or abandoned. Facilities Management will assist with identifying existing conditions and will provide drawings as available. Clearly indicate the project boundary.

SECTION 33 0500 – UTILITIES

PART 1 - GENERAL

1.1 QUALITY ASSURANCE
   A. Coordination of Divisions of Work: Care is required in preparation of documents to assure no overlapping and no gaps between the work for the various contracts. Each contractor shall be required to perform excavation, trenching, and backfill for his installations. Materials and compaction of fill materials shall meet the requirements stipulated in Division 31, regardless of who performs this work; therefore, in Divisions 23, 24, 25, and 26 the requirements of earthwork may be best specified by making reference to Division 31.

   B. Surveyor to review and coordinate survey to assure that the survey shows all utilities.

PART 2 - PRODUCTS

2.1 MANHOLES
   Manhole frame, cover, and grate castings shall include the name and location of the manufacturer. Covers shall have cast identification markings of “storm drain”, sanitary, “steam”, “electrical”, “telephone” etc. as appropriate. Masonry manholes shall be parge coated inside and out. Manholes are considered confined spaces and appropriate safety measures should be taken when entering them.
2.2 VALVES
A. All valves are required to have a valve lockout device (need donut for protection).
B. All valve covers shall have concrete collars.
C. All water valves to operate by turning the square nut clock-wise (right) to close and counter-clockwise (left) to open.
D. Provide all valves with extensions when grade at location is altered.

SECTION 33 1150 – UTILITIES

PART 1 - GENERAL

1.1 UTILITY STANDARDS
A. All underground piping and utilities (both metallic and non-metallic), except copper pipe, shall have a separate copper tracer wire and non-metallic warning tape installed above the utility line.
B. The tracer wire shall be tested for continuity prior to backfill, immediately upon completion of backfill and compaction, and once again during final utility location/as-built at the end of the project. This also will include landscape irrigation mains to the points of the valves. All above ground utility features such as vaults, manholes, valves, handholds, etc shall be properly labeled. Contractor shall provide an inventory of all installed outdoor utility features including type and model.

1.2 IDENTIFICATION TAPE
The 1st stage of identification shall be a buried warning tape. This tape shall provide an early warning at shallow depth excavation. The tape shall be 6" wide, and buried approximately 18" to 30" above the service pipe, but a minimum of 10" below finished grade. It shall consist of multiple layers of polyethylene with an overall thickness of 3 to 5 mils. It shall be installed continuous from valve box to valve box or manhole to manhole, and shall terminate just outside of valve box or manhole wall. The black colored lettering on the warning tape shall be abrasion resistant and be imprinted on a color-coded background that conforms to APWA color code standards. The lettering on the tape should name the utility it is protecting. (i.e. Caution Buried Sewer Line Below).

1.3 TRACER WIRE
A. The 2nd stage of identification shall be a buried tracer wire. This tracer wire shall provide pipeline identification, be fully detectable from above grade utility locators, and be able to provide a depth reference point to top of pipe.
B. All pipe, including lawn irrigation lines, and metallic pipe with compression gasket fittings installed underground shall have a tracer wire installed along the length of the pipe. The wire shall be taped to the bottom of the pipe at a maximum of 10' intervals and not allowed to "float freely" within the backfill.
C. Tracer wire shall be single-conductor, 12 gauge minimum, copper single-conductor wire with type "UF" (Underground Feeder) insulation, and shall be continuous along the pipeline passing through the inside of each valve box. A #12 AWG or heavier (smaller AWG number), solid, insulated (RHW, THW, or polyethylene insulation is recommended), copper wire shall be taped to pipe at 10 foot intervals. Do not wrap wire around pipe. The wire must be one continuous, unbroken length. Coil tracer wire at meter location and street end with enough wire to extend a minimum of two feet above grade.
1.4 TRACER WIRE BOXES

Plastic gas and water services longer than 1000 feet in length from curb valve to meter riser must have tracer wire boxes installed in accordance with UNC Charlotte standards.

1.5 FINAL AS-BUILT SURVEY

A. The As-Built Survey is a survey conducted several times during a construction project to verify, for the designer/project manager (not the contractor), which work was authorized, was completed to the specifications set on the Plot Plan or Site Plan. This entails a complete survey of the site to confirm that the structures, utilities, and roadways proposed were built in the proper locations authorized in the Plot Plan or Site Plan. As-builts are done a minimum of 2-3 times during the construction project; once after the foundation has been poured; once after the walls are put up; and at the completion of construction.

B. Prior to project punch-list the engineer shall have the As-Built survey finalized by a licensed surveyor and locating company. Any problems found in the survey should be included in the punch-list. The final As-Built survey shall locate and inventory all utilities and also survey the existing conditions. The survey of the site shall also include 1’ contours, manhole elevations, inverts, building footprint, and all aspects of the site.

C. The surveyor will identify any untraceable utilities and relay missing information to designer/project manager in order to coordinate repairs with contractor. Surveyor shall relocate and resurvey missing data after repair. Survey will extend a minimum of 50’ past site construction to tie data into existing campus utility plans. Digital (CAD) and stamped survey (1 PDF and 1 Mylar) to be delivered to UNC Charlotte within 20 business days of punch list acceptance.

SECTION 33 4100 – STORM DRAINAGE

PART 1 - GENERAL

A. SUMMARY

1. Drainage systems are to be designed with minimal visual impact.

2. Surface Drainage
   a. Surface drainage shall be designed to flow away from all buildings and entrance plazas. Drainage shall sheet flow away from the building and be collected in grass swales and drain to natural drainage-ways or drainage inlets.
   b. Lawns and mulch areas are encouraged when possible around new building areas to increase natural percolation and decrease impervious run-off.
   c. Surface drainage shall be directed away from planting areas when possible. Subsurface drainage may be required in new planting areas with poor soils.

3. Natural Drainage
   a. Natural drainage-ways shall be utilized and maintained where ever possible. The vegetative area 50 feet from each side the centerline of the swale or stream shall be maintained whenever possible to provide for greater natural percolation and pollutant filtering. When a natural drainage course is required to be diverted due to site improvements the following shall be considered,
   b. The vegetative area adjacent to the new drainage course shall be re-planted to its original condition or improved with lawn and/or tree plantings.
   c. If sub-surface drainage is required within lawn or landscape areas the outfall shall be to the nearest downstream existing drainage structure or into a natural drainage-way such as a creek.

B. Sub-surface Drainage: Sub surface drainage shall be incorporated into the site improvement design to ensure that surface runoff is removed as quickly as possible. Ponding of water is not
acceptable. Oversized grates can reduce the visual quality of the campus and are to be avoided.

1. The size of inlet shall be designed according to the drainage area. The minimum size grate acceptable shall be 8 inches square. Drainage grates in lawn areas within 25 feet of a walkway shall be designed to have a 2.0 percent slope from the edge of the walk to the storm drainage rim.

2. Drainage grates within brick walks and plazas shall comply with the campus standard. Alternative types of drainage grates must be submitted to the Facilities Landscape Architect for approval. The number of grates shall be determined by grading and storm drainage design.

3. New sub-surface drainage shall tie into existing storm drainage systems where possible following acceptable engineering practices. Flared end sections and headwalls should be avoided.

4. Bee-Hive type drainage grates shall be used in mulched planting areas.

5. In gathering areas such as plazas or quads small grates are preferred rather than large grates in order to reduce a negative visual impact.

1.2 QUALITY ASSURANCE

Erosion Control measures for new construction shall follow the North Carolina Department of Natural Resources Sedimentation and Erosion Control Manual.

PART 2 - PRODUCTS

2.1 FLARED END SECTIONS

1. If the new storm drain system cannot be tied into an existing drainage structure Flared End Sections shall be installed with the following criteria,
   a. Outlet into natural drainage ways such as grassed swales or creeks.
   b. At locations that are in remote areas away from heavy pedestrian or vehicle use.
   c. The designer shall discuss with the Facilities Landscape Architect conditions that shall not allow the new storm drainage to be tied into an existing system and potentials for screening by grading or planting.
   d. The use of riprap is to be avoided. The following are preferred methods to prevent erosion at Flared End Sections,
      1) Naturally weathered stone equal to NCDOT classified riprap.
      2) Vegetation with appropriate erosion control matting.
      3) The combination of 1 and 2 above.

2.2 HEADWALLS

A. The appearance of exposed concrete headwalls in highly traveled areas can lessen the aesthetic value of the campus. Therefore the location and treatment of headwalls are to be considered carefully.
   1. Headwalls shall use brick or stone veneer and be determined on a case by case basis.
   2. Slope and creek bed stabilization methods other than riprap should be considered in conjunction with veneered headwalls. (See DLS 404:P1)

2.3 DRAIN OPENING PROTECTION

A. Install removable bars or grills at open end of culverts, drains, and pipes 10 inch diameter and larger.

B. In stairwells, areaways and similar locations where leaf clogging of conventional drains would be expected provide scupper or dome type drains.
SECTION 3:

APPENDICES AND ANNEXES
APPENDIX B

DESIGNING DISABILITY-FRIENDLY SPACES
DESIGNING DISABILITY-FRIENDLY SPACES

GUIDELINES FOR DESIGNING DISABILITY-FRIENDLY SPACES FOR UNC CHARLOTTE

1.1 OVERVIEW

A. These guidelines are intended to help architects, engineers, and project managers to design disability-friendly spaces in order to ensure that UNC Charlotte is an accessible environment. Often the industry standards for Americans with Disability Act compliance are thought of abstractly rather than as a means to remove barriers and foster inclusiveness for individuals with disabilities.

B. Designing disability-friendly, inviting spaces requires thinking of functional accessibility and equitable use of space for all of the faculty, staff, students, and visitors with and without disabilities that will utilize the campus. In other words, planning that considers the needs of faculty, staff, student and visitor who may have low vision, blindness, a temporary or permanent mobility impairment, hearing loss, chronic medical disorder, age related limitations, or several of these concerns.

C. This perspective is embodied in the concept of universal design. Universal design requires planning access to all facilities and spaces for the broadest spectrum of individual abilities. Universal design advocates at NC State developed a clear set of principles in 1997 that are identified in Appendix A.

D. The UNC Tomorrow initiative (http://www.northcarolina.edu/nctomorrow/index.htm), spearheaded by the University of North Carolina system, highlights the importance of access to education for a broader, more diverse, currently underserved, group of constituents. Planning of buildings and pathways with broad universal access for all constituents requires consideration of the variety of ways in which any of these individuals will use classroom or campus space.

E. Utilizing a universal design perspective (design that provides access to all) when pre-planning campus buildings and pathways adds little cost in the planning stage, but saves countless dollars of expensive retro-fitting later.

1.1 ACCESS TO BUILDINGS

A. It is important to plan access to buildings for all of the ways in which individuals will arrive at the door. Although UNC Charlotte buildings are required to comply with the North Carolina Building Code, minimum compliance, for example with a specific number of accessible entrances, does not necessarily provide adequate access for each building and location of entry/exit.

B. Provide accessible entrances to nearby buildings, facilities, and special features to ensure equitable use for all constituents. Intentional planning for the greatest accessibility better serves the University and the community in the long run.

C. Designing disability-friendly access to buildings involves:
   1. Multiple, direct, accessible pathways to nearby (especially adjacent) buildings;
2. Accessible parking within 200 feet on a direct accessible pathway to an accessible entrance (North Carolina Building Code);
3. Accessible pathways to transport modes from multiple building entrances; transport modes include accessible parking areas, shuttle stops, and bicycle/walking paths from other areas of campus;
4. Direct accessible paths to nearby specialty areas, such as outdoor picnic seating or cafeteria.
5. Accessible paths to buildings with necessary curb cuts at the base of the ramp to ensure the shortest, most direct, accessible pathway to the accessible building door.

1.2 PATHWAYS
A. The hilly topography of the UNC Charlotte campus can be difficult to mediate and creates significant challenges for people with mobility disabilities. Many individuals with mobility or physical disabilities use electric wheelchairs, Segways, scooters, and a variety of alternative methods for moving around campus. A slope can be navigated by wheeled transport; however, steps present a barrier.

B. Individuals with low vision have difficulty with stairs, but can easily navigate a slope. Accessible pathways benefit the whole campus body since many individuals read text messages, roll equipment from or to classrooms, check PDAs, and ride bicycles while traversing the campus.

C. Designing disability-friendly pathways requires:
   1. Accessible common campus pathways, whenever possible;
   2. Parallel accessible pathways when separate pathways are necessary;
   3. Sloped, rather than stepped common campus pathways;
   4. Pathways that provide excellent sight lines in all directions;
   5. Smooth, wide, level pathways.

1.3 BUILDING FEATURES
A. Accessible Entrances
   1. Building safety and accessibility features should be together in the same accessible location, but spaced sufficiently apart to avoid interfering with other accessible features.
   2. An accessible location is generally a flat, broad surface that is free from low overhangs, chair-height molding and is at least 24 inches from an inside corner or the arc of an opening door.
   3. Activators or devices that are placed near an inside corner, under large molding, or close to decorative hardware are usually inaccessible to wheelchair users because the individuals are unable to get close enough to activate the device. Trash barrels and other types of equipment are best located away from accessible entrances to ensure that they do not block access.
   4. Place devices at an accessible level (34-36 inches from the finished floor) without crowding or obstructing the activation of other devices (approximately 6-8 inches from other devices).
   5. For example, a doorway that has a card swipe on the left side with an actuator on the right side is not functional. Likewise, a blue light safety device that protrudes 6 inches from the wall, placed within 2 inches of the automatic door actuator prohibits individuals from accessing the actuator.
   6. Designing disability-friendly accessible entrances includes:
      a. Cluster accessible features in the one area at an 34-36 inches from finished floor;
      b. Avoid placing any accessible feature within 24 inches of an inside corner;
      c. Space accessible features at least 6-8 inches apart from other features;
d. Avoid placing devices beneath thick, overhanging building trim.

B. Interior Features
1. Interior building features, such as elevators, elevator buttons, and water fountains, need similar consideration as exterior entrance features.
2. It is important to avoid placing elevator buttons near the inside corners of a wall or within 24 inches of another feature, such as a water fountain, as this blocks access to both features. Locate utilities, such as trash and recycle bins away from accessibility features as they can interfere with the use or activation of these features.
3. Elevator call buttons outside and inside of the elevator should be located at 34-36 inches from the finished floor. Individuals with limited use of their arms may be unable to access all levels of a building when the buttons are placed at higher levels.
4. Designing disability-friendly interior features requires:
   a. Avoid crowding features such as water fountains and elevators close together;
   b. Place all elevator buttons at 34-36 inches from the finished floor and unobstructed by trim;
   c. Avoid placing accessible or general use features within 24 inches of an interior corner.

C. Interior Signage
1. Signage within buildings should be large, high contrast, and consistently placed. Emergency and directional signage should be placed at an accessible height and should be unobstructed by ancillary signage. Areas of rescue assistance should be clearly marked on floors without direct egress.
2. Designing disability-friendly signage includes:
   a. Directional signage within buildings should be at an accessible height determined by the ADA Accessibility Guidelines, clearly marking accessible egress paths. (This is particularly important in large, complex buildings where accessible egress may be limited in one or more areas of the building.)
   b. Areas of rescue assistance shall be clearly marked so that visitors in the building can easily determine their best route in an emergency and to inform both those disabled individuals who need assistance as well as their rescuers where to locate them during an emergency.

D. Classrooms, Laboratories and Internal Spaces
1. Ensure that classrooms and internal activity/gathering spaces are accessible for faculty, staff, student and visitors to the maximum extent possible. When including separate tiered space use ramps to provide inclusive access.
2. Fixed classroom desks should meet ADA standards for height and leg space to maximize utilization (height: top 28 inches from finished floor with 27 inches of knee room).
3. Any teaching classroom containing lab tables should each have at least one ADA adjustable table that is in a visually unobstructed location near the front of the classroom.
4. Provide access to multiple levels in large tiered lecture halls to ensure accessibility compliance.
5. Podiums and smart classrooms features shall be located at least 36 inches from the wall and should be fully accessible for faculty or guests with disabilities.
6. Avoid building classrooms with one accessible level or fixed desk as this does not provide adequate access when there are two students with wheelchairs and or a faculty member who is a wheelchair user.
7. Designing disability-friendly classrooms includes:
   a. Provide access to multiple levels in tiered classrooms (lowest and highest points in the room);
   b. Include wheelchair accessible seating in multiple locations;
   c. Avoid tiers within classrooms when possible;
d. Provide wheelchair accessible lab tables, lab sinks, podiums, electrical & gas connections, and access to all other necessary equipment in each classroom or research laboratory;

e. Design classroom aisles with a turn space for wheelchairs.

E. Food Service Areas/Staff Kitchens
1. Include accessible features in departmental kitchens and accessible residential units. Avoid blocking accessible features with cabinets or other interior fixtures.
2. Designing disability-friendly kitchen areas includes:
   a. Ensure that there is wheelchair access to kitchen countertop, sink, and microwave, using ADA Accessibility Guidelines to determine this.
   b. Kitchen areas should be inviting for individuals who have disabilities.

F. Restrooms
1. Typical multiple-user restrooms are often inaccessible because of heavy entrance doors and venting systems. Family restrooms provide a fully accessible restroom for individuals who need the assistance of an attendant.
2. Designing disability-friendly restroom facilities includes:
   a. Provide at least one accessible, family-friendly restroom on an egress level of newly designed buildings; (The door shall swing freely, rather than have spring or hydraulic closer.)
   b. Place towel dispensers on the wall away from the sink to allow wheelchair access;
   c. Avoid corner entrances to restrooms that are difficult for wheelchair users to maneuver.

