



Design Standard Criteria

Facility Design & Construction Services
770-499-3602

Design Standards	pp 1-43
IEQ Assessment – Appendix A	pp 44-46
Integrated Life Safety System – Appendix B	pp 47-82

July 1, 2013

**Kennesaw State University
Design Standard Criteria**

DIV. I GENERAL REQUIREMENTS

1. General overall layout of rooms, corridors and facilities shall be functional and logical, and meet current codes. Board of Regents Standards must be satisfied. The intent of these standards is “not” to specify proprietary products or systems. The design professional shall assure that competitive bidding exists unless otherwise approved in writing by the owner.
2. All work shall comply w/current published criteria of ADAAG (Americans with Disabilities Act Accessibility Guidelines) and all applicable codes.
3. Provide access to building for maintenance vehicles. Provide shielded exterior areas with wash down capability for refuse containers. If too close to Cooling Towers, refuse will be pulled into tower(s).
4. Provide adequate storage areas for custodial materials as well as maintenance equipment, preferably one or more per floor. Custodial materials and maintenance equipment not to be in same areas.
5. Provide (where possible) an outside door to mechanical rooms, particularly boiler rooms (which require mechanics to carry chemicals for equipment services.) Do not put down carpet in areas of Chiller – Boiler Equipment Rooms. (Chemical could stain same).
6. Mechanical rooms should not be located next to sound-sensitive spaces. Locate high voltage transformers as far as practical from office/classroom space and equipment. Mechanical noise should not be noticeable in classrooms and meeting rooms.
7. Acoustics should be considered in appropriate areas for comfort, presentations, and privacy.
8. Room numbering on all design/construction documents shall be coordinated with and approved by University. Establish space numbering prior to preliminary design review.
9. Avoid inaccessible ceiling systems (to accommodate maintenance).
10. Design space layouts so that all major equipment may be removed and replaced without removal of building elements.
11. Provide safe rooftop access for large, heavy loads.
12. Since feature areas (such as stairs and/or landings in a lobby, atrium, etc.) tend to be areas where concentrated groups of people gather for photo opportunities, choral & other types of special performances etc., consider the assembly loads necessary for safe, concentrated assembly of people on these elements. Design professional to show a prominent note on all Design & Construction Documents that shows the designed allowable floor load for these type features.

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13. Provide north arrows on all floor plans. Provide key plans where needed for orientation. Confirm exact name and number of project with Kennesaw State University. Include special conditions and requirements after discussing with the owner.
14. Provide gypsum board on steel stud partitions with approximately 24" x 24" inspection/access panel for all under stair areas (usually the lowest level). Where the design professional feels that this is not appropriate (such as lobby or monumental stairs) please request a variance from the KSU Project Manager.
15. Design Professional is responsible to provide framed evacuation plan for all new and/or remodeled areas. It is acceptable to put this requirement in the project documents for the contractor's responsibility.
16. Contractors and vendors are responsible for arranging their own network connections to the internet, etc. KSU can possibly accommodate them with a network connection if the job trailer is within 200-300 ft. of a building and there is sufficient capacity at that location. Also, AT&T does not provide DSL on campus and Comcast (or other providers) do not have a presence on campus, so that will not be an option for them. If any contractors have a need for any type of network connectivity and KSU cannot readily provide it, they will have to plan on getting a wireless network card from a cell service provider such as AT&T, Sprint or Verizon.
17. Water features are strongly discouraged.
18. Design Professional (and later, the contractor[s]) should include adequate (but not excessive) time and focus in the project schedule for the purpose of flushing out the gasses from the new space construction and/or material. Confirmation of acceptability of air quality by testing air samples (either internally performed or an independent agency, submitting to KSU directly, depending on project needs) prior to acceptance/turn-over/move-in. This can probably be concurrent with time for "burn-in" of the facility by KSU personnel. All timing needs to be carefully coordinated with the end users (alignment with semester start dates and pre-requisite activities such as furniture, move-in, etc.). The contract documents that the Design Professional prepares, should carry these responsibilities into the contractor[s] scope-of-work. Please see the attached IEQ Guidelines prepared by KSU's EHS&RM Department (Appendix A).
19. At least one (1) elevator needs to be on the emergency generator and all other elevators, if any, should have battery back-up to bring those elevators to the main floor.
20. For new and remodeled buildings, after approval of construction documents, Project Architect is to submit an Excel spreadsheet with the final room names, all room numbers per floor, room type, and square footage for our use. All interior spaces should be accounted for, and the total net and gross areas should be documented along with this information. A diagram showing the exterior dimensions and area of each floor should also be included. This information will be used by KSU for the campus Facilities Inventory Report.
21. A Fire Department Knox Box should be provided for new construction and major renovations.
22. To the fullest practical extent possible, capture roof and condensate water in a storage area so the water can be used for irrigation purposes.

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23. To the fullest practical extent possible, add soil amendments to planting & turf areas in a manner recommended by KSU Plant Operations Grounds Department.
24. All devices containing significant amounts of oil (electrical transformers, generators, elevator pistons, etc.) to have EPA approved containment to prevent flow into storm drain systems.
25. Stair identification will not be by numerals (1, 2, 3, 4, etc.) due to confusion with floor numbering. Therefore, stair identification will be by letters (A, B, C, D, etc.) or, if the KSU Project Manager approves, compass direction (North Stair, South Stair, etc.). This will be applicable to all new buildings. Remodel projects will be at the discretion of the KSU Project Manager.
26. Provide three (3) sets of Owner's Manuals containing trade company/vendor contact information, selection and submittal data, warranties, guarantees and affidavits, etc. to the KSU Project Manager at the Acceptance/Turn-over of the project.

DIV. 2 SITE REQUIREMENTS

A. General

1. Street and parking lot layouts shall comply with standards of municipality in which project is located.
2. Design drainage structures and surface runoff to remove water efficiently from the site with proper retention as required. Water runoff to be retained on site with an engineered underground structure with appropriate release rates, (if needed). No above ground ponds or weirs are allowed unless approved by Owner in writing.
3. Select traffic pavement type for specific soil conditions and anticipated loading. Use Georgia Department of Transportation standard pavement specifications.
4. Contractor shall restore existing trees, shrubs, grass, sprinklers, sidewalks, etc. to their original condition if disturbed. Grass should be replaced between April 1 and September 1 as follows: Match existing turf with Tifton Tifway '419' Bermuda grass sod or Meyer Zoysia grass sod. (Annual Rye grass may be used, 400 pounds per acre, only if restoration takes place outside of the above time frame). Match existing mulch with Hardwood Blend dyed Forest Brown (made by Wood Tech).
5. Soil conditions should be tested by a licensed professional geotechnical engineer. Foundations shall be designed in accordance with engineer's recommendations. Copy of soils report shall be delivered to University for project file.
6. Provide bollards where there are vehicular passageways i.e. loading docks, driveways next to building. This is to protect the building, dock, etc. from vehicular damage.
7. Use PVC outside sewer pipe- except under street or slab use ductile iron, concrete lined.
8. Site Furnishings – Bench shall be the Victor Stanley Classics Collection Bench (C-10, C-7,

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- C-9) Black with reinforced recycled plastic slats.
9. Site Trash Receptacle shall be Landscape Forms, Scarborough Collection, Scarborough Series, side opening 25" x 40", square bar panel, 30 gallon capacity (sc5002-24-40).
 10. Site Bike Rack shall be Trystan Cobra Rack TC-7.
 11. Brick pavers shall be 4x8x2-1/4 in. nominal Whitacre-Greer No. 43 Tangerine, Vacuum-dry-press pavers, solid uncored frost free brick, complying with ASTM C902, Class SX, type I application, PX, 8000 PSI compression strength, 8% water absorption.
 - Engraved brick shall be .65 inch lettering of Demi-Bold font, sandblasted and black lettering infill.
 12. Site Lighting shall be:
 - Head: Arlington Series postop fixture, cast aluminum, color black 480 or 240 volts depending on locations, 175 watt, metal halide, Holophane cut. In case of 480 volts: #AR175MH48BG3 + LAMP; in case of 240 volts: #AR175MH24BG3 + LAMP.
 - Pole: Hamilton series cast aluminum post, fluted shaft 14', color black, Holophane CAT H14F5/16-CA/BK.

B. Irrigation System (for landscaped areas)

1. Rainbird, Maxicom compatible, components.
2. Drip irrigation to be installed in all shrub and tree areas of the landscape.
3. Fixed spray irrigation using standard 12" pop up sprinklers shall be installed in all annual and perennial beds.
4. Fixed spray or gear driven rotor sprinklers shall be installed in all turf areas. Type of head depends on size of area. Fixed sprays in turf areas must raise 6" minimum above grade.
5. All isolation valves shall be full port brass valves located inside a 10" valve box.
6. Install within 10" of the main isolation valve, a dual check backflow prevention device (use National Plumbing Code to specify specific type) inside a 12" valve box or suggested size box.
7. Master valve shall be installed after the backflow prevention device using a normally closed valve. This master valve shall be electrically operated with a minimum of #12 LJF wire, blue in color.
8. Flow meter shall be installed after the master valve using the manufacturing installation recommendations. The type of flow meter shall be determined by the designer. Flow meter must have the capability to communicate with the Maxicom Central Control System.
9. Brass quick connects shall be placed around the property allowing for easy access to water.

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10. All electric valves shall be installed in a 10" valve box.
11. Communication wire must meet all Maxicom specifications.
12. Controller must have the ability to communicate with the Maxicom Cluster Control Unit.
13. Drip irrigation shall be staked to stable ground every 4'.
14. All wire connectors must include a wire nut enclosed inside a waterproof gel.
15. Any above ground irrigation line must be installed using Sch. 40 PVC.
16. Any irrigation design must be completed by a certified irrigation designer.
17. Any Maxicom hardware must be installed by a certified installer.
18. Install Sch. 80 PVC under roadways, walkways, etc.

C. CONCRETE SIDEWALK DESIGN:

1. 4" thickness for standard pedestrian travel and 7" for truck access, including (especially) fire truck lanes. 5000 psi Fibermesh concrete in both mix designs. NO WIRE MESH.
2. Both walk designs should be built on 95% compacted earth, or suitable granular fill to match.
3. Expansion control and crack jointing shall be tooled in wet concrete, in panels nominally equal to the width of the sidewalk, as a minimum. Saw cutting of joints is not recommended.
4. Expansion control joints are developed with ½" cane board, and sealed with backer rod and pourable NP 701 sealant or equal joint sealer.
5. BOTH 4" and 7" truck access walks shall have greased/sleeved ½" steel dowels, spaced 30" maximum at all expansion joints and reinforcement at corners/radius to prevent cracking. All sidewalks shall thicken in depth at these expansion joints to accommodate the dowel to a maximum of 8" depth.
6. The vehicular access walks shall be a minimum of 10 feet wide, 12 feet preferred, and if fire trucks drive on 10 feet walks there shall be 'GrassPave' to make up the difference.
7. Medium to stiff broom finish, depending on walkway gradient, and perpendicular to path of travel. Apply 'Cure and Seal' or similar application after the concrete is finished. Backfill to grade with topsoil after forms are removed, and straw/seed per landscaping specifications.