1.4 SUMMARY LISTING OF ACCESS GUIDELINES:

A. Accessible and common use features, e.g., automatic door activator, card swipe, elevator buttons, shall be placed at 34-36 inches from the finished floor

B. Do not place accessible or common use building features within 24 inches of an interior corner

C. Accessible features shall be 6-8 inches from any other accessible or common use feature

D. Accessible and common use features shall not be obstructed by trim or other building features

E. Lab classrooms that require a sink shall have at least one sink that is fully accessible

F. Lab classrooms with fixed tables should have at least one adjustable table, placed in a visually unobstructed location near the front of the classroom

G. Adjustable lab tables will be placed in an accessible area of the classroom (with an area sufficient for turning)

H. When feasible, provide one unisex restroom in a building preferably on an egress level floor

I. Provide ADA access to large tiered classrooms at multiple levels

J. Use ramps to provide access for tiered feature or gathering areas

K. Ensure good line of sight for campus pathways

L. Provide multiple means of access to adjacent buildings, specialty features and transport modes

PRINCIPLES OF UNIVERSAL DESIGN

1.5 EQUITABLE USE:
The design does not disadvantage or stigmatize any group of users.
1.6 FLEXIBILITY IN USE:
The design accommodates a wide range of individual preferences and abilities.

1.7 SIMPLE, INTUITIVE USE:
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

1.8 PERCEPTIBLE INFORMATION:
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

1.9 TOLERANCE FOR ERROR:
The design minimizes hazards and the adverse consequences of accidental or unintended actions.

1.10 LOW PHYSICAL EFFORT:
The design can be used efficiently and comfortably, and with a minimum of fatigue.

1.11 SIZE AND SPACE FOR APPROACH & USE:
A. Appropriate size and space is provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility.

B. Compiled by advocates of Universal Design in 1997. Participants are listed in alphabetical order: Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story, Gregg Vanderheiden. The Principles are copyrighted to the Center for Universal Design, School of Design, State University of North Carolina at Raleigh [USA].

C. The Principles established a valuable language for explaining the characteristics of Universal Design. They are in common use around the world, sometimes with slight modifications, primarily one or two principles grouped together. It is expected that the principles will be reconsidered on the occasion of their tenth anniversary in 2007 and are likely to evolve in response to experience with implementation and in order to incorporate insights and perspectives from the engagement of more diverse cultures.

1.12 WEBSITE
http://www.adaptenv.org/index.php?option=Content&Itemid=25
APPENDIX C
CONTRACTOR SAFETY PROGRAM
ENVIRONMENTAL HEALTH & SAFETY OFFICE
Contractor Safety Program

Environmental Health & Safety Office

Please refer to webpage for Contractor Safety Program
http://safety.uncc.edu/contractors

April, 2012
APPENDIX D

TELECOMMUNICATIONS IMPLEMENTATION AND DESIGN GUIDELINES
It is at the discretion of the UPM and the design team whether to retain the services of a telecommunications RCDD. UNC Charlotte ITS has implemented this policy for several reasons; the ongoing and fluid changes in technology and standards in the telecommunications industry, the need for cohesive communications and support for telecommunications-specific projects during construction evolutions on campus, and direct communications with the type of professionals that are typically responsible for telecommunications infrastructure projects.

The assigned RCDD professional will be required to assist the ITS/Telecommunications Department, University building occupants, and University project managers as required, with developing an up to date telecommunications installation package per the ITS Telecommunications Standards Design Manual and Telecommunications Industry Regulations and Specifications, for any new construction or renovation projects for which an architectural or engineering design firm has been selected by the University and by where telecommunications requirements have been established through the project. The RCDD will also to interface with project engineers, designers, and UNC Charlotte project managers for implementation of telecommunications infrastructures related to drawings and written specifications.

More formal procedures and processes are required for construction projects that require telecommunications implementations than projects in the past because of more complex installations, and more integrated services being implemented into the communications infrastructure. Contrary to common ongoing perceptions, it is no longer a matter of mere cabling and cable terminations that make up telecommunications installations and implementations. These implementations can be more complex and require the knowledge of a professional registered telecom designer to navigate.

The requirement to provision a certified professional to have this type of direct contact who understands the language of the industry, and is up to date on all industry regulations and standards while maintaining close contact and communications with the project designers and engineers, provides the University and the ITS department with the level of efficiencies necessary to provide a sound communications package. This person could also assist in leveraging potential costs savings to the project relative to telecom component requirements.

The selected RCDD will be referred to as the “Project Design RCDD”. The PDRCDD will be “required” in the early Design Development phase of the project and is to remain active thru out the project until completion and sign over of said project to the University.

The selected PDRCDD will be responsible at minimum for the following:

A: Meeting with the ITS Department, Project managers for the university, and occupants as a kickoff or introduction to a given project.

B: Provisioning Telecom outlet locations, cable tray designs and routes, telecom room lay outs, specialty communications room lay outs if required, outside plant fiber and copper, building copper and fiber riser systems, telecommunications grounding systems, voice/data cabling systems, wireless systems, WI-FI
(802.11X) access points, etc… while coordinating with ITS for any and all necessary details and specifications as it relates to University standards and procedures.

C: Identify that all correct information, bid alternates, amendments, addendums, etc… are contained on drawings and written specifications before release for public bidding.

D: Coordinate with project entity (GC, Electrical, etc…) on a specific project that is responsible for obtaining the telecommunications installation bid responses before award of telecommunications install. The PDRCDD will be responsible for reviewing these responses along with the entity that received the bid responses to assure that the telecom contractor being awarded the telecommunications installation meets all required criteria as set forth in the telecommunications bid documentation. The PDRCDD will not be responsible for awarding the telecommunications installation. They are only to serve as a reviewer/advisor to the process to help avoid any issues with awarding the telecommunications installation to a non qualified telecom installer.

E: Attend any project meetings, construction meetings, weekly meetings, or monthly owners meetings necessary to keep in pace with the project. Perform walk through at a minimum of once a month and/or at critical stages of the telecommunications installation.

F: Provide the firm that retains the PDRCDD with any installation deficiencies documentation (i.e. punch list) to require the installation contractor to provide corrective actions before acceptance of a telecommunications installation.

G: Verify fiber optic and copper cable testing documentation for proper compliance before telecom installer applies for any cable warranties required by the project.

H: Verify all telecommunications bid and documentation requirements have been met by the telecommunications installer. And perform final sign off of installation that verifies that UNC Charlotte is receiving a complete, fully tested, properly installed, warranted system, before it is handed over to the University.

The RCDD should have a minimum of the following career qualifications:

A: 5 Years of Telecommunications cabling and systems design experience

B: Minimum of three years practical field experience in telecommunications installations. Previous design work performed in a University setting is preferred.

C: Working knowledge of Local Area Networks and their performance requirements as it relates to cabling infrastructure. LAN Design Certificate a plus.

UNC Charlotte ITS will work directly thru the PDRCDD to develop telecommunications specifications for a given project. ITS reserves the right to perform “in house” installations that are smaller and do not require heavy document development. Design or engineering firms will need to verify this thru the project manager for the university to the ITS Department before project design commences. This is required if an engineering firm or design firm does not already have an RCDD on staff and would have to retain the services of an independent telecom designer/RCDD.

It is strongly recommended that the designated PDRCDD be an independent telecommunications designer located within no more than a 2 hour radius around the Charlotte Metro area and to also not be retained from a cabling contract company. This request alleviates any conflict of interest issues that could arise with competitive bidding from other cabling contract companies. This ensures UNC Charlotte ITS
gets the best pricing from the best qualified cabling contractors that are available and are certified to install the UNC Charlotte structured cabling system.

UNC Charlotte ITS will provide the PDR/CDD the UNC Charlotte ITS Design Standards Manual during the kickoff or initial meetings. The UNC Charlotte ITS Telecom Standards Design Manual is a fluid, living document which incorporates frequent technology changes and campus standards adjustments.

The UNC Charlotte ITS telecom Standards Design Manual is designed to supplement the University Master Design Document in order to continuously reflect the telecommunications changes, requirements, stipulations, and standards that need to be supported and enforced on campus.

Contacts for UNC Charlotte ITS design requirements:

Troy Russell  
UNC Charlotte  
ITS Department  
Phone 704-687-8602  
E-Mail: trussel@uncc.edu

Tom Lamb  
UNC Charlotte  
ITS Department CTO  
Phone: 704-687-3931  
E-Mail: tlamb@uncc.edu
APPENDIX I

RFI, COST OF CHANGE WORKSHEET, ATTIC STOCK FORM
**QUOTATION FORMAT FOR CHANGES IN THE WORK**

This format shall be used to request changes in the Work in accordance with Article 19.

Where unit prices shown on the Form of Proposal apply, they shall be used to determine the amount of addition to or deduction from the Contract price as called for in Article 19, Paragraph C (1) and not in this format.

All additions and deductions to the Contract price not covered by unit prices resulting from changes in the Work shall be determined by the following format:

Please submit an itemized quotation within 14 days for the proposed modification to the Contract. Documents described herein, indicating changes in the contract sum and/or time incidental to this request. **THIS IS NOT AN AUTHORIZATION TO PROCEED WITH WORK DESCRIBED NOR A CHANGE ORDER.**

(1) FOR THE ___________________________________ CONTRACT WORK

<table>
<thead>
<tr>
<th>Description of items (breakdown including quantity, labor, and materials)</th>
</tr>
</thead>
<tbody>
<tr>
<td>----------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>

(2) Rent of equipment (list separate)

| Performance Bond adjustment        | ________________ |
| Worker's Compensation Insurance    | ________________ |
| Social Security and Old Age Benefits | ________________ |
| Pro rata charges for foremen       | ________________ |
| Sub-total                           | ________________ |

(3) Subcontract work (when required)  

| Sub-total | ________________ |

(4) Contractor's overhead and profit 

| Sub-total | ________________ |

**Sales tax (on Material and Equipment only)**

| Total Quotation | ________________ |

(1) Insert type of Contract such as General, Electrical, Plumbing, Mechanical, etc.

(2) Shall be in accordance with AED schedule - submit copy.

(3) When work is to be performed by a Subcontractor, a like breakdown shall be included.

(4) See Article 19 for percentage and when overhead and profit is allowed.
## ATTIC STOCK SUMMARY

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<th>SPEC. SECTION &amp; PARA.</th>
<th>MATERIAL TYPE / DESCRIPTION</th>
<th>TOTAL SQ. FT. INSTALLED</th>
<th>% OF TOTAL REQUIRED</th>
<th>CERTIFIED BY DESIGNER</th>
<th>RECEIVED BY UNIVERSITY</th>
</tr>
</thead>
</table>

Note: This form is to be filled out by the contractor and submitted to the University and Designer prior to the final inspection.
ANNEX A

LEED CHECKLIST
# LEED for New Construction and Major Renovation 2009 Project Scorecard

## Sustainable Sites

<table>
<thead>
<tr>
<th>Credit</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credit 1 Site Selection</td>
<td>1</td>
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</tr>
<tr>
<td>Credit 2 Development Density &amp; Community Connectivity</td>
<td>6</td>
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</tr>
<tr>
<td>Credit 3 Brownfield Redevelopment</td>
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<td></td>
</tr>
<tr>
<td>Credit 4 Alternative Transportation, Public Transportation Access</td>
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</tr>
<tr>
<td>Credit 4.3 Alternative Transportation, Bicycle Storage &amp; Changing Rooms</td>
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<tr>
<td>Credit 4.3 Alternative Transportation, Low-Emitting &amp; Fuel-Efficient Vehicles</td>
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<td>Credit 4.4 Alternative Transportation, Parking Capacity</td>
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<td>Credit 5.1 Site Development, Protect or Restore Habitat</td>
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<tr>
<td>Credit 5.2 Site Development, Maximize Open Space</td>
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<td>Credit 6.1 Stormwater Design, Quantity Control</td>
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<tr>
<td>Credit 6.2 Stormwater Design, Quality Control</td>
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<td>Credit 7.1 Heat Island Effect, Non-Roof</td>
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<tr>
<td>Credit 7.2 Heat Island Effect, Roof</td>
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<tr>
<td>Credit 8 Light Pollution Reduction</td>
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## Water Efficiency

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<td>Credit 1 Water Use Reduction, 20% Reduction</td>
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<tr>
<td>Credit 1.1 Water Efficient Landscaping, Reduce by 50%</td>
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<td>Credit 1.2 Water Efficient Landscaping, No Potable Use or No Irrigation</td>
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<td>Credit 2 Innovative Wastewater Technologies</td>
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<td>Credit 3 Water Use Reduction</td>
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<td>Credit 3.1 10% Reduction</td>
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<td>Credit 3.2 20% Reduction</td>
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<td>Credit 3.3 40% Reduction</td>
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## Energy & Atmosphere

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<td>Credit 1 Fundamental Commissioning of the Building Energy Systems</td>
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<td>Credit 2 Minimum Energy Performance: 16% New Buildings or 16% Existing Buildings</td>
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<td>Credit 3 Fundamental Refrigerant Management</td>
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<td>Credit 3.1 Optimize Energy Performance</td>
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<td>Credit 3.1.1 1% New Buildings or 1% Existing Building Renovitations</td>
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<td>Credit 3.2 On-Site Renewable Energy</td>
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<td>Credit 6 Measurement &amp; Verification</td>
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<td>2</td>
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</tr>
</tbody>
</table>
## LEED for New Construction and Major Renovation 2009
### Project Scorecard

### Materials & Resources

<table>
<thead>
<tr>
<th>No.</th>
<th>No.</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Storage &amp; Collection of Recyclables</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Building Reuse, Maintain 50% of Existing Walls, Floors &amp; Roof</td>
<td>1-3</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Building Reuse, Maintain 75% of Existing Walls, Floors &amp; Roof</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Building Reuse, Maintain 60% of Interior Non-Structural Elements</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Construction Waste Management, Divert 50% from Disposal</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Construction Waste Management, Divert 75% from Disposal</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Materials Reuse, 5%</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Materials Reuse, 10%</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Recycled Content, 10% (post-consumer + 15% pre-consumer)</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Recycled Content, 20% (post-consumer + 25% pre-consumer)</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td>Regional Materials, 10% Extracted, Processed &amp; Manufactured Regionally</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Regional Materials, 20% Extracted, Processed &amp; Manufactured Regionally</td>
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</tr>
<tr>
<td>13</td>
<td></td>
<td>Rigidly Renewable Materials</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Certified Wood</td>
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</table>

### Indoor Sustained Quality

<table>
<thead>
<tr>
<th>No.</th>
<th>No.</th>
<th>Description</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>11</td>
<td></td>
<td>Minimum IAQ Performance</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Environmental Tobacco Smoke (ETS) Control</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td>Outdoor Air Delivery Monitoring</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Increased Ventilation</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Construction IAQ Management Plan, During Construction</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>Construction IAQ Management Plan, Before Occupancy</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>Low-Emitting Materials, Adhesives &amp; Sealants</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>Low-Emitting Materials, Paints &amp; Coatings</td>
<td>1</td>
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<tr>
<td>19</td>
<td></td>
<td>Low-Emitting Materials, Flooring Systems</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>Low-Emitting Materials, Composite Wood &amp; Agrifiber Products</td>
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</tr>
<tr>
<td>21</td>
<td></td>
<td>Indoor Chemical &amp; Pollutant Source Control</td>
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</tr>
<tr>
<td>22</td>
<td></td>
<td>Controllability of Systems &amp; Lighting</td>
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<td>23</td>
<td></td>
<td>Controllability of Systems, Thermal Comfort</td>
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<td>24</td>
<td></td>
<td>Thermal Comfort, Design</td>
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<tr>
<td>25</td>
<td></td>
<td>Thermal Comfort, Verification</td>
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<td>26</td>
<td></td>
<td>Daylight &amp; Views, Daylight 75% of Spaces</td>
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<tr>
<td>27</td>
<td></td>
<td>Daylight &amp; Views, Views for 90% of Spaces</td>
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### Innovation & Design Process

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<td>28</td>
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<td>Innovation in Design: Provide Specific Title</td>
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<tr>
<td>29</td>
<td></td>
<td>Innovation in Design: Provide Specific Title</td>
<td>1</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Innovation in Design: Provide Specific Title</td>
<td>1</td>
</tr>
<tr>
<td>31</td>
<td></td>
<td>Innovation in Design: Provide Specific Title</td>
<td>1</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td>LEED® Accredited Professional</td>
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### Regional Priority Credits

<table>
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<th>No.</th>
<th>No.</th>
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<tr>
<td>33</td>
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<td>Regional Priority Credit: Region Defined</td>
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<tr>
<td>34</td>
<td></td>
<td>Regional Priority Credit: Region Defined</td>
<td>1</td>
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<tr>
<td>35</td>
<td></td>
<td>Regional Priority Credit: Region Defined</td>
<td>1</td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>Regional Priority Credit: Region Defined</td>
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### Project Details (Certification Estimates)

<table>
<thead>
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<th>No.</th>
<th>No.</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td></td>
<td>Certificate: 45-49 points = Silver; 50-54 points = Gold; 55-59 points = Platinum</td>
<td>110</td>
</tr>
<tr>
<td>38</td>
<td></td>
<td>Not Certified</td>
<td></td>
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</table>
ANNEX B

WASTE REDUCTION & RECYCLING GUIDELINES
WASTE REDUCTION & RECYCLING GUIDELINES

This section represents the supporting documentation for general Requirements Section 2 Point D. Site Construction & Demolition Waste Management

WASTE MANAGEMENT

1.1 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
B. Commingling: Mixing recyclable C/D material in one waste container. Materials Recovery Facilities (MRF) exists to sort and recycle commingled materials off-site.
C. Construction and Demolition Waste: Includes all non-hazardous solid wastes resulting from construction, renovations, alterations, repair, and demolition.
D. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity or reactivity.
E. Material Recovery Facility (MRF): A processing facility designed to sort and separate recyclables based on market needs and material components.
F. Non-hazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity, or reactivity.
G. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
H. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
I. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste. Can be conducted on-site (as in the grinding of concrete and reuse on-site).
J. Return: To give back reusable items or unused products to vendors for credit.
K. Reuse: To reuse a construction waste material without altering its form on the project site or elsewhere.
L. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
M. Sediment: Soil and other debris that has been eroded and transported by storm or well production runoff water.
N. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste in order to reuse or recycle them.
O. Toxic: Poisonous to humans either immediately or after a period of exposure.
P. Trash: Any product or material unable to be reused returned, recycled, or salvaged.
Q. Volatile Organic Compounds (VOCs): Chemical compounds common in and emitted by many building products over time through off gassing: solvents in paints and other coatings; wood preservatives; strippers and household cleaners; adhesives in particleboard, fiberboard, and some plywood; and foam insulation. When released, VOCs can contribute to the formation of
smog and can cause respiratory tract problems, headaches, eye irritations, nausea, damage to the liver, kidneys, and central nervous system, and possibly cancer.

R. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

S. Waste Management Plan: A project-related plan for the collection, transportation, and disposal of the waste generated at the construction site. The purpose of the plan is to ultimately prolong the useable life of waste materials and reduce the amount of material being landfilled.

T. Waste Management Report: A monthly report completed by the contractor describing actual waste disposal of materials, including methods, types of waste, destination and quantities. All weight tickets must be attached to waste management report.

1.2 RESOURCE EFFICIENCY

A. The Contractor shall use resources as efficiently as possible, in completion of the project. Namely Owner shall require the Contractor to:
   1. Use techniques that minimize waste generation
   2. Reuse and renovation of existing structures in lieu of demolition
   3. Salvage of existing materials and items for reuse/resale
   4. Reuse materials on site where possible
   5. Recycling of waste generated during the demolition and construction process

1.3 ADDITIONAL INFORMATION/RESOURCES

A. Build America Beautiful Program
   National Association of Home Builders
   1201 15th Street, NW, Washington DC 20005, (800) 368-5242

B. Designing With Vision: Public Building Guidelines for the 21st Century
   Chris Stafford, AIA, Stafford-Harris, Inc., 1992
   1916 Pike Pl., Seattle WA 98101, (206) 682-4042

C. Environmental Building News
   A bimonthly newsletter on environmentally sustainable design and construction.
   Yearly subscription
   RR 1, Box 161, Brattleboro, Vermont 05301, (802) 257-7300

D. The Environmental Resource Guide
   A collection of detailed material assessments, articles, and case studies connecting environmental awareness with building construction
   Quarterly: $200/year

E. The American Institute of Architects
   1735 New York Ave, NW, Washington DC 20006
   (202) 626-7331 (800) 365-ARCH

F. “Green Building” Performance Standard Guide
   American Society for Testing Materials (ASTM), 1992

G. The Healthy House
   An in-depth look at the construction of a “healthy house” especially with respect to chemical sensitivity. Chapters are broken down into stages of building (i.e., planning, location, etc.) and building components (i.e., foundation systems, steel framing, windows and doors, etc.) Good lists of organizations and suppliers.
   John Bower
   Carol Communications 1989.
   Covers a wide range of topics. Over 800 pages.
   University of Florida College of Architecture,
   Center for Construction and Environment, 1994, (904)392-7502
   107
   E-1 APPENDIX E - GREEN BUILDING RESOURCES
   TRIANGLE J COUNCIL OF GOVERNMENTS Waste Spec
   APPENDIX E - GREEN BUILDING RESOURCES E-2

I. Sustainable Building Guidebook for the New State Office Building: A Preliminary Overview
   Center for Maximum Potential Building Systems, Inc
   February 1993

J. Architectural/Engineering Guidelines
   Comprehensive specifications covering energy efficiency and other life cycle and sustainable provisions
   About 110 pages
   State of Texas General Services Commission, Office of Facility Planning, 1993 Austin, Texas

K. Demolition for Salvage and Reuse: Prototypical Demolition Specifications
   A summary of background and specifications used on a demolition project in Portland
   About 25 pages
   Metro Solid Waste Department, 1993
   600 NE Grand Avenue, Portland, Oregon, (503) 797-1650

L. Waste Reduction Specifications 1993
   A collection of examples of waste reduction specifications
   About 50 pages
   Metro Solid Waste Department
   600 NE Grand Avenue, Portland, Oregon, (503) 797-1650

M. URBAN PLANNING/LAND USE/COMMUNITIES
   A Pattern Language: Towns-Buildings-Construction
   A design classic, illustrating patterns that work on all scales, from the reading nook to the whole city
   Christopher Alexander, Sara Ishikawa, and Murray Silverstein
   Oxford University Press
   Design with Nature
   Ian L. McHarg
   John Wiley & Sons, Inc., 1991
   605 3rd Avenue, New York NY 10158 (212) 850-6000 or from the AIA Bookstore (800) 365-2724

N. Land Use Strategies for More Livable Places: A Guidebook for Local Governments
   Clear and concise guidelines for land use planning to reduce automobile use.
   California emphasis, but nationwide applicability
   Have sample drafts of a resolution and other documents for use by local governments or community groups
   Steve Weissman and Judy Corbett, Local Government Commission, 1992
   909 12th Street, Suite 205, Sacramento CA 95814, (916)448-1198
   (916) 448-8246 (fax).
   108 TRIANGLE J COUNCIL OF GOVERNMENTS Waste Spec

O. Sustainable Communities: A New Design Synthesis for Cities, Suburbs, and Towns
   Essays by these two leading planners and several others provide a good overview to the theory of ecologically appropriate land use.
   Sim Van der Ryn and Peter Calthorpe
## 1.4 INDUSTRY EXAMPLES SUCCESS STORIES

<table>
<thead>
<tr>
<th>Record-Setting Program</th>
<th>Project Type</th>
<th>Project Highlights</th>
<th>Recovery Strategy</th>
<th>% Debris recovered (by weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bagley Downs Apartments</td>
<td>Demolition and construction</td>
<td>This project created 30 affordable housing units, saved the University of Oregon demolition costs, and preserved a community landmark.</td>
<td>Entire buildings saved by moving them to a new location.</td>
<td>73%</td>
</tr>
<tr>
<td>Eugene, OR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Erickson’s Diversified</td>
<td>New construction</td>
<td>Erickson’s planned to incorporate materials recovery efforts during the construction of the project.</td>
<td>Source separation of materials during the construction of the project.</td>
<td>69%</td>
</tr>
<tr>
<td>Corporate Headquarters</td>
<td>Its new corporate headquarters even though it expected to pay more than if it disposed all materials generated. In fact, the company diverted 69% of the project debris and saved money.</td>
<td>Construction by all subcontractors.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hudson, WI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four Times Square</td>
<td>Demolition and construction</td>
<td>Materials recovery was included in plans from the beginning. The contract included requirements that subcontractors reduce disposal and, as an incentive, they were allowed to retain savings earned through avoided disposal costs and materials revenues.</td>
<td>Pre-demolition salvage, construction materials sorted off-site because of space limitations.</td>
<td>58%</td>
</tr>
<tr>
<td>New York, NY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marion County Senator</td>
<td>Demolition</td>
<td>Marion County and Salem Area Transit saved over $160,000 by diverting demolition materials from disposal while using the project as a tool to educate the public on recycling. The county placed ads on TV and radio and placed banners illustrating the project recycling rate around the project site.</td>
<td>Salvage of usable items before demolition. Hand and mechanical sorting of materials after demolition to recover metals, concrete, and asphalt.</td>
<td>82%</td>
</tr>
<tr>
<td>Block Salem, OR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ridgehaven Green Office</td>
<td>Renovation</td>
<td>The city of San Diego wanted to reduce, recycle, and reuse renovation materials from this project in order to comply with California’s 50%</td>
<td>Many existing materials refurbished and reused. Materials sorted into labeled dumpsters for recycling.</td>
<td>51%</td>
</tr>
<tr>
<td>Building San Diego, CA</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>
recycling goal and reduce materials going to the city-owned landfill. In addition to recycling, diverting 51% of the renovation materials from disposal, the city also saved $92,000.

<table>
<thead>
<tr>
<th>Project Location</th>
<th>Type</th>
<th>Description</th>
<th>Cost Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stowe Village Hartford, CT</td>
<td>Deconstruction</td>
<td>This demonstration project not only recovered 50% of the materials from six public housing units, it also trained nine public housing residents in deconstruction techniques.</td>
<td>50%</td>
</tr>
<tr>
<td>Whole Foods Market Corporate Headquarters Austin, TX</td>
<td>Renovation</td>
<td>Recovery of renovation materials saved Whole Foods over $32,000. Reuse of materials, such as ceiling tiles, light fixtures, and doors, helped the company avoid the purchase of nearly $25,000 worth of supplies. The company was also able to take an $8,000 tax deduction for donating salvaged goods to non-profit organizations.</td>
<td>42%</td>
</tr>
</tbody>
</table>

1.5 REQUIRED RECYCLING INCLUDES: (NOT AN EXHAUSTIVE LIST)

A. Used beverage containers—banned from all North Carolina landfills (NC SB111. p. 1345)
B. Cardboard—banned from Mecklenburg County Landfills
C. Clean wood wastes
D. Scrap metal
E. Asphalt
F. Gypsum
G. Ballasts
H. Fluorescent bulbs containing mercury—banned from North Carolina landfills
I. White goods—banned from North Carolina landfills (major household appliances such as stoves and refrigerators that are typically finished in white enamel)
J. Yard waste – Banned from North Carolina Landfills
K. In addition to required recyclables/recycling, encourage:
L. Log and sell timber from land-clearing operations any ground timber will be used on campus as mulch
M. Excess clean earth may be used/needed by UNC Charlotte
N. Inert materials such as stumps, brick, concrete, block and rock cannot be disposed of in sanitary landfills and must go to a permitted Construction/Demolition landfill.
O. Bricks and blocks
P. Doors and windows
Q. Plumbing fixtures and pipes (provided they don’t contain lead)
R. Electrical fixtures and wiring
S. Metals
T. Cardboard
U. Aluminum
V. Concrete

1.6 SAMPLE WASTE MANAGEMENT PLAN (DRAFT & FINAL)

1.7 SAMPLE MONTHLY WASTE MANAGEMENT REPORT

1.8 STIPULATIONS
   A. The Contractor shall remove all generated trash, recycling, and debris (including, for example, old carpeting) at his or her expense. The Contractor may not place this trash and debris in University dumpsters. The Owner, acting through the Designer, shall retain the right to direct the disposal of salvageable equipment (such as metals, cardboard, plastics, paper, glass, and blueprints).
   B. For all demolition or renovation work which removes serviceable, repairable, or otherwise recoverable equipment or materials (such as metals, cardboard, plastics, paper, glass, and blueprints), the Contractor shall certify that he or she has exercised every practical means of recovery or salvage. (Note: this would be in addition to the required recyclables).
SECTION 3, ANNEX D

CAMPUS EXTERIOR SIGNAGE STANDARDS
A comprehensive system of signs for vehicular and pedestrian traffic
# Table of Contents

**Introduction**

- Graphic Standards 1-4
- Large Vehicular Directory - A A.001
- Medium Vehicular Directory - B A.002
- Small Vehicular Directory - C A.003
- Attached Parking Deck ID – D.1 A.004
- Attached Parking Deck ID – D.2 A.005
- Detached Building ID - E A.006
- Primary Entrance Building ID A.007
- Attached Building ID – F.1 A.008
- Attached Building ID – F.2 A.009
- Attached Building ID – F.3 A.010
- Attached Parking Deck ID - G A.011
- Pedestrian Directional – H A.012
- Pedestrian Directional (low) – H.1 A.013
- Street Sign Directional - I A.014
- Parking Lot ID – J A.015
- Parking Lot ID (low) – J.1 A.016
- Map Kiosk - K A.017
- Special Landscape Signs A.018
- Specifications 19 - 23
In an effort to present a consistent image and visual harmony throughout The University of North Carolina at Charlotte campus, an overall signage program has been developed. This way-finding system will help guide students, faculty, staff and visitors to their destinations throughout the campus.

The purpose of these signage standards is to establish basic guidelines for the fabrication and installation of all exterior identification, informational and directional signage. These standards establish certain policies for the execution of signage as well as providing a description of various sign types, graphic uses, materials, Specifications, fabrication and installation procedures, etc.

All signage must be in conformance with these standards and approved by the UNC Charlotte Department of Facilities Management prior to fabrication and installation. The sign types herein identified for UNC Charlotte adhere to the codes and regulations for the City of Charlotte, North Carolina.

Specific signs on public roadways may require sign permits prior to fabrication. The fabricator shall be responsible for obtaining any required permits from the City. A construction drawing has been completed for each sign type and may be obtained at the UNC Charlotte Department of Facilities Management.

These drawings must be complied with, though fabrication methods and materials may be altered in attempt to produce a better product with approval of Facilities Management Design Services.

The fabricator shall submit in writing for approval any suggested revisions to these drawings to the UNC Charlotte Department of Facilities Management prior to making the revision. Sign shapes, sizes, colors, finishes, graphics, etc. may not be changed. It is required that the fabricator produce shop drawings of all signs to be fabricated, and submit them to the Project Manager for approval.
For all layouts on Exterior Signage, the vendor must provide Submittal Drawings with layout and character sizing, including compression and spacing sizes used to create readable signage for moving vehicular traffic.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.
The copy placement and margin specifications for signage are to be adhered to and will act as standards for the text on all signs. The above representation is subject to final text volume and content requested, and may require text height changes to accommodate the final sign design. Please refer to the Construction Documents or details for specific layout and final sizing of Text and Graphics.

Vendor is required to submit final elevation layout drawings for approval prior to text ‘application’ to the sign surfaces. The fabricator is to provide scaled text layouts of all signs to the University for review and modification as required.

The standard text compression is .85 and spacing is 1.05. This may vary depending on length of text descriptor line and width of sign body. Vendor to submit drawings to Project Manager for approval prior to fabrication and installation.
The copy placement and margin specifications for signage are to be adhered to and will act as standards for the text on all signs. The above representation is subject to final text volume and content requested, and may require text height changes to accommodate the final sign design. Please refer to the Construction Documents or details for specific layout and final sizing of Text and Graphics.

Vendor is required to submit final elevation layout drawings for approval prior to text ‘application’ to the sign surfaces. The fabricator is to provide scaled text layouts of all signs to the University for review and modification as required.

The standard text compression is .85 and spacing is 1.05. This may vary depending on length of text descriptor line and width of sign body. Vendor to submit drawings to Project Manager for approval prior to fabrication and installation.
The use of the UNC Charlotte logo and logotype for campus signage should always be maintained as consistent design elements. There are two (2) approved versions for the logo application for exterior signage display. For further descriptions or explanations, please visit the University website at:

http://publicrelations.uncc.edu/logo/main-logo.html

The arrow graphic and handicap symbol shown are to be used throughout the Master Signage Program as necessary. The components are to be reproduced in the font as shown, and are not to be distorted or altered for the signage program. Use of these elements is to be approved by the University and Copies of this artwork will be provided by the University for use by the fabricator as needed. (see sign descriptions for font details).
INTRODUCTION
All components and finished units within this program shall be manufactured by professional fabricators. An example of the fabricator’s previous work shall be reviewed by UNC Charlotte prior to production.

PERMITS (As Applicable)
The Vendor shall secure all required sign permits and licenses prior to the purchase of materials or the beginning of fabrication of any signs as required by local code. The Vendor shall notify the Owner immediately of any problems that arise during the permitting process if applicable. It is the responsibility of the Vendor to allow time in his work schedule for any permitting and process, securing such permits and inspections in a timely fashion so as to allow subsequent fabrication and installation to be completed on schedule.

SHOP DRAWINGS
Shop drawings must be furnished for UNC Charlotte Design Services review prior to fabrication showing specified materials, construction details, installation details or steps, dimensions, grade etc.

Note: Designer’s Working Drawings are for fabricators’ and suppliers’ reference and do not limit fabricators and suppliers from responsibility to ensure appropriate engineering for fabrication and installation. Shop drawings for all items furnished under this Contract shall include a complete sign schedule, scaled message patterns of all Sign Text Layouts, complete fabrication details of all signs, and timeline to completion.

Attachment details including all mechanical fasteners, steel support framing, hinges and removable panels, location, size, dimensions, and finishes or any other related items necessary to fabricate and install finished signs, exact identification of all paint colors and paint formulas, vinyl, and other product used in fabricating the sign(s).