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D. Plant List:

Kennesaw State University Plant List

		Light										Soil				Ornamental Value				
		Native Plants	Ornamental	Shade Tree	Deciduous	Evergreen	Perennial	Specimen	Full Sun	Partial Shade	Shade	Dry Soil	Well-Drained	Moist Wooded Areas	Wet Soil	Wildlife	Flower	Leaf Color	Fall Color	Disease Resistance
Large Trees																				
Acer rubrum	Red Maple	■	■	■			■	■						■				■	■	
Acer saccharum	Sugar Maple	■	■	■				■					■					■	■	
Betula nigra	River Birch	■	■	■					■					■						
Ginkgo biloba	Ginkgo																	■	■	
Liriodendron tulipifera	Tulip-poplar	■	■	■				■					■						■	
Magnolia grandiflora	Southern Magnolia	■	■	■			■	■					■				■			
Pinus glabra	Spruce Pine	■	■		■			■					■							
Pinus strobus	White Pine	■	■		■			■				■								
Pinus taeda	Loblolly Pine	■			■						■									
Pinus virginiana	Virginia Pine	■			■						■									
Quercus alba	White Oak	■	■	■			■	■				■								
Quercus coccinea	Scarlet Oak	■	■	■				■			■								■	
Quercus hemisphaerica	Laurel Oak	■	■	■				■				■								
Quercus phellos	Willow Oak	■	■	■				■					■							
Quercus rubra	Northern Red Oak	■	■	■			■	■					■						■	
Taxodium distichum	Bald Cypress	■	■	■			■	■					■						■	
Ulmus athena	Athens Elm		■	■	■			■					■							
Ulmus parvifolia	Chinese Elm		■	■	■			■					■							
Zelkova serrata	Zelkova		■	■	■			■				■	■							

Small Trees		Native Plants	Ornamental	Shade Tree	Deciduous	Evergreen	Perennial	Specimen	Full Sun	Partial Shade	Shade	Dry Soil	Well-Drained	Moist Wooded Areas	Wet Soil	Wildlife	Flower	Leaf Color	Fall Color	Disease Resistance
Acer barbatum	Southern Sugar Maple	■	■	■				■				■							■	
Acer japonicum	Japanese Maple		■					■	■		■	■							■	
Carpinus Caroliniana	Ironwood			■				■	■			■							■	
Cercis canadensis	Eastern Redbud	■	■	■				■	■				■					■		
Cornus florida	Flowering Dogwood	■	■	■				■	■				■	■				■	■	
Halesia carolina	Carolina Silverbell	■		■				■	■				■					■		
Ilex decidua	Possumhaw	■	■	■				■	■				■	■		■				
Ilex opaca	American Holly	■	■		■			■	■				■	■		■				
Ilex vomitoria	Yaupon Holly	■	■		■			■	■			■	■	■				■		
Lagerstroemia indica	Crape Myrtle		■	■				■	■				■					■	■	
Oxycodendrum arboreum	Sourwood	■	■					■	■				■	■				■	■	
Prunus caroliniana	Cherry Laurel	■			■			■	■				■					■		
Prunus yedoensis	Yoshino Cherry		■	■				■	■				■					■	■	
Vaccinium arboreum	Sparkleberry	■		■				■	■				■	■				■	■	

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		Light										Soil			Ornamental Value					
		Native Plants	Ornamental	Shade Tree	Deciduous	Evergreen	Perennial	Specimen	Full Sun	Partial Shade	Shade	Dry Soil	Well-Drained	Moist Wooded Areas	Wet Soil	Wildlife	Flower	Leaf Color	Fall Color	Disease Resistance
Shrubs																				
Abelia grandiflora nana	Edward Goucher Ableia		■		■			■	■	■							■		■	■
Aesculus parviflora	Bottlebrush Buckeye				■				■	■							■		■	■
Amelanchier canadensis	Shadblow Serviceberry	■	■																	
Berberis thunbergii	Pigmy Barberry		■		■				■		■	■						■		■
Camelia sasangua	Sasangua Camelia		■		■		■		■		■						■			
Cephalotaxus harringtonia	Japanese Plum Yew				■				■	■	■									
Chaenomeles lagenaria	Texas Quince		■		■				■			■						■		■
Forsythia suspensa	Forsythia				■							■	■				■		■	■
Fothergilla gardenii	Dwarf Fothergilla	■	■						■							■		■	■	■
Hosta species	Hosta		■			■				■		■	■				■	■		
Hydrangea quercifolia	Oakleaf Hydrangea				■			■	■	■		■	■				■	■		
Ilex carissa	Carissa Holly				■			■	■			■								
Ilex cassine	Cassine Holly				■			■	■		■	■	■		■					
Ilex glabra	Inkberry	■			■						■			■			■			
Ilex vomitoria 'Nana'	Dwarf Yaupon		■		■			■	■		■	■						■		
Itea virginica	Virginia sweetspire	■	■		■			■	■					■				■		
Mahonia aquifolium	Oregon Hollygrape	■	■		■				■	■			■				■	■		
Mahonia bealei	Leatherleaf Mahonia	■			■				■	■			■				■	■		
Rhododendron alabamense	Alabama Azalea	■			■				■				■					■		
Rhododendron canescens	Honeysuckle Azalea	■	■						■	■			■					■		
Spiraea prunifolia	Bridal Wreath Spirea				■			■	■	■		■					■			
Spiraea x bumalda	Bumald Spirea				■			■	■	■		■					■			
Viburnum burkwoodii	Burkwood Viburnum				■	■		■	■	■		■					■	■	■	
Viburnum juddii	Judd Viburnum				■	■		■	■	■		■					■	■	■	
Viburnum opulus	Cranberry Bush Viburnum				■	■		■	■	■		■					■	■	■	
Viburnum pragense	Pragense Viburnum				■	■		■	■	■		■					■	■	■	
Viburnum rhytidophyllum	Leatherleaf Viburnum				■	■		■	■	■		■					■	■	■	
Yucca aloifolia	Spanish Bayonet	■			■			■			■		■							

Ornamental Grasses

Festuca cinerea	April Gruen		■					■	■				■				■	■	■	
Imperata cylindrica	Red Baron		■						■	■	■		■				■	■	■	
Miscanthus floridulus	Giant miscanthus		■						■	■	■		■				■	■	■	
Miscanthus sinensis purpurascens	Flame Grass		■						■	■	■		■				■	■	■	
Pennisetum alopecuroides-Hameln	Dwarf fountain Grass		■						■	■	■		■				■	■	■	
Pennisetum alopecuroides-Moudry	Black-seeded fountain Grass		■						■	■	■		■				■	■	■	
Pennisetum caudatum	White-flowered fountain Grass		■						■	■	■		■				■	■	■	

Groundcover/Vines

Hemerocallis spec	Daylillies	■	■			■			■	■			■				■			
Liriope muscari monroe	Big Blue		■		■				■	■	■		■	■						■
Trachelospermum asiaticum	Asiatic Jasmine		■		■				■	■	■		■	■				■	■	■

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DIV. 3 - DIV. 5

No specific requirements- design/material recommendations per design consultant's professional judgment.

DIV. 6 WOOD & PLASTICS

A. Countertops

1. Use solid polymer material (Dupont "Corian" and similar products) or plastic laminate for counters and backsplashes.

B. LEED Credit MR7 – Certified Wood

1. LEED Credit MR7, which only recognizes certified wood products in accordance with Forest Stewardship Council's principles and criteria, shall not be included in any LEED application.
2. Use green building standards that give equal consideration to sustainable forest certification programs developed by the Sustainable Forestry Initiative, the American Tree Farm System, and the Forest Stewardship Council per The State of Georgia Executive Order, dated August 10, 2012.

DIV. 7 BUILDING ENVELOPE REQUIREMENTS

A. General

1. Exterior envelope systems shall be selected with low maintenance longevity as the primary consideration. EIFS and uncoated concrete masonry systems are not acceptable for permanent buildings.

B. Moisture Control

1. Prevent moisture problems (underground). Provide sheet membrane waterproofing and positive slope foundation perimeter drains to grade. Use protection board over all membranes.
2. Prevent moisture problems (above ground). Provide metal window and door head flashing, through wall flashing, and counter flashing with 50-year min. expected life. Slope all ledges and horizontal surfaces 1/4"/ft. minimum.

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C. Roofing

1. Roofing types: (unless otherwise approved by University)
 - Low Slopes (flat to 1/4" per foot slope) - 2-ply SBS modified bitumen, cold adhesive, torch applied base and cap sheet.
 - Med. Slopes (1/4" to 3" per foot slope) - 2-ply SBS modified bitumen, cold adhesive, torch applied base and cap sheet.
 - High Slopes (3" per foot and steeper) - standing seam metal panels or heavy weight fiberglass based asphalt shingles.
2. Warranty: Specify the manufacturer must provide a twenty year no dollar limit guarantee for the installed roofing system.
3. Insulation Board: Mechanically attached polyisocyanate insulation minimum 3" thickness. Provide cover board fully adhered.
4. Specify manufactured equipment curbs (Pate or Thycurb) for all roof mounted equipment. Don't allow equipment to be mounted on pressure treated wood. Roof mounted equipment should comply with recommended details of the National Roofing Contractors Association "*Handbook of Accepted Roofing Knowledge*".
5. Roofing material specifications shall require the use of "non-asbestos containing material". Roofing repair or replacement on roofs suspected of containing asbestos shall comply with regulations and codes.
6. Fume hood fans, motor starters and other roof mounted equipment should be installed on fully flashed raised curbs without the use of pitch pans. When roof mounted equipment cannot be set on curbs, allow 18 inches clearance minimum to facilitate repairs and reroofing.
7. Use roofing materials with a solar reflectance index (SRI) equal to or greater than 78 for roofs with a slope less than or equal to 2:12 and 29 for roofs with a slope greater than 2:12 for 75% of the roof.
8. Provide minimum 30" wide protected walkway path from roof access to rooftop equipment with walk pads compatible with roofing system. Rooftop equipment should have a walkway path on all four sides for maintenance.

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DIV. 8 DOORS, WINDOWS & GLAZING

1. Standard door sizes: 3'x7'x1.75"

Standard interior doors: Material - Solid core wood, flush style, 20 minute "C" label fire rated minimum, higher ratings as required by design and fire ratings. Standard Finish: Rotary cut Birch Veneer, clear seal finish. Standard Exterior Doors: 16 gauge Hollow Metal insulated shop prime painted finish, flush style.

Standard door frames:

- Interior: 1 ½ pair heavy duty standard hinge placement pattern, reinforced for door closers where required, 16 gauge minimum knockdown style cold-rolled steel, throat thickness to match wall design thicknesses. Provide standard Mortise Lockset strike with plaster guards, to match campus lock standards, door silencers.
- Exterior 1 ½ pair Heavy duty standard hinge placement pattern, reinforced for door closers or other attached hardware where required, 14 gauge (.053-inch) minimum Welded cold-rolled galvaneal steel, throat thickness to match design standards. Continuous security hinges may be required in lieu of the standard 1 ½ pair hinge pattern.
- Shop Prime paint all steel material.

Sustainable (LEED Certified) finishes and material selections contrary to the campus design standards briefly described herein shall be submitted to the KSU FPDS offices for approval.

PART 1 - GENERAL

A. SUMMARY

1. The work required under this section consists of furnishing hardware and supervising the installation of hardware and related items that are necessary to complete the work, as indicated on the drawings and described in this section.
2. Related work described in other sections includes:
 - Hollow metal work
 - Wood doors
 - Aluminum doors and frames
 - Electrical
 - Carpentry

B. REFERENCES

1. ANSI A117.1 - Specifications for making buildings and facilities usable by physically handicapped people.
2. AWI - Architectural Woodwork Institute
3. BHMA - Builders' Hardware Manufacturers Association
4. DHI - Door and Hardware Institute

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5. NAAMM - National Association of Architectural Metal Manufacturers
6. NFPA - National Fire Protection Association
 - NFPA 80 - Fire Door and Windows - *
 - NFPA 101 - Life Safety Code - *
 - NFPA 252 - Fire Test of Door Assemblies - *
 - NFPA 105 - Smoke and Draft Control Door Assemblies - *
7. UL - Underwriters Laboratories
 - UL 10B - Fire Test of Door Assemblies
 - UL 305 - Panic Hardware - *
8. SBCCI - Southern Building Code Congress International
 - Standard Building Code - *

C. SUBMITTAL

1. Hardware Schedule: Submit a complete schedule of hardware. Using the format of this specification, indicate type, number location, and finish of each item. Include manufacturer's name and model description, fastening devices, and complete keying schedule. Reference architect's door designation. Submit six (6) copies.
2. Provide a cross-reference between door number and hardware headings.
3. Physical Samples: When requested, submit physical samples of each item of hardware and show manufacturer's name, model, and finish.
4. Templates: Furnish templates and approve schedule to each related manufacturer of equipment which require same for the fabrication of their material.
5. Electrical Products: Provide wiring diagrams including riser diagrams to Electrical Contractor / Security Contractor. Also, provide "Function Description" or Electrical Packages.

D. QUALITY ASSURANCE

1. Provide hardware in compliance with the local building code requirements. Also comply with NFPA101 Life Safety Code and ANSI A117.1 where applicable.
2. Provide hardware for fire rated openings in accordance with NFPA80, Fire Doors and Windows and NFPA105, Smoke and Draft - Control Door assemblies.
3. Provide the services of a finish hardware supplier who has been furnishing hardware in the project's vicinity for a period of not less than two (2) years and is an experienced hardware consultant (AHC). The consultant shall be available during the course of the work to the architect, and contractor.