TEXT/ARROWS/SYMBOLS
Approved text, directional arrows, and symbols are to be reviewed by Facilities Management Design Services for use. The sign fabricator is to submit scaled copy layouts for approval.

For typical typographic layouts and type style per sign type, see 2010 Campuswide Exterior Signage pages; S1-3. All symbols or forms used for final sign application or final finishing shall be computer cut. Hand Cut letters or symbols are not acceptable.

SUBMITALS
Submit two (2) complete sets of shop drawings (including text layouts for each sign) at an agreed upon scale, for review prior to fabrication of all items. Owner’s review does not relieve the Vendor from responsibility for errors in dimensions nor for inadequate or improper use of materials for construction.

SUBSTITUTIONS
Any request for substitutions which does not clearly show equality to the Owner’s satisfaction will be rejected. The burden of proof that the proposed substitution is equal to and meets the requirements specified and shown in the project documents including type, design, quality, operation, function, use, size, appearance, capability and manufacturer shall be solely the responsibility of the bidding Vendor.
PAINT AND VINYL SYSTEM

Paint colors are specified in the drawings using the Matthews Paint Company System, specifically formulated for the UNC Charlotte sign system.

The recommended vinyl film system to be Arlon Vinyl Film by Arlon or 3M. Vinyl sheeting for sign text messages shall be computer cut, High Performance or Reflective Grade vinyl films 3.5 to 6.7 mils thick with continuous pressure sensitive adhesive backing.

AS-BUILT DRAWINGS

Upon completion, the vendor shall provide the owner with two (2) complete sets of as-built drawings on CD in AutoCAD and PDF. As-Built drawings shall include Location Plans and Sign Schedules.

FABRICATION/MATERIALS

Aluminum plates, extrusions and supports shall conform to the requirements of the design intent details, ASTM standards and all applicable building codes, and shall be as submitted and approved on the shop drawings. All screws, bolts and fasteners where used with aluminum shall be stainless steel. All fasteners are to be painted. All fastenings shall be as indicated on the drawings and shall be compatible to the materials fastened. Isolation materials shall be provided between unlike metals.

Before fabrication the Vendor shall make on-site measurements and verify that site conditions and/or current architectural drawings conform to the signage and graphics drawings and shall be responsible therefore. All work shall be fabricated to approved shop drawings and shall be first class workmanship in accordance with the best trade practices.

All joints, corners, miters, splices, or signage shall be accurately machined, filled, fitted and rigidly framed together at joints and contact points.

All materials are to be as specified on working drawings unless written approval has been obtained for material substitution by The office of Design Services at UNC Charlotte.

ALUMINUM

All aluminum sheet for signage is to be .125” thickness unless specified otherwise. All welding is to be seamless welded. All depressions or raised areas, due to welding, must be filled and ground smooth prior to priming and painting. All screws, brackets and fasteners in contact with aluminum are to be stainless steel or aluminum. Non-corrosive and non-staining.

PLASTICS

All plastics are to be PVC. Polycarbonate, or acrylic sheet unless specified otherwise. Other plastics may be substituted as long as a test sample is submitted prior to fabrication for owner’s approval.

FINISHES

All fabrication materials are to be smooth and free of all defects. Cut lines, welds, slag, dust, dirt, grease and other surface defects are to be removed prior to finishing.
PRIMING AND PAINTING

All materials are to be applied properly according to manufacturer’s recommendations and specifications. All paints, primers, solvents, top Coats, etc., are to be chemically compatible.

Step A - Use Aluminum specific cleaner on all aluminum parts to receive paint, followed by using bare metal sealer coating and then Acrylic Primer Sealer.

Paints for aluminum shall be Matthews Paint Company polyurethane opaque satin paint, with satin clear finish seal coat applied. Application shall consist of 1 coat of Metal primer @ .25mil minimum and 2 coats of opaque satin Acrylic Polyurethane paint of specified color. 1 mil DFT minimum each coat for a total dry film thickness of two (2) mils DFT.

Paints for spraying acrylics shall be matte Acrylic Polyurethane with an ultraviolet Inhibitor engineered for extreme heat and finish retention. Clear Satin finish shall be applied to a total dry film thickness of two (2) mils OFT. Acrylic material shall be 1/16”, 1/8”, and ¼” Acrylic Plexiglass, Matte Clear with a P95 finish. or approved equal as shown on Drawings.

Order or mix paint for each color in quantity to assure consistent application for all signs in a given color. Vendor shall allow paint surfaces to thoroughly air dry for a minimum of forty eight (48) hours prior to the application of masking film which shall be applied to protect all sign surfaces during shipping and installation.

All products below may have an “or equal”, but product submittals must be provided and approved prior to manufacturing and application of finishes, and must meet or exceed current product below.

Paint must cure for a minimum of forty eight (48) hours or longer based on Manufacturer guidelines prior to the application of masking film which shall be applied to protect all sign surfaces during shipping and installation.

Matthews Paint PPG Ind.
LakeView Corporate Park • 8201 100th St. • Pleasant Prairie, WI 53158 • 1.800.323.6593 • www.matthewspaint.com

Arlon Adhesives & Films Division
281 I South Harbor Blvd.
Santa Ana, CA 92704-5805 – (714) 540-2811 - (800) 854-0361

Rohm and Haas Plastic
Technology Center
PO Building 117.
Route 13 &.413
Bristol. PA 19007 - (215) 785-8000

SAMPLES

Vendor shall submit to the owner 6” x 6” samples of all materials and paint finishes of specified finishes unless vendor has previously installed approved product and code. All submittals shall bear the exact material identification and/or paint formula marked on the back surface.
INSTALLATION

All freestanding signs are to be mounted in concrete, except where specified otherwise. Footing size and depth to be determined by fabricator. Installer to verify final locations based on vicinity map provided by University Project Manager. All concrete footings are to be 3000 psi and should be sufficient to ensure the structural stability of the sign unit in high wind conditions.

All free standing signs are to have a concealed sleeve underground to allow for the removal of signs for maintenance and painting. The sleeve system will be set in concrete footings and contain a movable, tamperproof pin for access.

All signs are to be level and plumb. Use current Campus signage for template of installation.

All signage locations are to be approved by client and meet all local zoning codes for setback and height restrictions.

Sign locations are to be staked and identified with the Dept. of Facilities Management unless otherwise instructed.

The fabricator is to verify underground utilities with the Office of Facilities Planning prior to installation of footings.

The fabricator will get approval by a UNC Charlotte representative prior to driving a vehicle off designated streets or driveways in order to reach a sign location. Where special job conditions occur or where there is uncertainty as to interpretation, before execution of the work, vendor shall inform the Department of Facilities Management Design Services Project Manager.

UTILITY LOCATES

Installer is responsible for calling in public utility locates where property of University meets the City of Charlotte or County line. Project Manager will coordinate campus locates with internal departments in conjunction with calling One Call regarding on campus locate work.

CLEANING/PROTECTION REQUIREMENTS

Vendor shall not only protect his work at all times, but shall also protect all adjacent work and materials by suitable covering or other methods during progress of his work. They shall remove all rubbish, excess soil and rock, and accumulated materials and shall leave the work in a clean, orderly and acceptable condition. Any existing landscape material that is removed or disturbed during the installation of signs shall be replaced or restored to its original condition.

STORAGE

All signs, extrusions, graphic or signage material shall not be exposed to damaging conditions or abrasion during storage, fabrication, delivery or installation. All signs shall be stored in a weather protected space and not be subject to natural elements as determined in conjunction with the Owner.
SAFETY CONDITIONS

The Vendor or Bidder shall maintain safety standards for persons employed in accordance with the standards set by the Occupational Safety and Health Act (latest adoption).

The University of North Carolina at Charlotte and Facilities Management Design Services Group shall be held harmless for any accident, injury or any other incident resulting from noncompliance with these standards.

GUARANTEE

Vendor shall furnish a written guarantee stating that all materials and workmanship are guaranteed against defects for a period of one (1) year after completion and final acceptance of the installed or received work (based on Purchase requisition outlines), and that all materials and installation are in complete accordance with these and manufacturer’s written specifications and/or recommendations.

This guarantee shall be in addition to and not in lieu of other guarantees available to the University by North Carolina State Law.

Defects due to faulty material, workmanship or damage to existing surfaces prepared by other trades during the installation of signs and during the guarantee period shall be repaired to the original condition or replaced by the Vendor at their expense, to the satisfaction of the University representative, Design Services.
For any and all Exterior Signage projects, Manufacturers, Vendors, and Sign Retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in 3D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the University.

In many cases, the supplier must provide current paint samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate. These samples must be provided with graphics that must be signed off by Project Manager and returned via email to Vendor prior to the start of production. Production processes vary by vendor, so Project Manager must approve all samples prior to signing off the submittal drawings of that specific manufacturer's process.

Approved: mfake@unc Charlotte.edu
Scale: N.S.
Date: 10.18.2010
Sheet: 01 of 25
Drawn: slterry@unc.edu
Checked: 
Revision: 0
**General Notes:**

Assembly components and Installation:

A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.

B. Header Board - Assemblies painted in Campus Green, and affixed with both mechanical fasteners and adhesive systems.

C. Crown Assembly affixed to Band as feature, with Gold area being 04 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.

D. Sign Body - Aluminum with channel edge (see detail sheet), affixed with mechanical fasteners, and filler finish for blending with painted surfaces.

E. Footer support 3” x 2”  C channel metal footing bar. 3/4” diameter stainless steel hardware assembly (see detail) and #4 rebar cross pins.

F. Fasteners - #5 SS Bolt assembly and 1” access holes opposite of (2) fasteners must be plugged with painted 'snap in' cap.

G. Footing is 12” DIA. post hole 4” in depth poured to –1” finished grade.

**Finish Notes:**

Paint and Graphics colors:

A. Posts and Sign Body: ‘Black’ Green

Matthews Paint Co. MP21337 R91290

Satin Finish and Satin Clear Coat to seal.

B. Header Assembly:

Campus Green PMS 440

Matthews Paint Co. MP00457 R91290

Satin Finish and Satin Clear Coat to seal.

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Text/Graphics/LETTERING:

3M Diamond Grade Prismatic or equal

White High Performance Vinyl.

Typeface:

Utopia (Primary) or pre-approved alternate Century Schoolbook at 85% condensed format or greater as sign face requires and compressed average 10% letter spacing. Vendor must submit drawing 'proof' of graphics layout for review and acceptance prior to manufacture.

Logo - Gold crown Arton 04 or equal. Inset or second color to match sign body paint code.

Logo information at:

http://www.publicrelations.uncc.edu/logo/main-logo.html

**BANNER**

Two piece Band-board header component. To be mounted with mechanical fasteners combined with adhesive product to eliminate separation from sign body.

**TEXT**

Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

**STANDARD DIMENSION**

**FOOTING DETAIL**

for any and all exterior signages projects, manufacturers, vendors, and sign retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in detail that includes detail sheets for specific structural or finish applications. the buyer may require final measurement of existing installations in addition to any specifications provided by the developers.

In many cases, the supplier must provide current paint samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate. final submittals with graphics must be approved off by project manager, maintained via email. final signed to vendor prior to the start of manufacture, or Project Manager must approve in writing on the submittal drawing of that specific manufacturing process.

Approved: mfake@uncc.edu

Scale: N.T.S.

Date: 10.18.2010

Sheet: 02 of 25

Drawn: sterrey@uncc.edu

Checked:

Revision:
**General Notes:**

Assembly components and Installation:

A. Post stock - Aluminum 3” x 4” square tube welded at 45 degree cut joint intersection with internal reinforced supports.

B. Header – 8” high by width, painted directly to sign body in Campus Green. Test area volume may affect bend area. Optional height is 6” with 5” deep Crown Logos.

C. Crown Assembly is Painted of Vinyl application as feature, with Gold area being 04 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.

D. Sign Body - Aluminum with channel edge (see detail sheet), anodized with mechanical fasteners, and filler finish for blending with painted surfaces.

E. Footer support 3” x 48” C-channel steel metal footing bar. 1/2” diameter Stainless Steel hardware assembly (see detail) and #4 rebar cross pins.

F. Fasteners – 1/2” x 5” Bolt assembly and 3” access holes opposite of (E) fasteners must be plugged with painted "snap in" cap.

G. Footing is 12” O.D., post hole 3” in depth poured to 1” finish grade.

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**Finish Notes:**

Paint and Graphics colors:

A. Posts and Sign Body:
   - ‘Black’ Green
   - ‘White’ Green

B. Header Assembly:
   - Campus Green PM5.440
   - Matte Finish and Satin Clear Coat to seal.

---

**BANNER**

Painted Upper Banding header component. 6” high Decal Crown mounted directly to painted sign body.

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**TEXT**

Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

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**HARDWARE**

Unless otherwise specified, all hardware is to be Stainless Steel.

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**FOOTING DETAIL**

For any and all campus signage projects, manufacturers, vendors, and sign retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in detail that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the customer.

In many cases, the supplier must provide material cost samples, material samples, or small aluminum samples for requested or required in the bid or request for estimates documents. Final submittal with graphics must be signed off by Project Manager and returned via email with final seal from vendor prior to the start of fabrication or installation. Any changes to the graphic or code must be signed off by Project Manager to ensure the submittal drawing of that specific manufacturing process.

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**Container: TYPE “C” – SMALL ROAD DIRECTIONAL**

---

**For Approval: mfake@unc.edu**

**Scale: N.T.S.**

**Date: 10.18.2010**

**Sheet: 2 of 25**

**Drawn: slerry@unc.edu**

**Checked:**

**Revision:**
General Notes:

Assemble components and Installation:

A. Sign Body Paint: Aluminum 3" x 4" Square tube welded at 45 degree cut joint intersection with internal reinforced supports.

B. Header Paint: 12" high by width, painted directly to sign body in Campus Green.

C. Sign Body Construction: Aluminum with channel edge or like assembly. Affixed to wall surface with mechanical fasteners, and filler finish for blending with painted surfaces.

D. Fasteners: SS Thread, Nut, Washer and Bolt assembly. Access holes to be filled with Epoxy to assure mounting pin will not come loose due to expansion and contracting of hard surface areas.

Finish Notes:

Paint and Graphics colors:

A. Posts and Sign Body:
    "Black" Green
    Matthews Paint Co. MP21337 R91290
    Satin Finish and Satin Clear Coat to seal.

B. Header Assembly:
    Campus Green PMG 340
    Matthews Paint Co. MP00457
    R91290 Satin Finish and Satin Clear Coat to seal.

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Text Graphics/Lettering:

3M Diamond Grade Prismatic or equal White High Performance Vinyl.

Typeface:

Utopia (Primary) or pre-approved alternate Century Schoolbook at 85% condensed format or greater as sign face requires and compressed average 10% letter spacing. Vendor must submit drawing ‘proof’ of graphics layout for review and acceptance prior to manufacture.

Logos - Gold crown Arlin 04 or equal. Inset or second color to match sign body paint code.

Logo information at:
http://www.publicrelations.uncc.edu/logo/main-logos.html

HARDWARE

Unless otherwise specified, all hardware is to be Stainless Steel.

MOUNTING DETAIL

Pin and thread mounting system or equal to all wall surfaces for service and repair and access.

Vendor and/or installer to submit detail and anchor product for approval prior to assembly of Sign Body and provide sign detail of mounting assembly in Elevation and exploded diagram.

Shown is preferred Hilti 3/8” fastener.

for any and all Exterior Signage Projects, Manufacturers, Vendors, and Sign Retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in 3D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the University.

In many cases, the supplier must provide custom paint samples, end samples, or small aluminum samples as requested or required by the bid or request for estimate documents.

Final fabrication with graphics must be signed off by Project Manager and returned via email with final resultant vendor prior to the start of fabrication.

Vendors must submit a drawing of the specific component, as Project Manager must approve of the actual drawing of that specific manufacturing process.
**General Notes:**

Assembly components and Installation:

A. Sign Body Paint: Aluminum 3” x 4”
   Square tube welded at 45 degree cut joint
   intersection with internal reinforced supports.

B. Header Paint: 12” high by width,
   painted directly to sign body in Campus Green.

C. Sign Body Construction - Aluminum
   with channel edge or like assembly.
   Affixed to wall surface with mechanical
   fasteners, and filler finish for blending
   with painted surfaces.

D. Fasteners --55 Thread, Nut, Washer and
   Bolt assembly. Access holes to be filled
   with Epoxy to assure mounting pin will not
   come loose due to expansion and
   contracting of hard surface areas.

**Finish Notes:**

Paint and Graphics colors:

A. Posts and Sign Body:
   Black

B. Header Assembly:
   Campus Green

C. Body:
   Aluminum

D. Fasteners:
   Pin, Mounting Nut, Washer and
   Bolt assembly.

**Text:**

Refer to page 4.

Utopia is the standard
font excluding the logo
which is provided by the
University Marketing
Department.

**Hardware:**

Unless otherwise specified, all
hardware is to be Stainless Steel.

**Mounting Detail**

Pin and thread mounting system or equal to
all wall surfaces for service and
repair and access.

Vendor and/or installer to submit
detail and anchor product for approval
Prior to assembly of Sign Body and
provide Sign detail of mounting
assembly in Elevation and exploded
diagram.

Shown is preferred Hilti 3/8” fastener.

For any and all Exterior Signage projects,
manufacturers, Vendors, and sign installers
must send completed detail sheets for specific structural or finish
applications. This may require field
measurement of existing installations in
addition to any specifications provided by the
contractor.