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E. DELIVERY, STORAGE, AND HANDLING

1. Deliver finish hardware to project site in manufacturer's protective packaging. All items are to be marked to indicate door opening number, hardware schedule number, or other identifying marks.
2. Store hardware in secure lock-up area that is dry and lighted.

F. WARRANTY

1. Warrant door closers against failure due to defective materials and workmanship for a period of five (5) years beginning at date of substantial completion. Closers judged defective during this period shall be replaced or repaired at no cost to the owner.
2. Warrant exit devices against failure due to defects in material or workmanship for a period of three (3) years.
3. All other warranties and bonds are to be in accordance with Division I, Section 01700 - Contract Close-Out.

PART 2 - PRODUCTS

A. FINISH

1. Finish shall be as follows unless otherwise listed in schedule:
 - Hinges - Interior - US26D (652)
 - Exit Devices - US32D (630)
 - Locksets - US26D (626)
 - Closers - Sprayed Aluminum
 - Stops and Miscellaneous - as specified
 - Flat Goods - US32D (630)

B. KEYING

1. All cylinders shall be keyed into the existing Yale High Security Grand Master key System. All locks and cylinders to have construction temporary cores during construction. Security removable core cylinders are required for exterior openings. Conventional removable core cylinders are required for interior openings.
2. The keying layout shall be submitted with shop drawings. Keying requirements shall be coordinated with Kennesaw State's lock shop. All cylinders to have proper blocking rings and tailpieces as required.
3. Provide the following number of keys:
 - Two change keys per lock
 - Ten construction master keys
 - Five each Grand Masters, and Master keys
 - Two control keys

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C. HINGES

1. Types and materials as listed in the schedule.
2. Size shall be 4.5 x 4.5 unless otherwise listed in schedule. Provide 2 pair hinges for door leaves over 7'- 6" in height.
3. Bearings are not to be installed in hinge before electro-plating the hinge. If frozen bearings are found, replace the complete shipment.
4. Manufacturer's whose products meets the criteria of this specification and are acceptable.
 - Stanley
 - Hager
 - McKinney

D. LOCKSETS AND LATCHES

1. All locksets are to be mortise type ANSI A156.13 1987 Grade 1 Operational Grade 3 Security, ANSI/ASTMF476-76 Grade 20. The lock case is to be steel with corrosion protection. The backset is to be 2-3/4". The latch bolt throw is to be 3/4". The dead bolt throw is to be 1". The armored front is to be adjustable 1/8" in 2" for door bevel. The lever trim shall be thru-bolted through the door. Surface jointed or single side mounted levers are not acceptable.
2. All cylindrical locksets are to be ANSI 156.2; Grade 1. They shall meet ANSI A117.1 and ADA standards.
3. All locksets shall be manufactured by the same manufacturer. All lever trim is to be cast solid.
4. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Yale - AUR8700FL
 - Corbin Russwin - ML2200-NSA
 - Sargent - 8200 series-LNL

E. EXIT DEVICES

1. Exit devices shall be listed by Underwriters' Laboratories, Inc. for Accident Hazard. Exit Devices for use on fire-rated openings shall bear factory installed UL markings that indicate a three (3) hour fire rating.
2. All exit devices shall be of one manufacturer. All latch bolts are to be deadlocking type. Attach surface applied items to doors with sex nuts and bolts. Double doors should have removable mullions with stabilizers.
3. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Yale Security Inc.; 7000 Series
 - Corbin Russwin; ED5000 Series
 - Precision; 1100 Series
 - Von Duprin; 99 Series

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F. SURFACE MOUNTED DOOR CLOSERS

1. All surface closers shall be of one manufacturer. The closers shall be non-handed and non-sized. They will be hydraulically controlled and full rack and pinion operation. They shall have cast bodies and will have adjustments for back check, general speed, and latch speed.
2. Provide mounting plates as required, use sex nuts and bolts for application to all doors.
3. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Norton 7500/UNI7500
 - Yale 4400/4400 x 9/1 SERIES OH Stop
 - LCN 4040/4040 x 9/1 SERIES OH Stop

G. CONTINUOUS HINGES

1. Continuous gear hinges shall be manufactured of extruded 6063-T6 aluminum alloy/temper. Hinges shall consist of three interlocking extrusions in a pinless assembly applied to the full height of the door and frame. All hinges shall be manufactured to template screw locations and be non-handed. Frame leaf and door leaf shall be independently milled. Thrust bearings shall carry the vertical loads and be completely concealed by the gear cap the full length of the hinge. The frame leaf and door leaf shall be anodized after milling and drilling processes are complete. Thru-bolt fasteners shall be templated so as not to make contact with the frame assembly. All mortise hinges shall cover and wrap the edge of door completely. All hinges shall be tested by a certified independent testing laboratory to 1,500,000 cycles and certified functional ANSI 156.1.
2. Manufacturers whose product meets the criteria of the specification and are acceptable.
 - Pemko
 - Bommer

H. OVERHEAD STOPS AND HOLDERS

1. Manufacturer's whose product meet the criteria of this specification and are acceptable:
 - Rixson
 - Glynn Johnson

I. STOPS AND MISCELLANEOUS

1. Types as indicated in Hardware Schedule.
2. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Trimco
 - H.B. Ives Co.
 - Baldwin

J. BOLTS

1. Flush bolts shall be 1" x 6-3/4" brass, rectangular front, per lengths indicated with 3/4" throw. Furnish bottom strike and top strike plate. Wrought bolts are unacceptable.

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2. Bolts and accessories for use on fire-rated doors shall be Underwriters' Laboratories listed.
3. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Trimco
 - B. Ives Co.
 - Baldwin

K. FLAT GOODS

1. All kick plates shall be 6" in height and 2" less than door width unless listed otherwise.
2. All mop plates shall be 6" in height and 1" less than door width unless listed otherwise.
3. All kick plates and mop plates shall be .050 in thickness.
4. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Trimco
 - B. Ives Co.
 - Baldwin

L. THRESHOLDS AND WEATHERSTRIP

1. All thresholds shall be installed with flat head sleeve anchors.
2. Manufacturer's whose product meets the criteria of this specification and are acceptable:
 - Pemko
 - Zero
 - Reese

PART 3 - EXECUTION

A. PRELIMINARY

1. Receive, store in temporary bins, and be responsible for all finish hardware. Tag, index, and file all keys temporarily during construction.
2. Check all hardware upon arrival on job site against approved Finish Hardware Schedule. Function of hardware shall be examined against the job site conditions and interference's. If exceptions in these regards are found, notify Architect at once and retain subject hardware in its original packing carton. Adjustment and/or substitutions shall be made only as authorized by Architect.

B. INSTALLATION

1. Install hardware to doors as listed in the door schedule. Comply with "Recommended Locations for Builders Hardware for Custom Steel Doors and Frames" as published by the Door and Hardware Institute. Application shall be by skilled workmen, who work with proper equipment,

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and shall be in accord with manufacturer's instructions, fit to work of others accurately, applied securely, and adjusted properly. Hardware let into work of others shall be neatly done from template and shall fit perfectly. Exercise care not to injure work of others.

2. Install finish hardware to template. Cut and fit substrate to avoid damage or weakening. Cover cutouts with hardware item. Mortise work to correct location and size without gouging, splintering, or causing irregularities in exposed finished work.
3. Where cutting and fitting is required on substrates to be painted or similarly finished, install, fit, and adjust hardware prior to finishing, and then remove and place in original packaging. Reinstall hardware after finishing operation is completed.
4. Attach thresholds with flathead sleeve anchors, spaced at 24"o.c. maximum and symmetrical with the center of door opening. On cast thresholds where cast-on-anchors are used, apply utilizing an epoxy grout mixture.
5. Attach door closers to door, whether wood or metal, with nut and bolt assemblies. Where closers have stop function, install closer to stop the door before striking obstructions.

C. CLEANING AND ADJUSTING

1. At the time of hardware installation, adjust each hardware item to perform function intended. Lubricate moving parts with lubricant acceptable to hardware manufacturer.
2. Prior to "Date of Substantial Completion", readjust and re-lubricate hardware. Repair or replace defective materials. Clean hardware as recommended by manufacturer to remove dust and stains.

D. FASTENINGS

1. All exposed screws shall be Phillips head, finished to match item and sized to suit job requirements.
2. Surface applied items such as closers and overhead holders shall be applied with sex nut and bolt assemblies.

E. OPERATION AND ADJUSTMENT

1. After installation, all templates, installation instructions, As Built and Special Details to be placed in a properly identified Binder. This binder and all special tools are to be turned over to the Architect at Final Acceptance of the project.
2. After Final Acceptance, the hardware supplier shall instruct the Owner's designated personnel in the proper operation, adjustment, and maintenance of hardware and finishes.

F. COORDINATION

1. Coordinate finish hardware and electrical hardware installation with other trades to ensure proper installation and function for a complete operating system.

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GENERAL NOTE:

1. The following must be placed at top of first page of shop drawing which lists hardware per door:
ALL HARDWARE SHALL BE ATTACHED ONLY WITH FASTENERS PROVIDED WITH PRODUCTS BY MANUFACTURER. TEK SCREWS WILL NOT BE ACCEPTABLE UNLESS SPECIFICALLY NOTED.
2. Automatic door systems shall be provided at major public entrances for ease of accessibility.
Manufacturers acceptable:
LCN 4620
Norton 6660
3. There shall be an on-line card reader system installed on one entrance door, which should be with an automatic door for after-hours use.
Manufacturer acceptable:
Onity Integra 3 on-line system
4. Hardware standard for classrooms, seminar/conference rooms, etc.:
 - The 1st door to a room: mortised out to accept a campus-supplied and installed cardlock (template will be supplied by KSU). The installation will occur in the last few weeks of the project as soon as the doors are hung. Please note in the project documents so that the contractor is informed.
 - The second door to a room: standard mortise lockset.
5. Hardware – general: For double doors, provide removable keyed mullions with rim panic devices. No rods allowed.

DIV. 9 FINISHES/INTERIOR DESIGN REQUIREMENTS

A. Interior Design

1. All proposed finish and furniture selections will be submitted to and approved by the KSU Project Manager and Interior Designer. Submittal shall be in form of a "color board", 8 1/2" x 11" min. size, with actual paint colors, material samples, fabric swatches, and furniture pictures.
2. Below is a product list of acceptable finish products. Deviations must be approved by KSU.
 - Carpet - Karastan, Bigelow's Regent's Row (or equal). Woven, 34 ounce to be glued directly to slab.
 - Vinyl Composition Tile (VCT) - Armstrong, Standard Excelon (or equal), 12" x 12", 1/8" gauge. (Use waterproof mastic for vinyl tile applied to below grade floor slabs.)
 - Cove base - 4" height unless otherwise approved by Owner.
 - Paint - Color standards for existing campus building are on file in the Kennesaw State University Facility Planning and Design office.

Note: Where shown, an asterisk (*) indicates the use of the "latest adopted edition" of a code, standard, etc.

Wall paint must be flat or ultra-hide latex, eggshell finish, or semi-gloss.
Acceptable manufacturer: Duron (Hayseed #8220W, Genesis Eggshell)
Glidden or Dulux (China Doll #14120110)

PT-1 – Eggshell Plastic Kote commercial finishes (all rooms and offices) standard color Hayseed Tint, or China Doll.

PT-1 – Semi-Gloss Plastic Kote commercial finishes (all hallways, bathrooms and heavy traffic areas, etc.) standard color Hayseed, or China Doll.

Note: Level 5 drywall finish required for all walls that receive semi-gloss. (Public areas only)

PT-3 – Eggshell Plastic Kote commercial finishes, one wall per office. All offices accent wall will be the same throughout the building.

PT-2 – Semi-gloss Everlast water base for all metal doors, frames and interior handrails. All exterior handrails alkyd oil base gloss black modified with urethane or more permanent coatings.

All wood doors to match existing doors in building. (Stain)
Sanding sealer and two topcoats of urethane varnish satin.

- Ceilings - University standard ceiling system shall consist of a standard 2 x 2 foot lay-in acoustic panel with a 15/16" white exposed tee grid.

Depending on the project scope of work, design consultants should be encouraged to use this type of ceiling system. Other ceiling types or designs may be proposed, but must be approved by the University.

Acoustical ceiling tile standards shall be of a consistent design with material variations only as requested or approved by the University.

Offices, classrooms, utility areas, corridors, (generally "Campus Standard"):

- Armstrong #769 – 2 x 4; #770 – 2 x 2, white.

Lobbies, conference, major public spaces (General "Upgrade" Standard):

- Armstrong "Cirrus Non-Tegular" #584, white (Provide Non-Tegular unit unless specifically requested or recommended by University).
- Armstrong "Mesa" #680, white (Provide Non-Tegular unit unless specifically requested or recommended by University).

- Plastic Laminate - Acceptable manufacturers: Wilsonart, Nevemar, Formica.
- Finishes - All finishes shall be selected for easy maintainability and durability. In high abuse areas, these are the essential characteristics to consider in material selections.
 - At the completion of each project, a schedule of actual finish materials and colors used will be provided to the Project Manager.
 - Attic stock should be put on pallets and labeled with building name.

Note: Where shown, an asterisk (*) indicates the use of the "latest adopted edition" of a code, standard, etc.

B. Drywall Construction

1. The typical (non-fire rated) interior partition construction shall be of the following minimum standards:
 - Metal studs – 3^{5/8}” 24 gauge minimum, 16” O.C. to underside of acoustic grid ceiling, or 6” above ceiling.
 - Gypsum Wall Board – 5/8” minimum thickness, staggered joints, 8” O.C. screws on edge, 12” on field.
 - Minimum STC rating: 38, 47 with sound attenuating batts (2 ½” mineral wool).
 - Fire rating UL U465.
 - Match existing design conditions where possible on renovations, Level 4 finish standard.

Note: Level 5 drywall finish is required in all areas where gloss, semi-gloss enamel or non-textured flat paints are specified, except in building service areas that receive semi-gloss paint but will not need the Level 5 drywall finish.

DIV. 10 SPECIALTIES

A. Signage

1. Provide room number/identity signs for all project spaces which do not have existing signs meeting University standard or same numbering as approved for project by University. Signs shall comply with University standard designs or match existing signs (obtain sign design standard from University).
2. The Architect or design consultant should locate and design all interior and exterior signage for new building and renovation projects, (per KSU signage standards). The signage should be included in the construction project, but should be fully designed even if KSU decides to provide signs. Signage should be designed so that people are easily able to find destinations in the new building or area, and the designer shall work with the user representatives to make sure exact wordings are correct and all key components are identified.
3. The Architect or design consultant should design and specify in plans a place to install egress plans according to code. Architect should be responsible for providing proper egress plans (from their digital floor plans. The architect should provide the digital files to the contractor, so that permanent emergency egress plans are installed in accordance with applicable codes, as part of the project.
4. Provide University standard design building directory for new buildings. Consult closely with University.
5. Provide University standard exterior identity sign for new buildings. Consult closely with University.

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B. Toilet Compartments

1. Overhead braced partitions are preferred for new public restrooms. Painted metal partitions may not be used. Provide large coat hanger on stall side of door.

C. Toilet Accessories

1. Provide Bobrick B-2892 Classic Series surface mounted twin jumbo roll toilet tissue dispenser.
2. Soap dispensers (bag dispenser) are GOJO Dispensers, #NXT 1000, Size, 1000 ML; Height, 10"; Width, 5 1/8"; Depth, 4"; Refill, BIB. Kennesaw State University does not want soap dispensers mounted to vanity tops. IF automatic soap dispensers are used, these products must be used, (or approved equal): Pro Link Touch Free Foaming Hand Soap 1200 ML, #YG120 dispenser.
3. Hand Towel Dispenser: SOFPULL Center Pull Hand Tower Dispenser, Item #6622 (CENTER PULL Towel, #2 Cone, smoke front cover with black base for product #6622T and #52022T; dimensions 14.5" H x 11"W x 12" D). IF automatic paper towel dispensers are used, these products must be used, (or approved equal): North River Brown Roll Paper Towels/6 rolls per case, Kimberly Clark Elect-R-Matic Hands Free Dispenser, #5088175.
4. Trashcans should be placed under the counters and between the sinks if the design allows.
5. Provide sanitary napkin/tampon dispensers in women's toilet rooms, set for 25-cent coin operation.
6. Rest Rooms to have exhaust fan with back flow damper.

DIV. 11 EQUIPMENT

Meet with Kennesaw State University Facilities and Security staff to determine exact needs.

Security equipment to be provided:

Tier (1)

Motion activated cameras at the following locations to record people that enter the building before or after designated times:

- inside of all exit doors
- at building exit levels, stair exits, elevator lobbies and corridor coverage

Tier (2)

Additional camera locations as follows:

- corridors, stairwells and elevator lobbies on all floors
- receiving areas & loading docks
- mechanical rooms

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All camera locations to have the following:

- Adequate conduit, cable tray or other pathways that terminate at the LAN room on the nearest floor sufficient to contain a camera signal cable, an alarm signal cable and data signal cable.
- Conduit (in the jambs of exit doors) that extends above the ceiling (or other finished barrier) for the control of electronic locks.
- Nearby power on the emergency power circuit for the building (same power for emergency light near the exit).

DIV. 12 FURNISHINGS

A. Window Coverings

1. Use of draperies is discouraged in University facilities and may be used only with specific approval of University. One inch, horizontal metal blinds shall typically be used on windows for individual offices and in areas where outside light control is desired. Vertical blinds may be used as approved by University.

B. Fixed Seating

1. Fixed seating shall be 20" wide minimum. Proper spacing should be allowed for the physically challenged.

C. Furniture

1. All furniture selections shall be coordinated with and approved by the University.

DIV. 13 SPECIAL CONSTRUCTION

No specific requirements are issued for this type construction. Design/material recommendations shall be made per design consultant's professional judgment.

DIV. 14 CONVEYING SYSTEMS

A. Elevators

1. Provide three complete sets of final wiring diagrams, operating and maintenance manuals, parts manuals and troubleshooting guides. Provide all user and service codes for all diagnostic equipment with instructions.
2. Provide all special diagnostic equipment, meters or monitors manuals needed to trouble shoot or repair elevators. Proprietary equipment, computer hardware and software, shall not be used.
3. Parts or trouble shooting equipment needed to repair or maintain elevator equipment should be easily obtainable and generic.

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4. Provide inclusive maintenance, call-back service, and emergency repair on each elevator after it is completed and placed in operating order for a period of not less than 2 (two) years with no overtime charges during warranty period.
5. For hydraulic elevators, provide safety sleeve for jack.
6. Approved manufacturers:
 - KONE Elevators
 - Thyssen Krupp
 - Otis Elevator Company
7. Elevator cab lighting- provide fluorescent T-8 lamps with electronic ballasts or as approved by the University.
8. Provide key locks for independent service, fire service inspection, emergency stop, and fan. (Four [4] keys for each lock.)
9. Provide ADA- hand free communication with direct dial telephone line to KSU Public safety monitoring facility; one button push. Coordinate with KSU.
10. Provide wall panels in all elevator cabs with hangers for safety pads.
11. Provide safety pads in all elevator cabs (contractor must protect cabs during construction).
12. Provide hard, smooth, non-slip surface flooring (no carpet).
13. Provide Braille and tactile numbers and labels and meet all ADA requirements.
14. Provide instructions for fire service etched into panel.
15. Provide 2 copies of "design certificates" to University.
16. Provide directional indicator lantern lights in hoist way opening jamb at each floor and car position indicator at main entry levels.
17. To keep University elevator equipment in peak running environment, all new and renovated elevators shall have air conditioning and humidity controls in the control cabinets or equipment rooms. Shaft ways exposed to exterior environment (i.e. parking garages) shall be provided with humidity control to prevent water condensation on rails and operating mechanisms.
18. For passenger elevators, the elevator speed shall be no less than 150 FPM. For freight elevators, the speed is to be determined according to project needs.
19. Provide one dedicated service/ freight elevator, listed at 5000#'s, for all new construction for facilities 4 stories or greater.

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20. Provide one spill control kit for each elevator machine room in accordance with KSU Spill Prevention Control and Countermeasures (SPCC).
21. The entire elevator installation shall be in accordance with ASME A17, the most current edition.
22. Upon power failure the elevator must continue to operate off of the emergency generator.
23. Provide one laptop computer and elevator software with remote capability in the elevator machine room.
24. Maintenance: Starting at the date of Material Completion, provide a complete systematic inspection and maintenance of each elevator for a period of 24 months. Furnish trained experts and equipment to check, adjust, lubricate, and otherwise maintain the elevators in operation without defects of deterioration. Replace and repair materials and parts which become defective or deteriorated for any reason except through abuse or misuse by the Owner or occupants of the building. Return to the Project, within 18 hours of time the Owner reports defective operation, and proceed with repair and maintenance work to restore operation promptly.

DIV. 15 MECHANICAL SYSTEMS

15000- Project/Program Summary and Procedures

A. Owners Design Criteria:

- KSU Facilities Design Standard Criteria.
- International Mechanical Code 2006 with Georgia Amendments.
- International Fire Code, 2006 Edition, with Georgia Amendments.
- International Plumbing Code, 2006 Edition, with Georgia Amendments.
- International Fuel Gas Code, 2006 Edition, with Georgia Amendments.
- National Electrical Code, 2008 Edition, with Georgia Amendments.
- International Energy Conservation Code 2006 Edition A. with Georgia Supplements and Amendments.
- ASHRAE 62-2004, Ventilation for Acceptable Indoor Air Quality.
- ASHRAE 15, Safety Code for Mechanical Refrigeration.
- ASHRAE 90.1, 2007 edition.
- SMACNA Standards, all issues and editions.
- American with Disabilities Act, (ADAAG).
- Uniform Federal Accessibility Standard, (UFSA 1988).

B. Procedures:

1. IMPORTANT NOTICE: These “Mechanical, Plumbing, and Electrical Specifications” MUST be incorporated into the initial Architect’s Project Manual and the Construction Project Manual under “Division 15000 and 16000.” All KSU Purchase Orders must cross-reference this standard.

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2. Description

The project will involve the installation of a complete mechanical, plumbing and electrical system as described within these specifications and drawings.

3. Scheduling

The construction schedule, as approved by the KSU Project Manager, shall be an integral part of the Contract and shall establish interim contract completion dates for the various activities. The project schedule must include inspections and walkthroughs by Plant Operations staff at 50%, 80%, 100% completion and before ceiling grid or ceiling framing installations.

4. Ceiling Space and Equipment Access Coordination

The design team is responsible for designing all systems for adequate clearances and access to all systems. The General Contractor, and its subcontractors, shall coordinate and schedule the installation of all work above ceiling in accordance with manufacturer's installation instructions for all equipment. All trades shall participate and be required to attend special project meetings for the purpose of ceiling space coordination. Such coordination shall include, but is not limited to, the following work:

- Ceiling Grid and Ceiling Tile Installation
- Access doors, sizes and locations
- Ductwork, HVAC and Plumbing Piping, Sprinkler Piping
- Electrical Wiring, conduits, panels, control centers, and cable trays
- Telephone/Data Wiring
- All equipment

All equipment, and accessories requiring service or adjustment, shall be easily accessible to within 3 feet of the finish ceiling. Equipment access may require the installation of service platforms.

5. Inspection Requirements

The contractor shall be solely responsible for determining, verifying and complying with inspection requirements relative to the scope of work and with the authority having jurisdiction. All in floor, in wall, above ceiling rough-in work, and pressure tests shall be inspected by the architect/engineer prior to cover-up. All inspection reports shall be in writing and supported by digital pictures where deficiencies are found. Once the deficiency is corrected a follow-up inspection shall be made to verify compliance with the contract documents.

6. Closeout Documents and Requirements:

- As-built Drawings, Warranties and Guarantees.
- Operation and Maintenance Manuals.
- Control Drawings and Graphics.
- Fire Alarm Certification Letter.
- Filter Schedules, Lists and Drawings.

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- Equipment Log with Model and Serial Numbers.
- Extra Equipment and Materials for Owner stock.
- MEP Orientation for Plant Services. Provide video copy.
- Valve Tag Lists and Diagrams.
- Engineer approved TAB reports.
- Commissioning Final Report and Seasonal Follow-up report.