In every case, the supplier must provide
swatch past samples, final samples, or small
aluminum samples as requested or required in
the bid or required for estimate documents.
Final installation with graphics must be signed
off by Project Manager and returned via email.

Prior to installation, Project Manager must
approve in writing the submitted drawing of the
specific manufacturing process.

**Project:** 2010 Campus Exterior Signage

**Sheet title:** TYPE “D.2” – Attached Parking

**Deck Identification**

**COLOR VIEW EXAMPLE**

**TOP VIEW**

**3D VIEW**

**BANNER**

Painted direct band
header component.

**TEXT**

Refer to page 4.

Utopia is the standard
font excluding the logo
which is provided by the
University Marketing
Department.

**STANDARD DIMENSION**

5/8" – 3/8" to 5/8"

**CON DECK 1**

**CON DECK 1**

**CON DECK 1**

**CON DECK 1**
**General Notes:**

Assembly components and Installation:

A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.

B. Header – 8” high by width, painted directly to sign body in Campus Green. Text area volume may affect bend area. Optional height is 6” with 5” deep Crown Logo.

C. Crown Assembly is Painted of Vinyl application as feature, with Gold area being 04 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.

D. Sign Body - Aluminum with channel edge (see detail sheet), affixed with mechanical fasteners, and filler finish for blending with painted surfaces.

E. Footer support 3’ x 48” “C” channel steel metal footing bar. 3/8” diameter Stainless Steel hardware assembly (see detail) and #4 rebar cross pins.

F. Fasteners – 1/2” SS Bolt assembly and 1” access holes opposite of (E) fasteners must be plugged with painted ‘snap in’ cap.

G. Footing is 12” DIA. post hole 30” in depth poured to -1” finished grade.

**Finish Notes:**

Paint and Graphics colors:

A. Posts and Sign Body: ‘Black’ Green
Matthews Paint Co. MP71337 R91290 Satin Finish and Satin Clear Coat to seal.

B. Header Assembly: Campus Green PMS 340
Matthews Paint Co. MP0457 R91290 Satin Finish and Satin Clear Coat to seal.

Text: Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

**Footage Detail**

For any and all Exterior Signage projects, backblows, vendors, and sign Installers are required to submit drawings and submittals for review and approval. For any and all Exterior Signage projects, backblows, vendors, and sign Installers are required to submit drawings and submittals for review and approval. For any and all Exterior Signage projects, backblows, vendors, and sign Installers are required to submit drawings and submittals for review and approval. For any and all Exterior Signage projects, backblows, vendors, and sign Installers are required to submit drawings and submittals for review and approval.
**PROJECT:** 2010 Campus Exterior Signage

**Sheet title:** Secondary Entrance Building Identification

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### General Notes:

Assembly components and Installation:

A. Post stock: Aluminum 2” x 3” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.

B. Header - 4” high by width, painted directly to sign body in Campus Green. Text area volume may affect band size.

C. Crown Assembly: Vinyl application as feature, with Gold area being 04 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.

D. Sign Body: Aluminum with channel edge (see detail sheet), affixed with mechanical fasteners, and filler finish for blending with painted surfaces.

E. Fasteners - 1/2” SS Bolt assembly and 1” access holes opposite of (E) fasteners must be plugged with painted ‘snap in’ caps.

---

### Finish Notes:

Paint and Graphics colors:

- A. Rails and Sign Body: 'Black' Green

Matthews Paint Co. MP71337 R91290 Satin Finish and Satin Clear Coat to seal.

B. Header Assembly: Campus Green PMS 349

Matthews Paint Co. MP00457 R91290 Satin Finish and Satin Clear Coat to seal.

Text:

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Paint and Graphics/ Lettering:

- 3M Diamond Grade Prismatic or equal

White High Performance Vinyl

Typeface:

- Utopia (Primary) or pre-approved alternate Century Schoolbook at 85% condensed format or greater as sign face requires and compressed average 20%

letter spacing. Vendor must submit drawing proof of graphics layout for review and acceptance prior to manufacture.

Logo - Gold crown Ar-84 or equivalent or approved color to match sign body paint code.

Logo information at:

http://www.publicrelations.uncc.edu/logo/main/logo.html

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**ENLARGED BUILDING SECTION**

**MATERIAL**

Refer to page A.007, Sign Type F.2 for style of Sign to be used.

**TEXT**

Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

**HARDWARE**

Unless otherwise specified, all hardware is to be Stainless Steel.

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**MOUNTING DETAIL**

Pin and thread mounting system or equal to all wall surfaces for service and repair access.

Vendor and/or Installer to submit detail and anchor product for approval prior to assembly of Sign Body and provide Sign detail of mounting assembly in Elevation and exploded diagram.

Shown is preferred Hilti 3/8” fastener.

Maximum Height to center of Sign is 64”.

---

Approved: mfaake@uncc.edu

Scale: N.T.S.

Date: 10.18.2010

Sheet: 02 of 25

Drawn: slterry@uncc.edu

Checked:

Revision:
General Notes:
Assembly components and Installation:
A. Post stock - Aluminum 2” x 3” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.
B. Header - 4” high by width, painted directly to sign body in Campus Green. Text area volume may affect band size.
C. Crown Assembly - Vinyl application as feature, with Gold area being 04 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.
D. Sign Body - Aluminum with channel edge (see detail sheet), affixed with mechanical fasteners, and filler finish for blending with painted surfaces.
E. Fasteners - 1/2” x 5B Bolt assembly and 1” access holes opposite of E) fasteners must be plugged with painted ‘snap-in’ cap.

Finish Notes:
Paint and Graphics colors:
A. Rails and Sign Body:
Black Green
Matthews Paint Co. MP71137 R91290
Satin Finish and Satin Clear Coat to seal.
B. Header Assembly:
Campus Green PM5 440
Matthews Paint Co. MP70449
R91290 Satin Finish and Satin Clear Coat to seal.

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

STANDARD DIMENSION

SHEET TITLE: TYPE “F.1” – ATTACHED BUILDING IDENTIFICATION

BANNER
Painted Upper Banding header component. 3-1/8” high
Decal Crown mounted directly to the painted sign body.

TEXT
Refer to page 4.
Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

3D VIEW OF CROWN APPLIQUE

HARDWARE
Unless otherwise specified, all hardware is to be Stainless Steel.

MOUNTING DETAIL
Pin and thread mounting system or equal to all wall surfaces for service and repair and access.

For any and all Exterior Signage projects, manufacturers, vendors, and sign retailers must submit drawings and documents describing construction components, manufacturing steps, a drawing assembly in 3D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the client.

In many cases, the supplier must provide current paint samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate documents. Final fabrication with graphics must be signed off by Project Manager and returned via email with thumbprint to vendor prior to the start of manufacture. Approval via email with thumbprint to vendor prior to the start of manufacture, as Project Manager must approve in writing on the submittal drawing of that specific manufacturing process.

Approved: smake@uncc.edu
Scale: N.T.S.
Date: 10.18.2010
Sheet: 02 of 25
Drawn: slterry@uncc.edu
Checked: Revision:
PROJECT: 2010 Campus Exterior Signage

Sheet title: TYPE “F.2” – ATTACHED BUILDING IDENTIFICATION LETTERS

General Notes:

Assembly components and installation:

A. Lettering stock - Aluminum 2/4”, single cut unit, CNC or equal cut process. Edges and back to be Anodized.

B. Font – 12” – 18” (Depending on placement height on building, building surface allowance and distance factoring. Font layout with approx. 15% spacing.

Buildings may be identified using one or more sign types. Consideration should be given to size, placement, viewing distance, and architectural details when choosing a sign to identify any building. In all cases, the Campus Architect and Office of Facilities Management Design Services should be contacted for approval when signs are needed.

Finish Notes:

Paint and Graphics colors:

A. Lettering: Anodized Brushed Black

B. Stud: Stainless Steel or as specified by Vendor.

All surfaces to be smooth and free of obvious defects, voids filled where necessary. Aluminum to smooth to accept finishes.

Typeface:

Utopia (Primary) or pre-approved alternate Century Schoolbook at 85% condensed format or greater as sign face requires and compressed average 50% letter spacing. Vendor must submit drawing ‘proof’ of graphics layout for review and acceptance prior to manufacture.

Logo - If used (Gold crown in Brushed Gold or Brass coat or equal)

Logo information at: http://www.publicrelations.uncc.edu/logos/main-logos.html

MATERIAL

3/8” Brushed Black anodized Aluminum, mounted to surface with all thread pins.

TEXT

Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

HARDWARE

Unless otherwise specified, all hardware is to be Stainless Steel. All Thread tapped into back of letters and epoxy added in base for secure fasten.

STANDARD DIMENSION

Building letter stainless steel stud standoffs - Base nut or sleeve welded letter prior to coating. Threads protected during coating to allow stud entry for mounting on wall condition.

Smallest at: 12”

to Largest at: 18”

For any and all Exterior Signage projects, Manufacturers, Vendors, and Sign Retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in 3D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installation in addition to any specifications provided by the University.

In many cases, the supplier must provide current past samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate documents. Final selection with graphics must be signed off by Project Manager and returned via email with final format to vendor prior to the start of fabrication. In the event of any deviations, the Project Manager must approve in writing on the submittal drawing of that specific manufacturing process.

Approved: mfake@uncc.edu

Drawn: slerry@uncc.edu

Sheet: 02 of 25

Date: 10.18.2010

Scale: N.T.S.
General Notes:

Assembly components and installation:

A. Submittal - Vendor to provide Renderings scaled to glazed area selected for text.

B. Font - Utopia for Serif applications, and Interstate for Sans Serif lettering schemes.

C. - Standard lettering vinyl in High Performance White. Other colors must have approval by Design Services and vendor must provide render and vinyl swatch.

D. Logo - Use of University Logos must be approved by Design Services under direction of Marketing Department guidelines.

If using a Gold crown, use High Performance Arlon 04 or equal. Inset or second color to match sign body paint code.

E. Preferred Method - Reverse Cut application to interior of Glass area unless site warrants exterior need or visibility requires it.

Logo information at:
http://www.publicrelations.uncc.edu/logo/main-logo.html

MOUNTING DETAIL

Maximum Graphic Height for Directory Graphics is 72”.
Glazed areas and surfaces to be cleaned prior to installation

SPEC

The placement of the text as shown is an approximation. Final placement is to be determined with consideration for the amount of glass adjacent to the entry door.
**General Notes:**

Assembly components and installation:

**Illuminated Sign Body Construction:**

A. Sign Body Paint: Aluminum 3” x 4”

Square tube welded at 45 degree cut joint interaction with internal reinforced supports.

B. Header Lens Vinyl - PMS 349 Campus Green.

B.1 Body Text Lens Vinyl - Black Green per MPC specifications (Refer to Manual), and Crown in Translucent Gold.

C. Sign Body Construction - Steel Body Construction with assemble lens assembly. Affixed to wall surface with mechanical fasteners, and filler finish for blending with painted surfaces.

D. Fasteners - SS 5S Thread, Nut, Washer and Bolt assembly. Access holes to be filled with Epoxy to assure mounting pin will not come loose due to expansion and contracting of hard surface areas.

Vendor to submit Assembly drawings with electrical, mounting and servicing specifications for review and approval prior to starting manufacturing.

**Finish Notes:**

Paint and Graphics colors:

A. Posts and Sign Body:

- Black Green
- Matthews Paint Co. MP71317 R91290 Satin Finish and Satin Clear Coat to seal.

B. Header Assembly:

- Campus Green PMS 349
- Matthews Paint Co. MP04697 R91290 Satin Finish and Satin Clear Coat to seal.

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Test Graphics/LETtering:

- 3M Diamond Grade Prismatic or equal White High Performance Vinyl.

**Typeface:**

Utopia (Primary) or pre-approved alternate Century Schoolbook at 85% condensed format or greater as sign face requires and compressed average 10% letter spacing. Vendor must submit drawing of proof of graphics layout for review and acceptance prior to manufacture.

**Logo:**

Gold crown Arton O4 or equal. Insert or second color to match sign body paint code.

Logo information at:

- http://www.publicrelations.uncc.edu/
- logos/main-logos.html

**3D VIEW**

**COLOR VIEW EXAMPLE**

**BANNER**

Translucent Paint or color matched vinyl band header component.

Lettering to be 7 year Translucent Prismatic Vinyl in Utopia Font.

**TEXT**

Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

**STANDARD DIMENSION**

**HARDWARE**

Unless otherwise specified, all hardware is to be Stainless Steel.

**MOUNTING DETAIL**

Pin and thread mounting system or equal to all wall surfaces for service and repair and access.

Vendor and/or installer to submit detail and anchor product for approval Prior to assembly of Sign Body and provide sign detail of mounting assembly in Elevation and exploded diagram.

Shown is preferred Hilti 3/8” fastener.

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For any and all exterior signage projects, manufacturers, vendors, and sign dealers must provide a submittal drawing of the proposed sign body panel and mounting hardware for review and approval. A drawing assembly is required for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the drawings.

In many cases, the supplier must provide current paint samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate. Match finishes and graphics must be signed off by Project Manager. A drawing ofMounting will be submitted and must mirror the sign body panel layout. The submittal drawing must be submitted to the Project Manager and must include an itemized list of finishes and graphics. In some cases, the supplier must provide a drawing covering all aspects of the sign body panel and mounting hardware for approval.

A.011
**General Notes:**

- Assembly components and Installation:
  - Illuminated Sign Body Construction:
    - A. Sign Body Paint: Aluminum 3" x 4" Square tube welded at 45 degree cut joint intersection with internal reinforced supports.
    - B. Header Lens Vinyl - PM5 349 Campus Green.
    - 0.1 Body Text Lens Vinyl - Black Green per MPC specifications (Refer to Manual), and Crown in Translucent Gold.
  - Sign Body Construction - Steel Body Construction with insertable lens assembly. Affixed to wall surface with mechanical fasteners, and filler finish for blending with painted surfaces.
  - Fasteners - SS Thread, Nut, Washer and Bolt assembly. Access holes to be filled with Epoxy to assure mounting pin will not come loose due to expansion and contracting of hard surface areas.
  - Vendor to submit Assembly drawings with electrical, mounting and servicing specifications for review and approval prior to starting manufacturing.

**Finish Notes:**

- Paint and Graphics Colors:
  - B. Header Assembly: Campus Green PM5 349.
  - C. Crown in Translucent Gold.

**3D VIEW OF CROWN APPLIQUE:**

**BANNER**

- Painted direct band header component. 6" high Decal. Crown mounted directly to the painted sign body.

**TEXT**

- Refer to page 4.
- Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

**HARDWARE**

- Unless otherwise specified, all hardware is to be Stainless Steel.

**FOOTING DETAIL**

**STANDARD DIMENSION**

**COLOR VIEW EXAMPLE**

For any and all Exterior Signage projects, manufacturers, vendors, and sign dealers shall provide a set of standard structural and finish detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the University. In many cases, the supplier must provide custom part samples, end samples, or small samples as requested or required by the bid or request for estimate documents. Final fabrication with graphics must be signed off by Project Manager and returned via email with RFI signed to vendor prior to the start of manufacturing. The Project Manager reserves the right to refuse any manufacturer's samples as sent unless specifically requested by the Project Manager. As Project Manager must approve all details within the submittal drawing of that specific manufacturer process.
**General Notes:**

Assembly components and installation:

A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.

B. Header – 8” high by width, painted directly to sign body in Campus Green. Text area volume may affect band size. Optional height is 6” with 5” deep Crown logo.

C. Crown Assembly is Painted of Vinyl application as feature, with Gold area being O4 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.

D. Sign body - Aluminum with channel edge (see detail sheet), affixed with mechanical fasteners, and filler finish for blending with painted surfaces.

E. Footer support 2.5” x 40” 1/4” channel steel metal footing bar. 1/2” diameter Stainless Steel hardware assembly (see detail) and #6 rebar cross pins.

F. Fasteners - 1/2” SS Bolt assembly and 1” access holes opposite of (E) fasteners must be plugged with painted “snap in” cap.

G. Footing is 12” DIA. post hole 30” in depth poured to -1” finished grade.

**Finish Notes:**

Paint and Graphics colors:

A. Posts and Backer Body: ‘Black’ Green

Banners are 3M Diamond Grade Prismatic or equal.

White High Performance Vinyl or as specified in these documents.

**Text Graphics/Lettering:**

Interstate (Primary) or pre-approved alternate Helvetica at condensed or expanded format as sign face requires for balance and readability. Vendor must submit drawing ‘proof’ of graphics layout for review and acceptance prior to manufacture.

If any Logo is required,

Logo information at:
http://www.publicrelations.uncc.edu/logo/main-logo.html

**Hardware:**

Unless otherwise specified, all hardware is to be Stainless Steel.

**Footage Detail**

For any and all exterior signage projects, manufacturers, vendors, and sign dealers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in 3D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the designer.

In many cases, the supplier must provide current paint samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate documents. Final submittal with graphics must be signed off by Project Manager and returned via email with final proof in PDF format to vendor prior to the start of manufacturing. As Project Manager must approve in writing on the submittal drawing of that specific manufacturing process.
**General Notes:**

Assembly components and Installation:

**Illuminated Sign Body Construction:**

A. Post Assembly - Aluminum 3" x 1" Square tube welded at 45 degree cut joint interaction with internal reinforced supports.