15010 - Mechanical Minimum Standards

1. KSU prefers to standardize equipment and materials with existing campus systems when possible/applicable.
2. Provide ample access for maintenance, service and adjustment to all equipment and ductwork accessories such as fire and smoke dampers, volume dampers, plumbing and piping shutoff valves in walls and hard ceilings.
3. Provide Bakelite nameplates on all equipment, motor starters, remote push button stations, insertions type thermostats, remote bulb thermometers, filter gauges, pump pressure gauges, fume hoods, fans, pumps, panel mounted controls and manual damper operators, multi-zone damper sections by room number, room designation, zone number, etc.
4. Contractor(s) to record and photograph the data plate information along with the location in the building and name of equipment (as designated on the blueprints) into an Excel spreadsheet, on a CD, and to be submitted when the building is turned over to KSU, as part of the close-out documents.
5. Graphics for control systems shall be completed and turned over to Plant Operations whenever a building phase or new building is turned over to KSU.
6. Provide bound Operation and Maintenance Manuals (3 copies). Provide specific maintenance data, including replacement parts list for all equipment and framed control diagrams/sequences on appropriate equipment, filter schedule and lists. Provide computer (AutoCAD) file for control diagrams. Provide contractor training for University maintenance personnel on all systems after submittal of O&M manuals. Training and orientation presentations shall be videotaped.
7. All equipment, piping, conduit, etc. within a renovated space which is abandoned shall be removed. If it cannot be removed it shall be properly capped or plugged using the same type and gauge material as the existing system. Ductwork shall be capped and sealed using the same gauge as existing system.
8. All return air plenums in renovated areas shall be inspected for combustible, non-plenum rated materials which will subsequently be removed.
9. All asbestos materials, or materials that appear to be asbestos, and/ or upon discovery, shall be reported to the KSU Environmental Health, Safety and Risk Management.

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15020 – Energy Efficient Equipment and Systems:

A. Sustainable Design Features and Opportunities:

1. KSU's goal for projects should be a reduction in energy usage from the ASHRAE 690.1 baseline building. Innovative, sustainable design strategies will be required to achieve the goal, while providing a system that is appropriate for the campus and maintenance staff.
2. Sustainable Features of the HVAC system for consideration include, but not be limited to, the following:
 - Premium efficiency type motors.
 - High efficiency chillers.
 - Equipment and distribution systems selected for low air pressure drop.
 - Oversized cooling tower with variable speed drive fan.
 - Variable volume air handling systems with variable speed fans.
 - Reset of temperature setpoints and/or tolerances.
 - Reset pressure setpoints for air and water systems via discriminator control.
 - Energy recovery wheel for toilet exhaust and lab general exhaust to pre-treat ventilation air for air handling units.
 - Variable flow hot and chilled water system with variable speed pumps.
 - Automatic switches in operable glazing to deactivate mechanical cooling and heating systems in areas with open windows.
 - Provide separate air handling systems for laboratories and non-laboratory areas.
 - Reduce required air change rates in individual laboratories as appropriate based on an analysis of the risk associated with that space and the chemicals being used in it rather than on historical practice.
 - Return general exhaust air from non –laboratory spaces.
 - Design fume hoods to shut off completely when not and use and where not used for chemical storage.
 - Recovery of coiling coil condensate for reuse as cooling tower make up.
 - High filtration of incoming air.
 - Increased quantity of ventilation air without increasing the heating and cooling loads on the building.
 - Independent control of temperature in private offices.
 - High performance fume hoods.
 - Provide monitoring system for tracking and display of building energy use, water, etc. This system is to also be used as an educational opportunity and for auxiliary spaces billing information.
 - Ground source heat pumps.
 - Run around heat recovery from fume hood exhaust.
 - Supplemental solar reheat system.
 - Variable Speed Drives.
 - Indoor Air Quality/ASHRAE Standards for MERV rated filtrations systems.

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15050 - Basic Mechanical Materials and Methods

1. Provide isolation valves on pumps, chillers, coils, pipe risers, etc. Provide full port gate valves on piping 2 ½ inch and larger and ball valves on 2 inch pipe and smaller.
2. Use only sil-phos solder on copper chilled and hot water lines (No 95-5). “Ridgid” Pro-Press fittings and connection systems are acceptable for copper pipe and fittings 2 inches and smaller.
3. Pipe identification is required for all systems. Pipe identification shall conform to ASME Standard A13.1. All piping, if required to be painted, shall be painted first and prior to all labeling.
4. All exposed exterior gas piping shall be primed, painted and labeled. All equipment supports shall be primed and painted.
5. Provide automatic air vents with shut off ball valves before vent at high places in water lines and at top of coils. Pipe vent drain line to hub or floor drains, preferably in mechanical spaces. Trap Primers shall be ASCO Red Hat Valve # 3UL18-24/60 and be controlled by the DDC system.
6. All chilled water coils shall have ports and valves to support temperature and pressure difference measurement. Install pressure gauges or equipment with ball valve shut-off. Install (in well) temperature gauges on all heating-cooling coils. All piping specialties shall be installed prior to test and balance.
7. Provide cleaning of all piping systems prior to initial operation including chilled water, condenser hot water, steam, domestic and fire protection systems, and cooling towers. Cleaning shall be acceptable to the Owner’s Water Treatment Contractor. Water Treatment shall be provided by Waterman Inc. and shall include a 2 year service agreement after the warranty period expires.
8. Pipe, valves and fittings shall be single? domestic manufacturer.
9. Provide vibration isolation for all motor operated equipment.
10. Provide equipment bases and housekeeping pads (4” high min. and with 4” overhang min.)
11. All-thread nipples 1½ inches and smaller in diameter are prohibited. Nipples attached to larger pipes shall be schedule 80 attached with the use of thread-o-lets or weld-o-lets.
12. All elbows shall be long radius unless otherwise noted.
13. Mitered fittings and tapped pipes are not allowed.
14. Provide unions in piping to all equipment and specialties to permit removal for service; unions shall be metal seat type. Provide insulating unions where needed. Dissimilar metals, i.e. copper and steel, shall not be installed to allow direct contact between the metals. Provide

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dielectric connections. Also provide shut off ball valves to heating-cooling coils, etc. for removal of same.

15. Reducers in piping shall be eccentric type where grading is specified, (reducers shall be used to change pipe size).
16. Relief valves or devices discharge piping shall be piped to a drain.
17. Boilers and cooling tower make up water shall have slow acting valves to prevent water hammer. Provide water meters for boiler and cooling tower makeup water. Provide heat tape for cooling tower makeup water. Provide a 2 inch cold water make up water line to the cooling tower basin for quick fill use.
18. Equipment should not be placed so that it causes noise problems for occupied areas such as classrooms and offices. Proper sound attenuation and vibration isolation should be used so that occupants are not disturbed by noise or vibration. Screw-type chillers are not allowed in buildings or exterior of buildings next to classrooms or offices.
19. Rooftop equipment curbs shall be custom slope, with insulated panels. Cut out decking only for duct drops. Prior to setting equipment seal around all ducts and install felted semi-rigid mineral wool acoustical batt insulation, 4 pound density, 8 inches thick minimum, inside the curb.
20. Mechanical rooms on elevated floors and penthouses shall have epoxy floors, 4 inch curbs around perimeter of room and all piping, conduit, and duct sleeves shall be installed a minimum of 2 inches above finish floor. All floors shall have 2 % slope to floor drains.

15250 - Mechanical Insulation

1. Indicate duct sizes by “clear inside dimensions”. Do not use internal liner with high-pressure systems.
2. Provide extra duct insulation in attic spaces.
3. Specify SS wire wrapping of duct external insulation.

15300 - Fire Protection

1. Provide fire sprinkler system in accordance with NFPA 13 for all new buildings unless directed otherwise by University project manager. Provide sprinkler system in those renovation/repair projects wherever necessary to meet applicable codes or where requested by University project manager.
2. All fire sprinkler system design drawings must be sealed by a Georgia registered professional engineer and must be approved by the State Fire Marshal's Office.

Note: Where shown, an asterisk (*) indicates the use of the “latest adopted edition” of a code, standard, etc.

3. Contract documents shall require the fire protection contractor to submit sprinkler shop drawings and hydraulic calculations directly to the State Fire Marshall for approval.
4. Provide a clear shield and frame that fits over manual pull stations with horn in the cover so that whenever the cover is lifted, that internal local horn immediately starts to blow to discourage false alarms. (Manufacturer: STI, Inc. – Stopper II Pull Station Protector).
5. Fire alarm panel shall be Edwards EST-3 system, including dialer and network modules.
For further detailed information, see Fire Alarm Security and Access Control Specifications in Appendix B.

15400 – Plumbing Fixtures and Accessories

PART 1 – GENERAL

1.0 GENERAL PROVISIONS

- A. Each new building shall have at least one single handicapped accessible unisex public restroom.
- B. Provide a hose bib under restroom vanities or lavatories wherever the custodial closets or janitor’s room is not in the vicinity.
- C. Design all new restrooms and emergency showers to have floor drains.
- D. Design all custodial closets or janitor’s closets to have a floor drain along with a janitor’s sink.
- E. Provide air chambers or shock absorbers at all fixture locations.
- F. Design domestic water supply (hose bib) for all mechanical rooms, boiler rooms, all air handler rooms, all mechanical penthouses and at cooling towers. Cooling tower location shall have a 2 inch hydrant connection.
- G. All grease interceptors shall be a minimum of 3000 gallons and shall be outside. Point-of-use interceptors may be used with prior approval by KSU.

1.1 DESCRIPTION

- A. This section covers plumbing fixtures, trim and equipment

1.2 QUALITY ASSURANCE

- A. Conform to the following:
 1. ICC A117.1-2003
 2. International Energy Conservation Code-2006 with all Georgia State Amendments
 3. International Plumbing Code-2006 with all Georgia State Amendments

1.3 PLUMBING RELATED FIXTURES AND EQUIPMENT:

- A. Laboratory and science equipment is specified in another Division
- B. Laboratory fixtures (e.g., sinks and cup sinks) complete with faucets, vacuum beakers, drains, and tailpieces, unless specified otherwise herein, will be furnished with laboratory equipment and turned over loose for installation by this Section.

Note: Where shown, an asterisk (*) indicates the use of the “latest adopted edition” of a code, standard, etc.

PART 2 – PRODUCTS

2.1 PLUMBING FIXTURES – GENERAL

- A. Fixtures shall have smooth impervious surfaces, free from defects and no concealed fouling surfaces and be Grade A quality, with name or trademark of the manufacturer printed on or pressed into the fixtures. In addition, a label which cannot be removed without destroying it, containing the manufacturer's name or trademark and the quality of class of the fixture, per ASME A112.19, shall be affixed to fixture and not removed until after the work is accepted.
- B. Water fountains and faucets shall have lead-free water ways.
- C. Exposed waste and supply piping, including piping exposed when millwork doors are open and mounting bolts of fixtures shall be chromium-plated.
- D. Fixtures of the same construction shall be by the same manufacturer, e.g. vitreous china, water fountains, and stainless steel, unless otherwise specified herein.
- E. Vitreous china fixtures shall be white.
- F. Plumbing fixtures shall be complete with equipment, fittings, and trim as specified in Paragraph 2.03, Plumbing Fixture Trim.

2.2 PLUMBING FIXTURES:

- A. Water Closets- (Series F1)
 - 1. F1A, Water Closet, Wall Type Sensor Flush Valve:
 - Elongated vitreous china water saving type, with siphon jet bowl, flush valve and trim for 1.6 and 1.1 gal per flush, seat, chair carrier, and chromium plated nuts and washers.
 - Manufacturer: American Standard 2257.103, Crane 3446, Kohler K-4330, or Toto CT 708.
 - 2. F1B, Water Closet, Wall Type Sensor Flush Valve, Handicapped:
 - Elongated vitreous china water saving type, with siphon jet bowl, flush valve and trim for 1.6 and 1.1 gal per flush, seat, chair carrier, and chromium plated nuts and washers.
 - Manufacturer: American Standard 2257.103, Crane 3446, Kohler K-4330, or Toto CT 708.
 - 3. F1C, Water Closet, Floor Type Flush Valve
 - Elongated vitreous china water saving type, with siphon jet bowl, flush valve and trim for 1.6 and 1.1 gal per flush, seat, bolts, and caps with retainer clips.
 - Manufacturer: American Standard 2234.015, Crane 3325, Kohler K-4350, or Toto CT705.

Note: Where shown, an asterisk (*) indicates the use of the “latest adopted edition” of a code, standard, etc.

B. Lavatories- (Series F2):

1. F2A, Lavatory, Countertop Type, Handicapped:

- Vitreous china lavatory, nominal 20" x 17" "oval with 4" centers and fitter with faucet, supplies with stop valves, grid drain, P-trap, waste to wall, and escutcheons.
- Manufacturer: American Standard 0476.028, Crane 1280-V, Kohler K-2196, or Toto LT501.4.

2. F2B Lavatory, Wall Type, Handicapped:

- Vitreous china lavatory, nominal 20" x 18", with 4" centers and fitted with faucet, supplies with valves, grid drain, P-trap, waste to wall, escutcheons, and floor-mounted carrier.
- Manufacturer: American Standard 0355.012, Crane 1412-V, Kohler K-2005, or Toto LT307.4.

C. Specialty Sinks:

1. F2C Sink, Under counter oval sink, American Standard Ovalyn 0495.221, or 0496.221, or 0497.221. See cut sheets for sizes.

2. F2D Stainless Steel, under mount sink, Elkay ELUH1812.

3. F2E Stainless Steel, Gourmet Single Bowl Under mount Sink, Elkay ELU1418 or ELUH1418.

4. F2F Stainless Steel, Surface Mounted Sink, Elkay PSLVR1917 Series.

D. Urinals- (Series F3):

1. F3A, Urinal, Wall Type:

- Vitreous china without urinal, 0.125 gal per flush water-saving type, with extended shield, flushing rim, fitted with flush valve and trim, and floor-mounted carrier.
- Manufacturer: American Standard 6590.525, Kohler K-4904-ET, or Zurn Z5758, or Sloan WEUS-1000.1401-1.13 ECOS.

2. F3B, Urinal, Wall Type, Handicapped:

- Vitreous china washout urinal, 0.125 gal per flush water-saving type, with flushing rim, fitted with flush valve and trim, and floor-mounted carrier.
- Manufacturer: American Standard 6590.525, Kohler K-4904-ET, Zurn Z5758 or Sloan WEUS-1000.1401-0.13 ECOS.

3. F3C, Urinal, Wall Type, Water Saver Equal to American Standard Selectronic, Innsbrook, 0.5 Gallon Flush, #6520.001 and #6520.003

Note: Where shown, an asterisk (*) indicates the use of the "latest adopted edition" of a code, standard, etc.

E. Water Fountains- (Series F4):

1. F4A, Water Fountain, Bi-Level:

- Electronic water cooler type wall hung with regular and barrier-free tops packaged as a single unit with stainless steel finish, bubbler heads with guards, self-closing push bar valves, supply with stop valve, P-traps, waste to wall, escutcheons, refrigeration unit, mounting frame, and stainless steel panels. Units shall be certified to NSF 61-2008.

NOTE: Some projects do not require refrigeration unit. Verify with KSU.

- Manufacturer: Elkay EZSTLR8LC, OR Halsey Taylor OVL-II-SER-Q ADA.
- Accessory bottle filling station, Elkay EZH20 or equal.

2. F4B Water Fountain, Bi-Level

- Electric modular water cooler type with regular and barrier-free bowls, packaged as a single unit with round receptors with all stainless steel finish, bubbler heads with guards, self-closing push button valves, supply with stop valve, P-traps, waste to wall, escutcheons, refrigeration unit, mounting frame, and stainless steel panels. Units shall be certified in accordance with NSF 61-2008.
- Manufacturer: Elkay ERPBM28RAK, Halsey Taylor OVL-II-SER-Q, Haws H1011.8, or Oasis M8CR.

3. F4C, Water Fountain, Wall Panel Type, Stainless Steel Elkay Model ERPBM28RAK, Barrier Free.

F. Sinks, Service- (Series F5)

1. F5A, Service Sink, Floor Type:

- Terrazzo neo-corner service sink, 24" x 24" x 12", with cast integral drain, 6" drop front with stainless steel rim guard over drop, wall hung faucet, and hose with wall bracket, wall mounted mop bracket, and stainless steel wall guard.
- Manufacturer: Fiat TSBC-1610, Florestone 96-24x24, or Stern-Williams SBC-1700.

G. Sinks, Counter- (Series F-6):

1. F6A, Sink, Stainless Steel, One Bowl, Handicapped:

- Self-rimming 18 gauge type 304 stainless steel sink, 19" x 21" x 6", one compartment with 3 hole punch, faucet, supplies with stop valves, rear drain, P-trap, waste to wall, and escutcheons.
- Manufacturer: Elkay LRAD-2219, OR Just SL-ADA-1921-A-GR.

H. Showers- (Series F7)

1. F7A, Shower, Handicapped:

- Pressure-balanced type 3-port mixing valve with adjustable temperature limit stop, check stops, built-in volume control, hot and cold color coded escutcheon, metal lever handle, 30" adjustable slide bar, hand held shower

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head with 1.5 gpm flow control, 60” long metal hose, wall flange, inline vacuum breaker and swivel connector. Exposed parts and accessories shall be chromium-plated.

- Manufacturer: Zurn Z7100-S9-1.5 gpm, Symmons S-96-300-1.5-B30-X-L-V or Speakman SM-3400-SCS-M with VS-100-AF-1.75, VS-124 AND VS-145.

I. Emergency Fixtures- (Series F10):

1. F9A, Emergency Shower and Eye/Face Wash, Free-standing:

- Free-standing stainless steel shower and eye/face wash unit, with 1.25” supply, separate stay-open ball valves, shower pull rod, eye/face wash soft foam spray heads with flip top duct covers, 1.25” drain, and ANSI-compliant identification signage. Provide audible and visible alarm system connected to the building BAS.
- Manufacturer: Bradley S19-310SSJP, Guardian G1996, or Haws 8309PCP, OR Speakman SE-625.

J. Washer Boxes- (Series F10)

1. F10, Washing Machine Connection Box:

- Recessed, wall-mounted, laundry hose valve box supply drain unit, constructed of 16 gauge steel with corrosion-resistant epoxy finish, with hose valves, 2” drain outlet and bottom supply inlets. Hose valves shall have 0.5” brass sweat inlet connections, and 0.75” hose thread outlet connections.
- Manufacturer: Acorn 8185, Bradley 7906, or Guy Gray B-200.

K. Ice Maker Boxes- (Series F11)

1. F11, Refrigerator Ice Maker Connection Box:

- Recessed, wall-mounted galvanized steel box, with support brackets, adjustable face plate, enameled with finish on exposed parts, and water valve with 0.5” inlet and 0.25” compression outlet.
- Manufacturer: Guy Gray BIM875, Oatey 38687/38689, or Walter-Tite Metal Ice Maker Outlet Box.

2.3 PLUMBING FIXTURE TRIM

A. Water Closet Trim- (Series F1):

1. Flush Valves:

- Dual Sensor Flush Valves for Water Closets
 - Dual Flush type with 1.6 gal high flush and 1.1 gal low flush. Furnish valve with sweat solder adapter kit, solid ring pipe support, back check angle stop valve, vacuum breaker, battery powered infrared sensor for automatic operation including batteries, dual override buttons, and 11” rough-in.

Note: Where shown, an asterisk (*) indicates the use of the “latest adopted edition” of a code, standard, etc.

- Manufacturer: Sloan Ecos Flushometers, American Standard, Selectronic #6065.121.002 or equals.
- Retrofit Installations: American Standard #6065.525.002 or equal.

2. Water Closet Seats:

- Elongated Extra Heavy Weight:
 - Solid high impact plastic with open front seat, stainless steel post, washers and nuts, and self-sustaining check hinges, and antimicrobial agent.
 - Manufacturer: Bemis 1655SSC, Beneke 527SS, Church 9500SC, or Olsonite 95SS.

3. Floor Mounted Carriers:

- Commercial Type:
 - For wall-hung water closets: commercial type with a 500 lb. support weight capacity, adjustable vertically and horizontally from the faceplate, with the base support, adjustable coupling, gasket, and chromium-plated through-bolts, and acorn nuts.
 - Manufacturer: Josam, Smith, Wade, or Zurn

B. Lavatory Trim- (Series F2)

1. Lavatories:

- Self-adjusting battery type infrared sensor with controls located in the spout, polished chromium-plated brass body with vandal-resistant curved spout, base plate for 4" centers, and 0.5gpm vandal-resistant aerator flow control. Provide each faucet with an external user adjustable temperature control, cold and hot water inlets, integral checks, waterproof electronics with 60's wash cycle, a 2 s maximum run-on time, batteries, and installation hardware. The assembly shall comply with ASME A112.18.1/CSA B125.1-2005 and ICC A117.1-2003.
- Manufacturer: Chicago 115.727.21.1/240.768.21.1, Basis Design American Standard, Selectronic A/C or D/C powered .5 or 1.5 gpm with optional mixing valves.
- Angle stops with 0.5" id x 5" inlet sweat tube, bell escutcheon, loose key control, 0.375" od x 12" flexible tube riser, and exposed piping and parts chromium-plated.
- Manufacturer: EBC LA26K, McGuire 171LK, or Zurn Z8808LRLK.

2. Drains:

- Grid type with chromium-plated cast brass top and strainer with 1.25" 17 gauge tailpiece.
- Manufacturer: EBC SG7, McGuire 155-A, or Zurn Z8743-PC.

3. ADA Insulation:

- Handicapped fixtures: white molded closed cell vinyl, 3-piece for tailpiece, P-trap, and waste arm, and 2-piece for supply stops, and risers, and offset tailpiece accessory.

Note: Where shown, an asterisk (*) indicates the use of the "latest adopted edition" of a code, standard, etc.

- Manufacturer: EBC 1K, Insul-Tect I-T 101, and/or I-T 102, McGuire, PW2125 and or PW2150, Plumberex 2000, or Truebro 102-EZ.

4. Floor-Mounted Carriers:

- For wall-hung lavatories: floor-mounted commercial type, with concealed arm supports.
- Manufacturer: Josam, Smith, Wade, or Zurn.

C. Urinal Trim- (Series F3):

1. Flush Valves:

- Dual Sensor Flush Valves for Water Closets
 - Dual Flush type with 1.6 gal high flush and 1.1 gal low flush. Furnish valve with sweat solder adapter kit, solid ring pipe support, back check angle stop valve, vacuum breaker, battery powered infrared sensor for automatic operation including batteries, dual override buttons, and 11” rough-in.
 - Manufacturer: Sloan Ecos Flushometers, American Standard, Selectronic #6065.121.002 or equals.
 - Retrofit Installations: American Standard #6065.525.002 or equal.

2. Sensor Flush Valves for Urinals (Battery Type):

- 0.125 gal per flush, complete with sweat solder adapter kit, back check angle stop valve, vacuum breaker, battery-powered infrared sensor for automatic operation, batteries, and override button contained in a chromium-plated metal housing.
- Manufacturer: Sloan 0.13 ECOC, American Standard “0” Selectronic, or Zurn Z5758.205.00 Ecovantage.

3. Floor-Mounted Carriers:

- For wall-hung urinals: commercial type, floor-mounted, with hanger plates.
- Manufacturer: Josam, Smith, Wade, or Zurn

D. Water Fountain Trim- (Series F4)

1. Supplies:

- Angle stops with 0.5” sweat inlet, 0.375” od outlet, 0.375” od flexible tube riser, and wall escutcheon. Exposed piping and parts shall be chromium-plated.
- Manufacturer: Brass Craft OR1712AZC, EBC VA22, or McGuire 2165.

2. P-Traps:

- 1.25”, 17 gauge tubular chromium-plated brass, with tubing drain to wall, wall flange, cast brass slip nuts, and cleanout plug.
- Manufacturer: EBC TA125, McGuire 8872, or Zurn Z-8701-9.

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E. Service Sink Trim- (Series F5):

1. Faucets:

- Rough chromium-plated, with hose thread outlet, pail hook, vacuum breaker, stop valves in shanks and wall support.
- Manufacturer: Chicago 897-RCF, Speakman SC-5811-RCP, or T&S B-0667-RGH

2. P-Traps:

- For floor type service sinks: 3” cast iron.

3. Hose and Brackets:

- 0.625” outside diameter x 36” long, heavy duty black hose with 0.75” coupling, and wall-mounted stainless steel hose bracket with spring loaded rubber grip.
- Manufacturer: Fiat 832-AA, Florestone MR-370, or Stern-Williams T-35.

4. Mop Hangers:

- 24” long stainless steel with 3 spring loaded rubber mop handle grips.
- Manufacturer: Fiat 889-CC, Florestone MR-377, or Stern-Williams T-40.

5. Wall Guards:

- Two 24” long polished 20 gauge, type 304 stainless steel panels.
- Manufacturer: Fiat MSG-2424, Florestone MR-377, or Stern-Williams BP.