B. Blade Assembly - 1-1/8" aluminum with smooth edges and surface to accept reflective vinyl (See Blade Note).

C. Footer support 5" x 72" C channel steel metal footing bar. 3/4" diameter Stainless Steel hardware assembly (see detail) and M4 relax cross pins.

D. Fasteners – 1/4" SS Bolt assembly and 1/4" access holes opposite of (E) fasteners must be plugged with paint ‘snap in’ cap.

E. Footing is 12" DIA. post hole 42" in depth poured to 1" finished grade.

Vendor to submit Assembly drawings with electrical, mounting and servicing specifications for review and approval prior to starting manufacturing.

**Finish Notes:**

Paint and Graphics colors:

A. Post and Arm: ‘Black’ Green

Matthews Paint Co. MP21337 R913290

Satin Finish and Satin Clear Coat to seal.

B. Blade and Angle Assembly: 3M Light Green 5100R-78 Reflective Vinyl or equal. Sample swatch to be submitted by Vendor/Fabricator for approval before assembly.

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Text Graphics/LETTERING:

3M Diamond Grade Prismatic or equal White High Performance Vinyl.

**Typeface:**

Utopia (Primary) or pre-approved alternate Century Schoolbook at 85% condensed format or greater as sign face requires and compressed average 10% letter spacing. Vendor must submit drawing ‘proof’ of graphics layout for review and acceptance prior to manufacture.

Font information at:

https://www.publicrelations.uncc.edu/logos/main-logos.html

**BLADE**

**TEXT**

Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

**HARDWARE**

Unless otherwise specified, all hardware is to be Stainless Steel.

For any and all Exterior Signage projects, manufacturers, vendors, and sign retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assembly in 3D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the University.

In many cases, the supplier must provide current paint samples, vinyl samples, or small aluminum samples as requested or required in the bid or request for estimate documents. Final submission with graphics must be signed off by Project Manager and returned via email with ‘proof’ sent to vendor prior to the start of production. Vendor must provide sample swatch for review and acceptance prior to manufacture, as Project Manager must approve in writing on the submittal drawing of that specific manufacturing process.

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Approved: mfake@uncc.edu  Scale:  N.T.S.  Date:  10.18.2010  Sheet:  02 of 25  Drawn:  slterry@uncc.edu  Checked:  

Revision: A.014
General Notes:
Assembly components and installation:
A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint
intersection with internal reinforced supports.
B. Sign Backer – 1/8” Aluminum to match sign dimension with 3/16” x 2” rear
support base welding to vertical post 'legs', with 4 – 9/32” holes to match sign hole
template to mount powder coated Backer and University Permit sign. Affixed with
mechanical fasteners, and filler finish for blending with painted surfaces.
C. Footer support 2 1/2” x 3” channel
steel metal floating bar. 1/2” diameter
Stainless Steel hardware assembly (see
detail) and #4 rebar cross pins.
D. Fasteners - 5/8” SS Bolt assembly and
1” access holes opposite of (E) fasteners
must be plugged with painted ‘snap in’
caps.
E. Footing is 12” dia. post hole 30” in
depth poured to 1” finished grade.

Finish Notes:
Paint and Graphics colors:
A. Posts and Backer Body:
'Black' Green
Matthews Paint Co. MP71137 R91290
Satin Finish and Satin Clear Coat to seal.

All surfaces to be smooth and free of
obvious defects; seals filled where
necessary. Aluminum to be prime coated
to accept finishes.

Text/Graphics/Lettering:
3M Diamond Grade Prismatic or equal
White High Performance Vinyl or as
specified in these documents.

Typeface:
Interstate (Primary) or pre-approved
alternative Helvetica at condensed or
expanded format as sign face requires for
balance and readability. Vendor must
submit drawing proof of graphics layout
for review and acceptance prior to
manufacture.

If any Logo is required,
Logo Information at:
http://www.publicrelations.uncc.edu/
logos/main-logo.html

VINYL
Sign Blank to be covered
With 3M™ Grade III
Prismatic White Vinyl.
Lettering in Interstate font
Using Grade II prismatic
Vinyl and Permit Square
Use grade II in appropriate
Color for permit status.
ASTM Type X1 specification

STANDARD DIMENSION

TEXT
Refer to page 4.
Utopia is the standard
font excluding the logo
which is provided by the
University Marketing
Department.

HARDWARE
Unless otherwise specified, all
hardware is to be Stainless Steel.

FOOTING DETAIL

COLOR VIEW EXAMPLE

Approved: mfake@uncc.edu
Scale: N.T.S.
Date: 10.18.2010
Sheet: 02 of 25
Drawn: slterry@uncc.edu
Checked: 
Revision: 

2010 CAMPUS EXTERIOR SIGNAGE

SHEET TITLE: TYPE "J" – PARKING LOT IDENTIFICATION
Project: 2010 Campus Exterior Signage
Sheet title: TYPE “J.1” – PARKING LOT IDENTIFICATION (LOW)

General Notes:
Assembly components and Installation:
A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.
B. Sign Backer – 1/8” Aluminum to match sign dimension with 3/16” x 2” rear support bar welding to vertical post ‘legs’, with 4 – 3/8” holes to match sign hole template to mount powder coated Backer and University Permit sign. Affixed with mechanical fasteners, and filler for finish for blending with painted surface.
C. Footer support 2 1/2” x 3 1/2” channel steel metal footing bar. 1/2” diameter Stainless Steel hardware assembly (see detail) and #4 rebar cross pins.
D. Fasteners – 3/8” SS #8 Bolt assembly and 1” access holes opposite of #8 fasteners must be plugged with painted ‘snap in’ caps.
E. Footing is 12” dia. post hole 30” in depth poured to 1” finished grade.

Finish Notes:
Paint and Graphics colors:
A. Posts and Backer Body:
  ‘Black’ Green
  Matte
  Paint Co. MP71337 R91290
  Satin Finish and Satin Clear Coat to seal.
  All surfaces to be smooth and free of obvious defects; soils filled where necessary. Aluminum to be prime coated to accept finishes.
Text Graphics/Lettering:
3M Diamond Grade Prismatic or equal White High Performance Vinyl or as specified in these documents.
Typeface:
Interstate (Primary) or pre-approved alternate Helvetica at condensed or expanded format as sign face requires for balance and readability. Vendor must submit drawing ‘proof’ of graphics layout for review and acceptance prior to manufacture.
If any Logo is required,
Logo Information at:
http://www.publicrelations.uncc.edu/logos/main-logo.html

VINYL
Sign Blank to be covered With 3M™ Grade III Prismatic White Vinyl. Lettering in Interstate font using Grade II prismatic Vinyl. For Permit Square, use grade II in appropriate color for permit status.

TEXT
Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

STANDARD DIMENSION

HARDWARE
Unless otherwise specified, all hardware is to be Stainless Steel.

FOOTING DETAIL

for any and all exterior signage projects, manufacturer, vendor, and sign detail sheets for specific structural or finishing applications. This may require field measurement of existing installations in addition to any specifications provided by the University.

In many cases, the supplier must provide custom post samples, metal samples, or small aluminum samples as requested or required in the bid or request for estimate documents. Final fabrication with graphics must be signed off by Project Manager and returned via email with purchase order number in subject line or faxed in order to kick off fabrication. Vendor prior to the start of fabrication, all forms such as work order and list of parts must be reviewed and approved by Project Manager. In instances where the supplier is new, or Project Manager must approve in writing on the submit drawing at that specific manufacturing process.

Approved: mfake@unc.edu  Scale: N.T.S.  Date: 10.19.2010  Sheet: 02 of 25  Drawn: slterry@unc.edu  Checked:  Revision: 
General Notes:
Assembly components and Installation:
A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.
B. Header Board - Assembly painted in Campus Green, and affixed with both mechanical fasteners and adhesive systems.
C. Crown Assembly affixed to Band as feature, with Gold area being 04 Gold Vinyl or Paint equal, and dark green area painted to match sign body and posts.
D. Sign Body - Aluminum with channel edge (see detail sheet), affixed with mechanical fasteners, and filler finish for blending with painted surfaces. Stainless Steel/Hinges, LED interior Cabinet Lighting.
E. Footer support 8” x 12” C-channel steel metal footing bar. 3/4” diameter Stainless Steel hardware assembly (see detail) and 3/4” rebar cross pins.
F. Fasteners – #5 SS Bolt assembly and 3” access holes opposite of (E) fasteners must be plugged with painted ‘snap in’ cap.
G. Footing is 12” DIA. post hole 42” in depth poured to – 1” finished grade.

Finish Notes:
Paint and Graphics colors:
A. Posts and Sign Body:
   ‘Black’ Green
   Matthews Paint Co. MP71317 R91290 Satin Finish and Satin Clear Coat to seal.
   Alternate – RAL 6012 Black Green
B. Header Assembly:
   Campus Green PMS 449
   Matthews Paint Co. MP00457
   R91290 Satin Finish and Satin Clear Coat to seal.
C. Canopy Assembly:
   ‘Natural White LHV’
   Matthews Paint Co. MP42232SP
   R282204SP Satin Finish and Satin Clear Coat to seal.
   Alternate – RAL 9001 Signal White

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Text Graphics/Lettering:
3M Diamond Grade Prismatic or equal White High Performance Vinyl.
Logo: Gold crown Arlon 04 or equal. Insert or second color to match sign body paint code.
Logo information at: http://www.publicrelations.uncc.edu/logos/main-logo.html

BANNER
Two piece Band-board header component. To be mounted with mechanical fasteners combined with adhesive product to eliminate Separation from sign body.

TEXT
Refer to page 4. Utopia is the standard font excluding the logo which is provided by the University Marketing Department.

HARDWARE
Unless otherwise specified, all hardware is to be Stainless Steel.

FOOTING DETAIL

COLOR VIEW EXAMPLE

for any and all exterior signage projects, specifications, vendors, and sign facilities mounted on or near University of North Carolina at Charlotte facilities. In creating fabrication components, manufacturing steps, a drawing assembly in 2D that includes detail sheets for specific structural or finish applications. This may require field measurement of existing installations in addition to any specifications provided by the manufacturer.

In many cases, the supplier must provide current paint samples, yard samples, or small aluminum samples as requested or required to the bid or request for information. Final collaboration with graphics must be signed off by Project Manager and returned via email.

Approved: mfake@uncc.edu
Scale: N.T.S.  Sheet: 02 of 25  Drawn: slterry@uncc.edu  Checked:  Revision:
General Notes:

Assembly components and installation:
A. Post stock - Aluminum 3” x 4” Square tube welded at 45 degree cut joint intersection with internal reinforced supports.
B. Sign Backer – 1/2” Aluminum to match sign dimension with 3/12” x 2” rear support beam welded to vertical post ‘legs’, with 4 - 1/8” holes to match sign hole template to mount powder coated Backer and University Permit sign. Affixed with mechanical fasteners, and filler finish for blending with painted surfaces.
C. Footer support: 2” x 12” PVC channel steel metal footing bar. 3/8” diameter Stainless Steel hardware assembly (see detail) and #8 rebar cross pins.
D. Fasteners - 3/8” SS Bolt and Allen screw and 1” access holes opposite of 0” fasteners must be plugged with painted ‘snap in’ cap.
G. Footing is 12” dia. post hole 30” in depth poured to 1” finished grade.

Finish Notes:

Paint and Graphics colors:
A. Posts and Backer Body:
   ‘Black’ Green
   Matthews Paint Co. MP21337 R91290
   Satin Finish and Satin Clear Coat to seal.

All surfaces to be smooth and free of obvious defects; voids filled where necessary. Aluminum to be prime coated to accept finishes.

Text Graphics/ Lettering:
1M Diamond Grade Prismatic or equal White High Performance Vinyl or as specified in these documents.

Typeface:
Interstate (Primary) or pre-approved alternate Helvetica at condensed or expanded format as sign face requires for balance and readability. Vendor must submit drawing ‘proof’ of graphics layout for review and acceptance prior to manufacture.

If any Logo is required,
Logo information at:
http://www.publicrelations.uncc.edu/logos/main-logo.html

In any and all Exterior Signage projects, Manufacturers, Vendors, and Sign Retailers must provide submittal drawings listing all construction components, manufacturing steps, a drawing assemblies in 3D that includes detail sheets for specific structural or finish applications. The submittal must include a measurement of existing installations in addition to any specifications provided by the customer.

In many cases, the supplier must provide custom post samples, and samples, or small panels or samples as requested or required in the bid or request for estimate documents. Final fabrication with graphics must be signed off by Project Manager and returned via email with final ‘proof’ to vendor prior to the start of any fabrication. If the ‘signature’ does not occur, or is not in the form of the drawing, so Project Manager must approve in writing on the submittal drawing of that specific manufacturing process.
SECTION 3, ANNEX D.1

CAMPUS INTERIOR SIGNAGE STANDARDS
2010 Campuswide Interior
Signage and Graphics Systems

A comprehensive system of signs for building navigation and interior space designation.
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**Introduction**

**Graphic Standards**

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- Type B – ADA Restroom ID
- Type B.0 – Restroom ID
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- Type B.2 – Stairwell Fire Exit Exterior ID
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In an effort to present a consistent image and visual harmony throughout The University of North Carolina at Charlotte campus, an overall signage program has been developed. This way-finding system will help guide students, faculty, staff and visitors to their destinations throughout the campus.

The purpose of these signage standards is to establish basic guidelines for the fabrication and installation of all exterior identification, informational and directional signage. These standards establish certain policies for the execution of signage as well as providing a description of various sign types, graphic uses, materials, Specifications, fabrication and installation procedures, etc.

All signage must be in conformance with these standards and approved by the UNC Charlotte Department of Facilities Management prior to fabrication and installation. The sign types herein identified for UNC Charlotte adhere to the codes and regulations for the City of Charlotte, North Carolina.

Specific signs on public roadways may require sign permits prior to fabrication. The fabricator shall be responsible for obtaining any required permits from the City. A construction drawing has been completed for each sign type and may be obtained at the UNC Charlotte Department of Facilities Management.

These drawings must be complied with, though fabrication methods and materials may be altered in attempt to produce a better product with approval of Facilities Management Design Services. The fabricator shall submit in writing for approval any suggested revisions to these drawings to the UNC Charlotte Department of Facilities Management prior to making the revision. Sign shapes, sizes, colors, finishes, graphics, etc. may not be changed. It is required that the fabricator produce shop drawings of all signs to be fabricated, and submit them to the Project Manager for approval.
The vendor must provide Submittal Drawings with layout and character sizing, including compression and spacing sizes used to create readable and functional signage. Use of Sub-Brand Logos must be pre-approved by Marketing before including in sign fabrication if other than the Crown or the Crown and University name as depicted above in standard black or PMS 349 Campus Green.

http://www.publicrelations.uncc.edu/logo/main-logo.html
http://www.publicrelations.uncc.edu/logo/sub-brand.html

**TYPE STYLE AND COPY**

To maintain consistency, the typeface used on all Logos is to be UTOPIA. The Tactile or Raised Relief sign copy will be Interstate upper case. Utopia and Interstate are the new 2009 standard fonts created for the University and compatible for PC based vinyl cutting devices and is required for this program. While the point sizes of text will vary, the letter spacing condensed characters and letter kerning must be followed. All copy should be 85% condensed and have -.15 letter spacing.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

**ARROW AND COPY**

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.

There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
One piece etched sign construction.

TYPE A
FIXED ROOM IDENTIFICATION

CURRENT BUILDING SAMPLE LIST WITH NEW DESIGN
MANUAL SIGNAGE

WINNINGHAM
DENNY
FRETWELL
CONE CENTER

STUDENT HEALTH CENTER
ROWE ARTS
BIOINFORMATICS CAMERON
KING BUILDING

The vendor must provide Submittal Drawings with layout and character sizing, including compression and spacing sizes used to create readable and functional signage.

TYPE STYLE AND COPY

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program. While the point sizes of text will vary (Std. is ¾”), the letter spacing condensing or spacing of characters and kerning balance must be followed.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.
Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief.
Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

ARROWS AND COPY

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.

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One piece etched sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

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There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
Lower section etched sign construction. Upper clear acrylic face with painted back bands. Attached to black acrylic backer.

UPDATEABLE ROOM IDENTIFICATION

The vendor must provide Submittal Drawings with layout and character sizing, including compression and spacing sizes used to create readable and functional signage.

**FABRICATION AND MOUNTING**

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program.

While the point sizes of text will vary (Std. is ¾”), the letter spacing condensing or spacing of characters and kerning balance must be followed.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

**ARROWS AND COPY**

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There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
One piece etched sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

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The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications. Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief. Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

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Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief.

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**FABRICATION AND MOUNTING**

One piece etched sign construction.
One piece etched sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

**TYPE STYLE AND COPY**

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program. While the point sizes of text will vary (Std. is ¾”), the letter spacing condensing or spacing of characters and kerning balance must be followed.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief.

Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

**FABRICATION AND MOUNTING**

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.

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**ARROWS AND COPY**
The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

<table>
<thead>
<tr>
<th>TYPE STYLE AND COPY</th>
<th>FABRICATION AND MOUNTING</th>
<th>ARROWS AND COPY</th>
</tr>
</thead>
<tbody>
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While the point sizes of text will vary (Std. is ¾”), the letter spacing condensing or spacing of characters and kerning balance must be followed.

**FABRICATION AND MOUNTING**

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

**ARROWS AND COPY**

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.