F. Counter Sink Trim- (Series F6)

1. Faucets:

- For sinks:
 - Swing gooseneck type with 8” spread in spout, polished chromium-plated with 4” brass blade handles, color-coded indexes, ceramic cartridges, 0.5” rigid brass inlet shanks on rigid 8” centers, and 2gpm vandal-resistant aerator flow control. 2 gpm vandal-resistant laminar flow control.
 - Manufacturer: Chicago 201-A-317GN8A-E3VP, T&S B-2866-78-79A, or Zurn Z831C4-2F-ICT.

- Sinks:

- Angle stops with 0.5” id x 5” inlet sweat tube, bell escutcheon, loose key control, 0.5” od x 12” flexible tube riser, and exposed piping and parts chromium-plated.
- Manufacturer: EBC LA27K, McGuire 171LK, or Zurn Z8809LRLK.

2. Strainers:

- Grid type strainer:
 - Chromium-plated finish brass body and flat strainer with brass lock nut, sealant washers, and 1.5” x 4” seamless 20 gauge tailpiece.

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- Manufacturer: EBC SF8W, Elkay LK18, Just J-35-SF, McGuire 152, or Zurn R450W.

3. P-Traps:

- 1.5”, tubular chromium-plated brass, with 17 gauge tubing drain to wall, wall flange, cast brass slip nuts, cleanout plug, and minimum 2” water seal.
- Manufacturer: EBC TA150, McGuire 8912, or Zurn Z8702-9-B.
- Manufacturer: McGuire 8912CNC, or Zurn Z8702-9LC-B.

4. ADA Insulation:

- Insulation kit for handicapped locations: white molded closed-cell vinyl, 3-piece for tailpiece, P-trap, and waste arm, and 2-piece for supply stops, and risers.
- Manufacturer: EBC 1K, Insul-Tect I-T 101 and/or I-T 102, McGuire PW2125 and/or PW2150, Plumberex 2000, or Turebro 102-W.

15500 - Heating, Ventilating, and Air Conditioning (HVAC)

1. Please note it is the policy of Kennesaw State University (Board of Regents) not to put A/C equipment on any roof. Every effort must be made to put this equipment on the ground. However, we understand that ground space is often limited and there are also aesthetic and future expansion concerns. If a roof top unit must be used, adhere to the following minimum A/C specifications:

- No discontinued models
- No contractor grade units (low end)
- Refrigerant R-410A
- Air side economizer, 0 to 100 % with dry bulb controls
- Thermostatic expansion valve (TXV), on each circuit
- Low ambient kit, down to 0 deg. F
- High and low pressure cut out switches
- Dual compressors, on any system at or above 7.5 Tons
- Crankcase heaters
- Service valves
- Compressors shall have manual reset oil failure cut out
- Compressor motors shall have internal line overload protection
- Microprocessor control system
- 10 Year compressor warranty
- 15 SEER or higher
- UL approved
- Air conditioning and refrigeration institute (ARI), standard 210/240 certified
- By design, some apparatus may not be used

[All equipment and any changes to the above specifications must be pre-approved by Plant Operations HVAC Supervisor.]

Note: Where shown, an asterisk (*) indicates the use of the “latest adopted edition” of a code, standard, etc.

2. Use cast Iron reservoir duplex condensate return pumps with SS impeller and stem. (Specification standard manufacturer: Hoffman. Second choice: Dunham Bush.) Vent these to outside.
3. For steam boilers, use a Pulsatron Series E+ or equivalent metering pump to feed chemicals.
4. Steam traps: Prefer Armstrong. Second choice: Dunham-Bush.
5. Provide Chemical Controllers, feed equipment, and coupon racks for hot water, chilled water, condenser water and steam systems. Closed chilled and hot water systems shall have one shot feeders and sampling port location below face level. Pumps shall be positive displacement pumps equivalent to Pulsatron pumps. Controllers shall be electronic control type. Conductivity controllers shall be Pulsatron MCT3 10. Condenser water blow down valves shall be stainless steel ball valve driven by normally closed spring return type motorized actuators.
6. Provide all water treatment equipment required to deliver chemicals to systems at completion of construction, i.e. shot feeders, blow down controls, chemical pumps, and meters. Also, provide test equipment for operating personnel. Also open chemical tanks for mixing the chemicals.
7. Hot water and boiler condensate pumps shall have stainless steel shafts and impellers.
8. Automatic (boiler) surface blow downs shall have steel trimmed motorized ball valves.
9. Use Grundfos 1/25 and 1/6 hp. circulating pumps. These are water-cooled and water lubricated.
10. Use Aurora turbine type boiler feed pumps (in duplex) with SS impeller and stem.
11. Specify manufactured equipment curbs (Pate or Thycurb) for all roof-mounted equipment. Don't allow equipment to be mounted on pressure treated wood.

15550 - Heat Generation

1. Hot water boilers are preferred over steam boilers. If steam boiler systems are used, locate make up water feed in the condensate return systems; not directly into the boiler. Boiler systems should also contain de-aerator.
2. Use Cleaver Brooks fire tube boilers for steam 40 hp. up. Kewanee Boiler and York are also acceptable.
3. Use Ray-Pak - 96% thermal efficiency hot water generation equipment, or equivalent A.O. Smith Legend. Lochinvar New Generation also acceptable.
4. Use 96% thermal efficiency combustion equipment wherever available.
5. Use Honeywell BC7000 (or most recent update) programmers on boilers with read-out face.

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15650 - Refrigeration

1. Cooling towers: specify NC (normally closed) motorized, spring return valves for make-up water. Cooling tower level control shall be by mercury float switch type (not electronic contact type).
2. Provide proper refrigerant specialties (expansion valves, strainers, dryers, etc.).
3. Chillers shall have side marine connections on condenser water connections.

15750 - Heat Transfer

1. Design steam heat exchangers (that use a modulating control valve) to have a gravity or a pumped condensate return system to save wear and tear on the heat exchanger.

15850 - Air Handling

1. Evaporator coils/ condensate drains in ceilings shall have emergency drip pans with drain line and high level shut offs. Shut off valves at each coil, on supply and return line. Drip pans shall be anti-corrosion coated or stainless steel. Drip pan overflow drain line should discharge into readily observable space (such as public corridor). Do not use condensate pumps.
2. All condensate drain pans shall be coated with rust preventive paint and shall be sloped properly to drain to prevent the accumulation of condensate in the drain pan.

15880 - Air-Distribution

1. Variable Air Volume units, Powered Induction Units and other terminal HVAC equipment shall have 36 inches min. side clearance for maintenance access. VAV with VAV Reheat terminal units shall be used for new VAV system installations.
2. Provide access panels for fire damper maintenance. Panels to comply with SMACNA standards.
3. Allow flexible duct runs no longer than 10 feet w/only one 90-degree bend.
4. Air filters shall comply with newest IAQ standards (normally pre-filter with high efficiency filter behind it or electrostatic filtration on larger systems. Minimum 60% for all systems.
5. All fume hood ducts shall be type 3 16 stainless steel.
6. Provide access to sheet metal accessories, air dampers, splitter dampers, etc. All access panels shall be 24" square. (18" panels not acceptable).

15950 - Controls

1. **Provide direct digital controls (DDC) for all HVAC systems in accordance with University guide specification. Contact Kennesaw State University Plant Operations for**

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control system information for main campus area projects. When a building is being built as an extension to an existing building, control system must be evaluated for being operated as an extension of existing building systems. The final determination will be made by Kennesaw State University Plant Operations and Facility Planning & Design Services. Controls must be compatible with and connected to existing campus DDC systems. All DDC control work for renovations or construction shall be fully integrated into the controls of existing systems and/or central plants.

2. Add note to all mechanical system drawings requiring that all obsolete/non-functional controls be removed when retrofitting with DDC.
3. All construction and modification work shall include updated graphics of existing DDC control systems with color-coded zones and sensor locations noted. Graphic shall also identify all room numbers as assigned by the university. Floor plan shall be developed using the same architectural AutoCAD floor plans.
4. Terminal air units, such as VAV boxes, that have heat shall have discharge air temperature sensor as part of the control package installed as part of the DDC box controls. Also have CFM sensors and air supply to box temperature sensors.
5. Do not remove existing lighting control panels. Reuse the panels to allow lighting shut down in off hours while keeping a minimum of one foot-candle in all open areas. Add occupancy sensors to override shutdown of full lighting level.
6. Locate control cabinets as close as possible to the mechanical equipment with proper clearance for maintenance.
7. Provide NC (normally closed) type chilled water and NO (normally open) type steam/hot water valves.
8. DDC status proof should be accomplished with current status relays as opposed to differential pressure switches or auxiliary contacts.
9. Tag all wires and tubing for electrical and pneumatic controls and distribution. Match routing and markings to as-built information provided on CAD drawings.
10. Control air compressors shall have adjustable plunger type timer activated bottom blow down valves, piped to drain. Compressors shall be pressure lubricated with less than 2 ppm of oil carryover certified by the manufacturer. (Acceptable manufacturer: Quincy or equivalent) Each compressor tank unit to have two air compressors with lag-lead switch and malfunction light.
11. Duct smoke detectors and fire stats shall have button to test operation.

15990 - Testing, Adjusting, and Balancing

1. Specify Test & Balance certification by independent firm. Do a full summer and winter test and balance and provide copies to KSU.

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MECHANICAL - OTHER

1. Laboratory fume hood design shall conform to Board of Regents latest design criteria.
2. Use only pumps with mechanical seals.
3. Cooling Towers with stainless steel basin, and covers on (top) water distribution pans.
4. Install mater meters – on cooling tower, boiler water, make up lines.

DIV. 16 ELECTRICAL SYSTEMS

A. General

1. Provide sufficient capacity for substantial future growth.
2. The primary transformer feeding the building shall be three phase, loop feed, make before break switching for the loop feed, on/off switch load break, oil level gauge, pressure relief valve, thermometer, fused, 600 amp elbows, parking stands one per phase.
3. Provide minimal one receptacle on each wall in the offices.
4. No more than 12 receptacles on a circuit.
5. Provide corridor receptacles for custodial use, maximum spacing 30' on a separate circuit.
6. Surge protection at main and each sub panel.
7. All circuits to have an individual ground wire.
8. Major corridor lighting shall be timer controlled with duel technology occupancy sensor override to reduce foot candles to code approved minimum at night.
9. Energy savings fixtures and lamps shall be utilized at all locations. Provide parabolic troffer fixtures with electronic ballast & T8 lamps. Use compact fluorescent down lights where required. Provide dimmable compact fluorescent fixtures for dimming situations. All fluorescent lighting shall be 41K (color).
10. Use metal halide lamps for HM fixtures.
11. Wiring devices to be ivory with standard size stainless steel or nylon cover plates.
12. Exterior lighting, walkway lighting to match campus standard. Fixture type: Hamilton Series Post Op Fixture cast aluminum, color black, 175 watt metal halide Holophane catalog #AR175MHBG3. Pole type: Hamilton Series cast aluminum post fluted shaft 14 ft., color black, Holophane catalog #H14F5/16-CA/BK.
13. Exit lights, LED type battery backup, self-testing.

Note: Where shown, an asterisk (*) indicates the use of the “latest adopted edition” of a code, standard, etc.

14. The consultant should design aesthetically pleasing lighting systems and should utilize minimum standards that are based on those recommended by the Illuminating Engineering Society of North America (*), Department of the Army Field Manual Number 19-30 (*) and Volume III of the Protection of Assets Manual published by Merritt (*). They represent the current knowledge about the minimum lighting values that must be maintained for safety and security in a variety of settings.

Using these standards and recording the light levels in Foot Candles, the following are the ranges of acceptable minimums at various locations as they relate to the exterior and public areas of this building:

- Building Entrances – 5.0 to 10.0 FC
- Open Air Parking Lots – 0.8 FC
- Covered Parking Lots/Parking Decks – 3.0 FC
- Vehicle Entrances – 1.0 FC
- Walkways between buildings – 3.0 FC
- Covered and uncovered courtyards – 3.0 FC
- Lobbies and Hallways – 10.0 – to 20.0 FC
- Elevators and Stairwells – 10.0 to 20.0 FC

It should be understood that these light levels are the minimum standards in any location. For example, there may be higher readings than 0.8 FC at some locations in a parking lot, but there should be no location that falls below this level in the lot.

15. All exterior lighting levels must conform to the Illuminating Engineering Society of North America and also Volume III of the Protection of Assets Manual published by Merritt. They represent the current knowledge about the minimum lighting values that must be maintained for safety and security in a variety of settings.