There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
One piece etched sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program. While the point sizes of text will vary (Std. is \( \frac{3}{4} \)"), the letter spacing condensing or spacing of characters and kerning balance must be followed.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications. Chemically etched inset \( \frac{1}{32} \)" to meet 2010 ADA Standards for Tactile relief.

Signs to be mounted with secure 2-way tape for variable surfaces, and be located 66" to center of the sign (see NBCIR 18.4 for mounting heights and wall and doorway placement requirements).

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.

There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.

TYPE C.1 ADA WAYFINDING IDENTIFICATION
The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

**Type Style and Copy**

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program. While the point sizes of text will vary (Std. is ¾”), the letter spacing condensing or spacing of characters and kerning balance must be followed.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief. Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

**Fabrication and Mounting**

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief. Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

**Arrows and Copy**

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**Left side section etched sign construction.** Right clear acrylic face with painted back bands. Attached to black acrylic backer.

**TYPE D**

**LARGE ROOM IDENTIFICATION DIRECTORY**

Use when area has Master Entry to Suite of Offices or Groups

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### TYPE STYLE AND COPY

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program.

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### FABRICATION AND MOUNTING

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Signs to be mounted with secure 2-way tape for variable surfaces, and be located 60” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

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One piece etched sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

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Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief.

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One piece etched sign construction.

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There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
Full Face clear acrylic with painted back bands attached to black acrylic backer spaced by adhesive strips.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

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There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
One piece etched sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

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One piece etched – raised relief sign construction.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

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**FABRICATION AND MOUNTING**

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

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There are instances where a curved arrow or turned arrow is required to convey correct directions. The vendor must provide drawings for approval prior to fabrication.
Full Face clear acrylic with painted back bands attached to black acrylic backer spaced by adhesive strips.

The vendor must provide Submittal Drawings with layout, character and pictogram sizing, including compression and spacing sizes used to create readable and functional signage.

To maintain consistency, the typeface used on all sign copy will be Interstate in upper case. Interstate is the new 2009 standard font created for the University and compatible for PC based vinyl cutting devices and is required for this program. While the point sizes of text will vary (Std. is ¾”), the letter spacing condensing or spacing of characters and kerning balance must be followed.

The Fabricator is to provide scaled text layouts of all signs to the University for approval prior to fabrication. Refer to construction drawings for detailed specifications.

Chemically etched inset 1/32” to meet 2010 ADA Standards for Tactile relief.

Signs to be mounted with secure 2-way tape for variable surfaces, and be located 66” to center of the sign (see NCBC 18.4 for mounting heights and wall and doorway placement requirements).

The arrow as shown should be used for all directional needs. The arrow should be used in an orientation which will make the directional information most obvious. The relationship between the arrow and the type as shown should always be maintained.

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**TYPE L.1**

**INSERTABLE 18 X 36 WAYFINDING DIRECTORY**

Fullview Directory with clear acrylic Face. Black aluminum frame attached wall by adhesive strips and mechanical fasteners.

---

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INTRODUCTION
All components and finished units within this program shall be manufactured by professional fabricators. An example of the fabricator’s previous work shall be reviewed by UNC Charlotte prior to production.

PERMITS (As Applicable)
The Vendor shall secure all required sign permits and licenses prior to the purchase of materials or the beginning of fabrication of any signs as required by local code. The Vendor shall notify the Owner immediately of any problems that arise during the permitting process if applicable. It is the responsibility of the Vendor to allow time in his work schedule for any permitting and process, securing such permits and inspections in a timely fashion so as to allow subsequent fabrication and installation to be completed on schedule.

SHOP DRAWINGS
Shop drawings must be furnished for UNC Charlotte Design Services review prior to fabrication showing specified materials, construction details, installation details or steps, dimensions, grade etc.

Note: Designer’s Working Drawings are for fabricators’ and suppliers’ reference and do not limit fabricators and suppliers from responsibility to ensure appropriate engineering for fabrication and installation. Shop drawings for all items furnished under this Contract shall include a complete sign schedule, scaled message patterns of all Sign Text Layouts, complete fabrication details of all signs, and timeline to completion.

Attachment details including all mechanical fasteners, steel support framing, hinges and removable panels, location, size, dimensions, and finishes or any other related items necessary to fabricate and install finished signs, exact identification of all paint colors and paint formulas, vinyl, and other product used in fabricating the sign(s).

TEXT/ARROWS/SYMBOLS
Approved text, directional arrows, and symbols are to be reviewed by Facilities Management Design Services for use. The sign fabricator is to submit scaled copy layouts for approval.

For typical typographic layouts and type style per sign type, see 2010 Campuswide Exterior Signage pages: S1-3. All symbols or forms used for final sign application or final finishing shall be computer cut. Hand Cut letters or symbols are not acceptable.

SUBMITTALS
Submit two (2) complete sets of shop drawings (including text layouts for each sign) at an agreed upon scale, for review prior to fabrication of all items. Owner’s review does not relieve the Vendor from responsibility for errors in dimensions nor for inadequate or improper use of materials for construction.

SUBSTITUTIONS
Any request for substitutions which does not clearly show equality to the Owner’s satisfaction will be rejected. The burden of proof that the proposed substitution is equal to and meets the requirements specified and shown in the project documents including type, design, quality, operation, function, use, size, appearance, capability and manufacturer shall be solely the responsibility of the bidding Vendor.
PAINT AND VINYL SYSTEM

Paint colors are specified in the drawings using the Matthews Paint Company System, specifically formulated for the UNC Charlotte sign system.

The recommended vinyl film system to be Arlon Vinyl Film by Arlon or 3M. Vinyl sheeting for sign text messages shall be computer cut, High Performance or Reflective Grade vinyl films 3.5 to 6.7 mils thick with continuous pressure sensitive adhesive backing.

AS-BUILT DRAWINGS

Upon completion, the vendor shall provide the owner with two (2) complete sets of as-built drawings on CD in AutoCAD and PDF. As-Built drawings shall include Location Plans and Sign Schedules.

FABRICATION/MATERIALS

Aluminum plates, extrusions and supports shall conform to the requirements of the design intent details, ASTM standards and all applicable building codes, and shall be as submitted and approved on the shop drawings. All screws, bolts and fasteners where used with aluminum shall be stainless steel. All fasteners are to be painted. All fastenings shall be as indicated on the drawings and shall be compatible to the materials fastened. Isolation materials shall be provided between unlike metals. Before fabrication the Vendor shall make on-site measurements and verify that site conditions and/or current architectural drawings conform to the signage and graphics drawings and shall be responsible therefore. All work shall be fabricated to approved shop drawings and shall be first class workmanship in accordance with the best trade practices.

All joints, corners, miters, splices, or signage shall be accurately machined, filled, fitted and rigidly framed together at joints and contact points.

All materials are to be as specified on working drawings unless written approval has been obtained for material substitution by The office of Design Services at UNC Charlotte.

ALUMINUM

All aluminum sheet for signage is to be .125” thickness unless specified otherwise. All welding is to be seamless welded. All depressions or raised areas, due to welding, must be filled and ground smooth prior to priming and painting. All screws, brackets and fasteners in contact with aluminum are to be stainless steel or aluminum. Non-corrosive and non-staining.

PLASTICS

All plastics are to be PVC, Polycarbonate, or acrylic sheet unless specified otherwise. Other plastics may be substituted as long as a test sample is submitted, prior to fabrication, for owner’s approval.

FINISHES

All fabrication materials are to be smooth and free of all defects. Cut lines, welds, slag, dust, dirt, grease and other surface defects are to be removed prior to finishing.
PRIMING AND PAINTING

All materials are to be applied properly according to manufacturer’s recommendations and specifications. All paints, primers, solvents, top coats, etc., are to be chemically compatible.

Step A - Use Aluminum specific cleaner on all aluminum parts to receive paint, followed by using bare metal sealer coating and then Acrylic Primer Sealer.

Paints for aluminum shall be Matthews Paint Company polyurethane opaque satin paint, with satin clear finish seal coat applied. Application shall consist of 1 coat of Metal primer @ .25mil minimum and 2 coats of opaque satin Acrylic Polyurethane paint of specified color. 1 mil DFT minimum each coat for a total dry film thickness of two (2) mils DFT.

Paints for spraying acrylics shall be matte Acrylic Polyurethane engineered for extreme heat and finish retention. Clear Satin finish shall be applied to a total dry film thickness of two (2) mils DFT. Acrylic material shall be 1/16”, 1/8”, and ¼” Acrylic Plexiglass, Matte Clear with a P95 finish, or approved equal as shown on Drawings.

Order or mix paint for each color in quantity to assure consistent application for all signs in a given color. Vendor shall allow paint surfaces to thoroughly air dry for a minimum of forty eight (48) hours prior to the application of masking film which shall be applied to protect all sign surfaces during shipping and installation.

All products below may have an “or equal”, but product submittals must be provided and approved prior to manufacturing and application of finishes, and must meet or exceed current product below.

Paint must cure for a minimum of forty eight (48) hours or longer based on Manufacturer guidelines prior to the application of masking film which shall be applied to protect all sign surfaces during shipping and installation.

Matthews Paint PPG Ind.
LakeView Corporate Park • 8201 100th St. • Pleasant Prairie, WI 53158 • 1.800.323.6593 •
www.matthewspaint.com

Arlon Adhesives & Films Division
281 I South Harbor Blvd.
Santa Ana, CA 92704-5805 – (714) 540-2811 - (800) 854-0361

Rohm and Haas Plastic Technology Center
PO Building 117.
Route 13 & 413
Bristol, PA 19007 - (215) 785-8000

SAMPLES

Vendor shall submit to the owner 6” x 6” samples of all materials and paint finishes of specified finishes unless vendor has previously installed approved product and code. All submittals shall bear the exact material identification and/or paint formula marked on the back surface.
INSTALLATION

All freestanding signs are to be mounted in concrete, except where specified otherwise. Footing size and depth to be determined by fabricator. Installer to verify final locations based on vicinity map provided by University Project Manager. All concrete footings are to be 3000 psi and should be sufficient to ensure the structural stability of the sign unit in high wind conditions.

All free standing signs are to have a concealed sleeve underground to allow for the removal of signs for maintenance and painting. The sleeve system will be set in concrete footings and contain a tamperproof pin for access.

All signs are to be level and plumb. Use current Campus signage for template of installation.

All signage locations are to be approved by client and meet all local zoning codes for setback and height restrictions.

Sign locations are to be staked and identified with the Dept. of Facilities Management unless otherwise instructed.

The fabricator is to verify underground utilities with the Office of Facilities Planning prior to installation of footings.

The fabricator will get approval by a UNC Charlotte representative prior to driving a vehicle off designated streets or driveways in order to reach a sign location. Where special job conditions occur or where there is uncertainty as to interpretation, before execution of the work, vendor shall inform the Department of Facilities Management Design Services Project Manager.

UTILITY LOCATES

Installer is responsible for calling in public utility locates where property of University meets the City of Charlotte or County line. Project Manager will coordinate campus locates with internal departments in conjunction with calling One Call regarding on campus locate work.

CLEANING/PROTECTION REQUIREMENTS

Vendor shall not only protect his work at all times, but shall also protect all adjacent work and materials by suitable covering or other methods during progress of his work. They shall remove all rubbish, excess soil and rock; and accumulated materials and shall leave the work in a clean, orderly and acceptable condition. Any existing landscape material that is removed or disturbed during the installation of signs shall be replaced or restored to its original condition.

STORAGE

All signs, extrusions, graphic or signage material shall not be exposed to damaging conditions or abrasion during storage, fabrication, delivery or installation. All signs shall be stored in a weather protected space and not be subject to natural elements as determined in conjunction with the Owner.
Specifications

SAFETY CONDITIONS

The Vendor or Bidder shall maintain safety standards for persons employed in accordance with the standards set by the Occupational Safety and Health Act (latest adoption).

The University of North Carolina at Charlotte and Facilities Management Design Services Group shall be held harmless for any accident, injury or any other incident resulting from noncompliance with these standards.

GUARANTEE

Vendor shall furnish a written guarantee stating that all materials and workmanship are guaranteed against defects for a period of one (1) year after completion and final acceptance of the installed or received work (based on Purchase requisition outlines), and that all materials and installation are in complete accordance with these and manufacturer’s written specifications and/or recommendations.

This guarantee shall be in addition to and not in lieu of other guarantees available to the University by North Carolina State Law.

Defects due to faulty material, workmanship or damage to existing surfaces prepared by other trades during the installation of signs and during the guarantee period shall be repaired to the original condition or replaced by the Vendor at their expense, to the satisfaction of the University representative, Design Services.
ANNEX F

DESIGN GUIDE ILLUSTRATIONS
BENCH SHALL BE MAGLIN MLB300W
COLOR SHALL BE RAL 6012
APPROVED EQUAL BY OWNER
1. SOFT EDGE DETAIL

- 8"x4"x2-1/4" RED ENGLISH EDGE PAVERS
- 8"x4"x2-1/4" RED ENGLISH EDGE PAVERS DOUBLE SOLIDER COURSE EDGING
- SLOPE: 1/4"/FT

2. SOFT EDGE DETAIL

- 1/2" MAX. 0 GRANITE SCREENINGS IN JOINTS
- 8"x4"x2-1/4" FLASHED PEDESTRIAN ENGLISH EDGE PAVERS
- 8"x4"x2-3/4" FLASHED VEHICULAR ENGLISH EDGE PAVERS
- CROSS SLOPE 1/4" PER FT. FOR DRAINAGE
- 1-1/2" MAX. GRANITE SCREENINGS BEDDING COURSE
- GEOTEXTILE SOIL SEPARATOR
- 100% CRUSHED GRAVEL 3/4" MAXIMUM
- 4" MIN. FOR PEDESTRIAN WALK
- 8" MIN. FOR VEHICULAR CROSSWALK
- VEHICULAR PAVERS SHALL BE PLACED WITHIN SERVICE DRIVE OR OTHER STREET LOCATIONS.
- COMPACTED SUBGRADE

3. CURB EDGE DETAIL

- SET BRICK FLUSH
- 1/4" PER FOOT SLOPE TOWARDS CURB UNLESS OTHERWISE ON PLAN
- 1" MIN. DEPTH 100% CRUSHED GRAVEL 3/4" MAX. SIZE
- COMPACTED SUBGRADE

<table>
<thead>
<tr>
<th>UNIVERSITY OF NORTH CAROLINA AT CHARLOTTE</th>
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| DESIGN GUIDELINES FOR BRICK PAVER WALKWAY SECTIONS & DETAILS |}
<table>
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<th>APPROVED SHOPS</th>
<th>SCALE</th>
<th>ISSUE DATE</th>
<th>DETAIL NO.</th>
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<td>SHOPS ALL</td>
<td>N.T.S.</td>
<td>3-18-00</td>
<td>DW-2</td>
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</tbody>
</table>
Modified Herringbone pattern, flashed red pavers.

8" Soldier Course, typ. at edges, solid red pavers.

Brick banding may be used when relating to building modules and approved by the design section or facilities department.

- Narrow Walkway
- Wide Walkway

5' Radius

Brick Walk Intersections

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<tr>
<th>Approved</th>
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<td>3-18-XX</td>
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NOTES:
1. WAVE TYPE BIKE RACK (7 TO 9 BIKES PER RACK) MANUFACTURED BY GRABER USA MADISON, WISCONSIN.
2. BIKE RACK TO BE MOUNTED BELOW GRADE.
3. COLOR TO BE MALAGA GREEN FROM DEVOE (1UM40A), PMS 5605 OR EQUAL SUCH AS TIGER DRYLAC "RAL 6012" (AVAILABLE THROUGH GRABER USA).
- Posts Shall Be 3” O.D. Metal Pipe
- Post and Chain Shall Be Painted Malaga Green
- Align Posts With Brick Paving Bands

Final Layout shall be prepared by the Facilities Planning Department prior to installation.
PAINTING NOTE
ALL METAL SHALL BE PAINTED TO MATCH DEVOE PAINT CO. MALACA GREEN 1UM40A, PMS 5605 COLOR CODE.
PAIN SCHEDULE
FERROUS METAL:
ONE (1) COAT RUST PENETRATING METAL PRIMER
TWO (2) COATS ALKYD ENAMEL
HAND RAIL

PAINTING NOTE:
HAND RAILS SHALL HAVE 1 COAT PRIMER AND
TWO COATS DEVOE ALKYD ENAMEL MALAGA GREEN
DEVOE NUMBER 1UM40A OR PMS 5605

SAFETY RAIL

1 1/2" OUTSIDE DIAMETER

1" X 1 1/2" BAR STOCK

CONC. FTG. 3600 PSI

10"
HAND RAIL

PAINTING NOTE
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DEVOE PAINT CO. MALAGA GREEN 1UM40A,
PMS 5605 COLOR CODE.

PAINT SCHEDULE
FERROUS METAL:
ONE (1) COAT RUST PENETRATING METAL PRIMER
TWO (2) COATS ALKYD ENAMEL
Charlotte Research Institute

Design Standards
Introduction

The Charlotte Research Institute is envisioned as a partnership between corporate Charlotte and UNC Charlotte. It will provide a clear opportunity to address a compelling need of the region and the state. Leveraging Charlotte’s existing strengths and better positioning UNC Charlotte as a major research university are crucial if Charlotte is to develop and attract the high-technology and research interests it desperately needs. (Advantage Carolina)

This Design Guideline serves as an outline of site features for the Charlotte Research Institute Campus. The Master Plan is establishing a campus that will have an urban atmosphere. The architectural style, brick walks, lighting signage and other amenities will be traditional in design. The intent is to create a visual identity that will leave a lasting impression on those who visit and work at the campus.

The following pages provide the product names and sources. Consultants who wish to make substitutions must submit photographs, specifications and justifications to the Facilities Planning Department for review early in the design process.
Brick Walk
Pine Hall Brick
English Edged Paver with Flashed Fields and Red Border
Refer to Campus Sidewalk Master Plan
Herringbone Pattern
See UNC Charlotte Sidewalk Master Plan 1997
3. Maglin Metal Bench: Color: Malaga Green

3. Metal Bench: Color: Malaga Green

Benches
Pedestrian Light Fixture

Antique Street Lamps
LT30K 150S MOG ACT GR3 TV Multi-Tap Color Fixture
Color to be Malaga Green

Pedestrian Light Post

Antique Street Lamps
PX W19 12 S4 Color Aluminum Post
Color to be Malaga Green

Pedestrian Lights
Stop Sign / Street Name Sign Options
Other sign types can also be mounted on posts

All Signs shall use Antique Street Lamps
Washington Series:
Post PX W17 6 F4
Stop Sign: Frame STO30P
Yield Sign: Frame STT30P
Traffic Circle: Frame STD30P
One Way: STR3612P

Post Mounted Building Sign
Similar to Decorative Ash Urn
Creates Continuity

Maglin 32 G. Receptacle

Decorative Ash Urn ($550 each)

Receptacles/Ash Urns
ANNEX G

DRAWINGS STANDARDS
DREWING TECHNOLOGY REQUIREMENTS:

1.1 Drawing Technology Specifics: Do not send AutoCAD files in pdf format.
   A. All drawings shall be in 2000i AutoCAD format (.dwg).
   B. Microstation drawings will need to be saved as AUTOCAD drawings.
   C. Plot style table (ctb files) shall come with the drawings.

1.2 UNC Charlotte reserves the right of refusal of AUTOCAD drawings that are not conforming with UNC Charlotte’s CAD standards outlined in this document.

1.3 Drawing Types:
   A. As-built drawings must be sent in an AUTOCAD format.
   B. Shop drawings specific and or custom to UNCC must be sent in an AUTOCAD format.
   C. General shop drawings, not specific to UNCC may be sent in other standard digital formats such as pdf, doc, and tiff.
   D. This applies to all designers, contract designers, contractors and sub-contractors. If designers subcontractors are not in direct contract with UNC Charlotte it is the designer’s responsibility to get the drawings to UNC Charlotte in the correct format.

1.4 All X-REFS shall be included along with the AS-BUILT drawings.
   A. Most designers forget to include the X-REF because it is merely a ghost background which typically resides on the company’s server.

1.5 During preliminary design and construction phases CAD construction documentation along with any amendments will be provided in an AUTOCAD 2000i format to UNCC as they become available.

1.6 If renderings are to be prepared for a project they should also be sent to UNC Charlotte in a 3dMax or 3dViz format (.max). AS-BUILT should come in three forms:
   A. One set of hard copy drawings on regular opaque paper.
   B. One set of drawings on vellum/ reproducible bond.
   C. One electronic copy in AutoCAD. All drawings must be drawn “Life size” sometimes referred to as “Full size”.

1.7 In paper space setup all drawings with a rectangle indicating the edge of paper base upon the plot scale and sheet size. Place the rectangle on a layer named “border”. The bottom left corner is the drawings “lower limits” and will be at 0,0. The upper right corner of the rectangle is the “upper limit. Set the “units” command to architectural. Do not draw any entities outside of the limits set up by the rectangle on the layer “border”. All surveys should be compiled in North American Datum 83 using North Carolina State Plane Coordinate System. 14) In model space designers/drafters should use the North Carolina State Plane Coordinate System (from the survey) to orient objects and buildings. All pages should reflect the survey orientation.

1.8 Paper space drawings should be setup to be plotted at 1:1 scale. If other page sizes are required add additional layout pages.

1.9 Only one (1) line type per layer and only one (1) color per layer is permitted. Set line type and color to by layer.

1.10 Use only those line types provided with AUTOCAD. Do not use third party line types.

1.11 The use of standard AUTOCAD fonts and shapes is required. Nonstandard FONTS and SHAPES must be transmitted with the drawings in their original file format as separate files in a separate FONTS subdirectory.

1.12 Do not draw any entities on layer 0. Leave this layer clean.

1.13 All vector graphics shall be created at 1:1 scale. Scaling of drawings is not allowed. Paper space shall be used for creating/printing scaled drawings.

1.14 If the use of X-REF is required then upon transmittal of CAD drawings all X-REF’s must be bound (using AUTOCAD X-REF Bind/Insert command).

1.15 The use of Model and Paper space is required for all CAD drawings. No title block should be located in Model Space. Title blocks shall be located and used only in paper space.

1.16 Title blocks should not be X-RE F'ed. Title blocks should be created using blocks and sheet/title block information should be entered using the edit attributes command.

1.17 There should only be one (1) page per layout. Each file can have multiple Paper space layouts as long as they are labeled correctly.

1.18 Plot styles (.ctb), file names and layer naming conventions will conform to the latest National CAD Standards and the American Institute of Architects (AIA).

1.19 A text file (readme.txt) describing the indexing and organization of the Project and each files shall be located in the root directory. The file shall contain a listing of all files being distributed.

1.20 AUTOCAD files will be submitted for preliminary review to the CAD Manager when the project is sent out for bid. The CAD files will be sent for final review within 30 days of project is completion. If there is a problem with the project but the building is occupied by the University then AutoCAD files will be required within 30 days of occupation.
1.21 If the data provided to the UNC Charlotte is not of adequate quality, it will be remitted to the Consultant for the necessary adjustments.

1.22 75%-100% of all design manuals, warranty information, and paper documentation provided to UNC Charlotte will be in a digital format to facilitate storage. Acceptable file types are pdf, doc, xls, tiff, jpg, and dwg.
SECTION 3:

ANNEX I

FIRE DEPARTMENT REQUIREMENTS AND FORMS
Section 1.

Public Safety Radio Coverage in Buildings

1.1 Building Radio Coverage. Except as otherwise provided no person shall maintain, own, erect, or construct, any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for public safety entities, including, but not limited to, firefighters, emergency medical services and police officers. "Agency" as used in this code means the local governmental authority enacting this code.

Exceptions:
1. This section shall not apply to single family residential buildings; any building constructed of wood frame; any building twenty-five (25) feet high or less; as long as none of the aforementioned buildings make primary use of metal or concrete construction or contain below grade storage or parking areas. For purposes of this section, parking structures are included in the definition of building, and stair shafts are included in the definition of all parts of a building, but elevators may be excluded.
2. Buildings constructed prior to the implementation of this section shall not be required to comply with public safety radio coverage provisions of this section. However, should exempted structures undergo renovation, restoration, or significant modification to the original structure, exemption from the provisions of this Ordinance shall not apply.

1.2 Minimum Radio Coverage into building. A minimum voice quality of DAQ 3.4 (see TSB-88-B) (for Digital radio systems) and Circuit Merit 3 (for Analog systems) be present in all areas of the building when transmitted from the agency's radio system. For purposes of this section, 95% building coverage is considered to be all areas of the building.

1.3 Minimum Signal Strength out of building. A minimum signal strength of 20 db ± 5 db above the noise floor shall be provided to and from the agency's radio system when transmitted or received from all areas of the building. For purposes of this section, 95% building coverage is considered to be all areas of the building.

1.4 Technical criteria maintained by the Agency. The agency shall maintain a document of technical information specific to their requirements. This document shall contain as a minimum; the frequencies required, the location and effective radiated power (ERP) of radio sites used by the in-building system, the maximum propagation delay (in microseconds) and other supporting technical information.
1.5 Amplification Systems Allowed. Buildings and structures which cannot support the required level of radio coverage shall be equipped with a radiating cable system and/or a distributed antenna system (DAS) with FCC certified Bi-Directional Amplifier (BDA)s (aka bi-directional amplifiers), or systems otherwise approved by the agency in order to achieve the required adequate radio coverage.

1.6 Battery Systems. The active components of the installed system or systems shall be capable of operating on an independent battery system for a period of at least twelve (4) hours without external power input. The battery system shall automatically charge in the presence of external power input.

1.7 Bi-Directional Amplifier (BDA) requirements. If used, Bi-Directional Amplifier (BDA)s shall meet the following requirements as well as any other requirements determined by the agency:
   a. All Bi-Directional Amplifier (BDA) components shall be contained in one NEMA4 type water proof cabinet. Permanent external filters and attachments are not permitted.
   b. The battery system shall be contained in one NEMA4 type water proof cabinet.
   c. The system shall be capable of providing automatic alarming of malfunctions of the Bi-Directional Amplifier (BDA) and battery system. Any resulting alarm shall be transmitted to the agency’s designated recipient by means specified by the agency, including, but not limited to, automatic standard telephone dial-up circuit, TCP/IP network circuit, RS232 interface, etc.
   d. Products used in such systems must have FCC Certification prior to installation. Pending FCC certification is not acceptable.
   e. All Bi-Directional Amplifier (BDA)s must be compatible with both analog and digital communications simultaneously at the time of installation.

1.8 Additional frequencies and change of frequencies. The building owner will be required to modify or expand the public safety in-building system at their expense in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC. This is an advisory statement that the building owner may select equipment and distribution components that are capable of such changes. Prior approval of an in-building system on previous frequencies does not exempt this section.

1.9 Approval Prior to Installation. No amplification system capable of operating on frequencies licensed to the agency by the FCC shall be installed without prior coordination and approval of the agency. This is a FCC requirement.

2.0 Engineering and Design. The Bi-Directional Amplifier (BDA) system(s) shall be designed by a professionally licensed Engineering Firm with a currently certified electrical engineering professional in its employ.

2.1 Implementation. The Bi-Directional Amplifier (BDA) systems shall only be implemented by professional system integrator certified and trained by the manufacturer of the Bi-Directional Amplifier (BDA).
2.2 Documentation. As-built drawings consisting of a system block diagram, layout drawings and data settings, shall be provided electronically in AutoCAD format on CD and in paper copies (2) to the agency.

2.3 Testing and Proof of Compliance. Each owner shall submit at least one in-building coverage test:
1. Acceptance testing prior to occupancy of any newly constructed building.
2. Whenever structural changes occur including additions to buildings that would materially change the original field performance tests.
3. Annually.
4. When repairs or alterations are made to amplification systems, the performance test shall demonstrate that adequate radio coverage is available in all required areas of the building. At the conclusion of the testing a report shall be submitted to the agency which shall verify compliance with Section 1.2.

2.4 Acceptance Test Procedure. When an in-building radio system is required, and upon completion of installation, it will be the building owner's responsibility to have, the radio system tested to ensure that two-way coverage on each floor of the building is a minimum of 95 percent.

2.4.1 Each floor of the building shall be divided into a grid of approximately 40 equal areas. A maximum of two nonadjacent areas will be allowed to fail the test.

2.4.2 In the event that three of the areas fail the test, in order to be more statistically accurate, the floor may be divided into 40 equal areas. A maximum of four nonadjacent areas will be allowed to fail the test. After the 40-area test, if the system continues to fail, it will be the building owner's responsibility to have the system altered to meet the 95 percent coverage requirement.

2.4.3 The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system.

2.4.4 A test location approximately in the center of each grid area will be selected for the test, then the radio will be enabled to verify two-way communications to and from the outside of the building through the agency's radio communications system. Once the test location has been selected, prospecting for a better spot within the grid area will be permitted within 3' in any direction of the original selected test location.

2.4.5 Isolation Testing. As part of the installation a spectrum analyzer or other suitable test equipment shall be utilized to insure spurious oscillations are not being generated by the subject Bi-Directional Amplifier (BDA) due to coupling (lack of sufficient isolation) between the input and output antenna systems. This test will be conducted at time of installation and subsequent annual inspections.
2.5 System Settings. The gain and power values of all Bi-Directional Amplifier (BDA)s shall be measured. The test measurement results shall be recorded on as-built drawings and kept on file with the building owner so that the measurements can be verified each year during the annual tests. In the event that the measurement results become lost, the building owner will be required to rerun the acceptance test to reestablish the gain values.

2.6 Annual Tests. When an in-building radio system is required, it shall be the building owner’s responsibility to have all active components of the system, such as Bi-Directional Amplifier (BDA)s, power supplies and backup batteries tested to a minimum of once every twelve (12) months. Bi-Directional Amplifier (BDA)s shall be tested to ensure that the gain and power are the same as it was upon initial installation and acceptance. Backup batteries and power supplies shall be tested under load of a period of one hour to verify that they will properly operate during an actual power outage. If within the one hour test period, and in the opinion of the agency’s representative, the battery exhibits symptoms of failure, the test shall be extended for additional one hour periods until the integrity of the battery can be determined. All other active components shall be checked to determine that they are operating within the manufacturers specifications for the intended purpose.

2.7 Field Testing. Police and Fire Personnel shall at any time have the right to enter onto the property to conduct its own field-testing to be certain that the required level of radio coverage is present.

2.8 Minimum qualifications of personnel. The minimum qualifications of the system engineer and integration organization shall include
   a. A Valid Professional Engineering Certification
   b. Certification of in-building system training issued by the manufacturer of the equipment being installed.

2.9 Other code compliance. The in-building system installation and components shall comply with all applicable local codes, including but not limited to, Federal Communications Rules (47 CFR 90.219), NEC, NFPA, IBC, IFC, TIA/EIA etc.

Version 9-18-07
**Charlotte Fire Department Building Details**

**Pre-Incident / Prevention Building Survey**

---

### General Information

- **Building Name:** __________
- **Address:** ____________________________________________________________
- **Building Phone:** __________

<table>
<thead>
<tr>
<th>Property/Land Use</th>
<th>Fire Demand</th>
<th>High Rise</th>
</tr>
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<tbody>
<tr>
<td>_________________</td>
<td>____________</td>
<td>__________</td>
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<table>
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<tr>
<th>Occupancy Use</th>
<th>Grid Number</th>
<th>Still Alarm</th>
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</thead>
<tbody>
<tr>
<td>______________</td>
<td>____________</td>
<td>____________</td>
</tr>
</tbody>
</table>

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### Inspection

- **Inspection District:** ______________
- **Occupancy Use:** ________________
- **Occupancy Load:** ________________
- **Last Building Survey:** __________

<table>
<thead>
<tr>
<th>Inspector</th>
<th>CO Inspector</th>
<th>Fire Educator</th>
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<td>____________</td>
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<table>
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<tr>
<th>Last Inspection Date</th>
<th>Total # of Inspections</th>
<th># of Active Permits</th>
</tr>
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<tbody>
<tr>
<td>_________________</td>
<td>_________________</td>
<td>_________________</td>
</tr>
</tbody>
</table>

### Fire Alarm

- **Type:** __________
- **Test Date:** __________
- **Monitoring Agency:** __________

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<thead>
<tr>
<th>Annunciator Location</th>
<th>Control Panel Location</th>
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</thead>
<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Other Extinguishing System Title</th>
<th>Location</th>
<th>Test Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________</td>
<td>____________</td>
<td>____________</td>
</tr>
</tbody>
</table>

### Sprinkler System

- **Type:** __________
- **Test Date:** __________
- **Standpipes:** __________
- **Standpipes Test Date:** __________

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<thead>
<tr>
<th>Standpipe FDC Location</th>
<th>FD Connection Location</th>
<th>Post Indicator Location</th>
<th>Riser #1 Location</th>
<th>Riser #2 Location</th>
<th>Riser #3 Location</th>
<th>Backflow Preventer</th>
<th>Fire Pumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>______________</td>
<td>______________</td>
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</tr>
</tbody>
</table>

- **Test Date:** __________

### Electrical Panel Location

- ______________

### Gas Meter Location

- ______________

### Water Shut Off Location

- ______________

### Emergency Generator

- ______________

---

**Page 1 of 2**  
**Created @ 2/3/2009 2:28:35 PM**
Knox Box

Knox Box Location: ____________________________________________________________
Knox Box Serial #: __________________________________________________________

Haz Mat

Health: __ Fire: __ Reaction: __ Other: _______ # Haz Mats: ___

Fire Protection Considerations

Fire Load: ____________ Defensive Ops Only: _____ Fire Flow Required Available: _____
Common Attic: ____________ Building Length: ________ Fire Flow Required: ____________
Roof Operations: ____________ Building Width: ________
Exposures: ________________________________________________________________

Risk Assessment

Vertical Open: ____________ Stairway: ____________ Basement: ____________ Floor: ____________ Roof: ____________
NA: _____ # Floors Below: _____ High Pile: _____ Concrete: _____
NA: _____ # Floors: _____ UnSafe: _____ Wood Truss Deck: _____
Roof Attachments: _____ Walls: _____ Tanks: _____ # Floors: _____ Steel Truss Deck: _____
Cooler: _____ Unsafe: _____ Above Ground: _____ Other: _____
A/C: _____ See Remarks: _____ High Risk: ____________
Sign: _____ #Exit Doors: ________

Remarks: _________________________________________________________________

Other

MST Notes: ______________________________________________________________
Critical Facility: _____ Vital Facility: _____

Property Contacts

First Name: ______________________ Last Name: ______________________ Primary Phone #: ______________________ Calling Sequence: ______________________

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________