- Building Entrances – 5.0 to 10.0 FC
- Parking Lots – 0.8 FC
- Property Perimeters – 0.4 FC

16. All offices and hallways to have individual light switches.

17. All exterior lighting to be on contactors controlled by one photocell.

18. All Buildings over 20,000 square feet to have a stand-by (emergency) generator.


19. Follow University Standards* for voice/data systems. Data Closets to have walls wrapped in 3/4" plywood with intumescent white paint. 20 amp dedicated quad outlets should be located on each wall or as determined by University.

20. 1" conduits shall be provided to the roofs of all new buildings and appropriate remodel projects. Conduits to originate at the closest IDF/LAN room and terminate in the vicinity of the major corners of the buildings. Large dimension roof plans may require additional intermediate locations.

21. 2-Way Intercoms for classrooms, seminar/conference rooms, etc.:

- Provide a quad backbox (with blank faceplate & conduit to above-ceiling) located near the main light switches.

Note: Where shown, an asterisk (*) indicates the use of the "latest adopted edition" of a code, standard, etc.

 Kennesaw, Georgia	EFFECTIVE DATE: July, 2009	DOCUMENT NUMBER: EHSRM- 0001
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TYPE: ENVIRONMENTAL, HEALTH & SAFETY STANDARD	ISSUED BY: EHS DEPARTMENT	
DOCUMENT TITLE: Guideline for Post-Construction, Pre-Occupancy Baseline IEQ Assessment for Newly Constructed Facility		

Approved By:	
Director of Environmental Health and Safety	

1. Purpose

The purpose of the document is to provide general procedure and requirement for Baseline IEQ assessment to ensure acceptable indoor air quality prior to occupancy of a new or refurbished facility at Kennesaw State University (KSU).

2. Scope

These guidelines apply to new or significantly refurbished building facilities at KSU campus.

3. Scheduling

Scheduling of IAQ testing should be done well in advance to ensure the work is performed and completed after the construction activities, but prior to occupancy.

4. Procedures

A. HVAC System Verification

To assure compliance with recognized standards for indoor air quality including ASHRAE Standard 62 latest version, the contractor's independent testing and balancing agency shall verify the performance of each HVAC system including space temperature and space humidity uniformity, outside air quantity, filter installation, drain pan operation, and any obvious contamination sources.

B. Flush-Out Procedures

1) Option 1

After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cu.ft. of outdoor air per sq.ft. of floor area while maintaining an internal temperature of at least 60 °F and relative humidity no higher than 60%.

C. Baseline IAQ Assessment

- Contractor shall hire an independent IAQ consultant/contractor, with a minimum of 5 years experience in performing IAQ assessment, to test levels of indoor air contaminants in compliance with these guidelines, subject to approval by the KSU's EHS department.
- IAQ testing shall be performed following the completion of all interior construction activities and prior to occupancy. The building shall have all interior finishes installed including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Perform testing prior to installation of furniture, workstation components, and casework.
- IAQ testing shall be conducted using testing protocols consistent with the EPA's Compendium of Methods for the Determination of Air Pollutants in Indoor Air.
- The independent IAQ contractor shall prepare a sampling plan for the approval of by KSU EHS Department. The plan shall specify sampling locations, instrumentation, sampling methods and quality control procedures.

1) Sampling Procedure

1. Air samples shall be collected during normal occupied hours (prior to occupancy) with the building ventilation system starting at the daily normal start times and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
2. IAQ samples shall be taken for each portion of the building served by a separate ventilation system.
3. The number of sampling points shall not be less than one per 25,000 sq. ft., or for each contiguous floor area, whichever is larger. Verify areas to be tested with the KSU's representative.
4. Samples shall be collected within the breathing zone, between 3'-0" and 6'-0" above the finished floor and over a minimum 4-hour period.
5. For formaldehyde and TVOC, at least one outdoor air samples, for each contaminant, shall be collected simultaneously with indoor sampling at appropriate outside locations for comparison.

2) Evaluation Criteria

- Maximum concentrations for monitored IAQ pollutants shall not exceed the limits listed in the most current LEED standard.

Contaminant	Maximum Concentration
Formaldehyde	27 ppb
Particulates (PM10)	50 $\mu\text{g m}^{-3}$
total volatile organic compounds (tvocCs)	500 $\mu\text{g m}^{-3}$
4-Phenylcyclohexene (4-PCH)	6.5 $\mu\text{g m}^{-3}$
Carbon monoxide (Co)	9 ppm

D. Reports and Submittals

- IAQ consultant shall prepare assessment reports showing the results and location of each test, a summary of the HVAC operating conditions, and a listing of any discrepancies and recommendations for corrective actions, if required.
- In the event that any non-compliant test results occur, Contractor must provide a written report to KSU describing the source(s) of the non-compliant condition(s) and the corrective action(s) implemented.
- For each sampling point where the maximum concentration limits are exceeded, the Contractor is responsible for conducting additional flush-out with outside air and retesting the specific parameter(s) exceeded to indicate the requirements are achieved.

Section 13850 Special Construction

Integrated Life Safety System

Kennesaw State University

PART 1 General

1.1 Summary

1.1.1 Summary - Fire - Security - Access Control

This performance specification provides the minimum requirements for the Integrated Life Safety, Security, Access and Video Surveillance System. The system shall include, but not limited to all equipment, materials, labor, documentation and services necessary to furnish and install a complete, operational system to include but not limited to the following functions:

Fire detection and alarm system
Access control system
Security system
Video surveillance interface

1.1.2 Manufacturer

Acceptable fire alarm system manufacturers include:
Edwards Systems Technology, Inc.

All equipment and components shall be the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protected premises protective signaling (fire alarm) system <access control> <security>, and smoke control system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.

The contractor shall provide, from the acceptable manufacturer's current product lines, equipment and components, which comply, with the requirements of these specifications. Equipment or components, which do not provide the performance and features, required by these specifications are not acceptable, regardless of manufacturer.

1.2 References

1.2.1 Codes

1.2.1.1 Codes - Fire - Security - Access Control

The equipment and installation shall comply with the current provisions of the following codes and standards:

NFPA 70 - 2002 National Electric Code®
NFPA 72 - 1999 National Fire Alarm Code®
NFPA 90A - 1999 Air Conditioning Systems
NFPA 92A - 2000 Smoke Control Systems
NFPA 92B - 2000 Smoke Management Systems in Malls, Atria, and Large Areas
NFPA 101- 2000 Life Safety Code®
UL 864 - Control Units for Fire Protective Signaling Systems.
UL 268 - Smoke Detectors for Fire Protective Signaling Systems.
UL 268A - Smoke Detectors for Duct Applications.
UL 217 - Single and Multiple Station Smoke Alarms
UL 521 - Heat Detectors for Fire Protective Signaling Systems.
UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.
UL 464 - Audible Signaling Appliances.
UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling

Systems

UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.
UL 1971 - Signaling Devices for the Hearing-Impaired.
UL 1481 - Power Supplies for Fire Protective Signaling Systems.
UL 1711 - Amplifiers for Fire Protective Signaling Systems.
UL 1635 - Digital Alarm Communicator System Units
UL 294 - Access Control System Units
UL 1610 - Central Station Burglar Alarm Units
UL 609 - Local Burglar Alarm Units and Systems

City of Kennesaw AHJ

Local codes/standards such as: Georgia State Accessibility Code

Federal Codes and Regulations

Americans with Disabilities Act (ADA)

Factory Mutual (FM) approval

International Standards Organization (ISO)
ISO-9000
ISO-9001

1.3 System Description

1.3.1 General

1.3.1.1 General Fire - Security - Access Control

The Contractor shall furnish all labor, services and materials necessary to furnish and install a complete, functional integrated life safety fire, security, access control system (System). The System shall comply in all respects with all pertinent codes, rules, regulations and laws of the local jurisdiction. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (ULI) listings.

It is further intended that upon completion of this work, the Owner be provided with:

Complete information and drawings describing and depicting the entire system(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the system(s) at a future date.

Complete documentation of system(s) testing.

Certification that the entire system(s) has/have been inspected and tested, is/are installed entirely in accordance with the applicable codes, standards, manufacturer's recommendations and ULI listings, and is/are in proper working order. Contractor shall use "Fire Alarm System Certification and Description" as required by Section 1-6.2 of NFPA 72 - 1999 edition.

1.3.2 Description

1.3.2.1 Description - Fire - Security - Access Control

<Note: The following section needs to be specifically tailored to the specific project. The intent of this section is to describe the project scope, describe location of equipment and any additional details.>

Provide and install a new fire detection and alarm system consisting of:

Fire command center shall be located as shown on the drawings.

LCD Annunciator shall be located as shown on the drawings.

Provide a multi-channel one-way voice communication system.

Provide a color graphic workstation and printer, as shown on the drawings.

Remote control panel(s) shall be located every five (5) floors, as shown on the drawings..

Manual pull stations shall be located as shown on the drawings.

Area smoke detection shall be provided as shown on drawings.

Area heat detection shall be provided as shown on drawings.

Beam smoke detection shall be located as shown on the drawings

Duct smoke detection shall be provided as shown on the drawings.

Monitor the sprinkler system Waterflow(s) and valve supervisory switch(s).

Monitor the stand alone suppression systems as shown on the drawings.

Provide audible appliances located throughout the building, as shown on the drawings.

Provide synchronized visual appliances located throughout the building, as shown on the drawings.

Provide a Two- way communication system <remote telephone> <phone jack> located at elevator lobby(s), within exit stairwell(s), elevator car(s), the fire pump room, as shown on drawings.

Magnetic door holders shall be located as shown on drawings.

Provide fan shutdown controls as shown on drawings.

Provide direct interface to the building automation system.

Provide elevator recall functions for primary and alternate floors and elevator power shunt trip activation.

Provide access control card readers and controllers and required accessories at the doors shown on the drawings.

Provide electrically controlled door locks, type and location as shown on the drawings.

Provide 1 set of access control card management software for installation on owner's

computers

Provide intrusion detection sensors, type and location as shown on the drawings.

Provide security keypads as shown on the drawings.

Provide connection to a central station. The owner shall arrange for two dedicated phone lines to be terminated as directed by the installing contractor.

Remove the existing fire detection and alarm system(s).

1.3.3 Operations

1.3.3.1 Sequence of Operations

1.3.3.1.1 General

<The following representative tasks should be customized for each project>

Upon the alarm activation of any area smoke detector, heat detector, manual pull station, sprinkler Waterflow, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.

Display the alarm event on the graphical workstation.

The LCD display shall indicate all applicable information associated with the alarm condition including; zone, device type, device location and time/date.

All system activity/events shall be documented on the system printer.

Any remote or local Annunciator LCD/LED's associated with the alarm zone shall be illuminated.

Activate notification audible appliances on the fire floors (zones) immediately above and below (adjacent to) the fire floor (zone) <general alarm evacuation>.

Activate visual strobes notification appliances on the fire floors (zones) immediately above and below (adjacent to) the fire floor (zone) <general alarm evacuation>. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.

Transmit signal to the building automation system.

Transmit signal to the central station with point identification.

Activate automatic smoke control sequences.

All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

All stairwell/exit doors shall unlock throughout the building.

All self-closing fire/smoke doors held open shall be released.

Direct the closed circuit TV cameras to the alarm event and start video recording.

Transmit alarm text messages to "alpha-numerical" display pagers.

1.3.3.1.2 Duct Smoke Activation - Supervisory

<The following representative tasks should be customized for each project>

The supervisory activation of any duct smoke detector, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.

Display the event on the graphical workstation and display a pictorial image.

The LCD display shall indicate all applicable information associated with the

supervisory condition including; zone, device type, device location and time/date.
All system activity/events shall be documented on the system printer.
Any remote or local Annunciator LED's associated with the alarm zone shall be illuminated.
Transmit signals to remote Annunciator located in building security desk, the engineer's office and the building management office.
Transmit signal to the building automation system.
Transmit signal to the central station with point identification.
Shutdown the local air handling unit.
Transmit alarm text messages to "alpha-numerical" display pagers.
All automatic events programmed to the alarm point shall be executed and the associated outputs activated.

1.3.3.1.3 Supervisory Operation

Upon supervisory activation of any sprinkler valve supervisory switch, fire pump off-normal, clean agent fire suppression system trouble, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.
Display the event on the graphical workstation and display a pictorial image.
The LCDXL display shall indicate all applicable information associated with the supervisory condition including; zone, device type, device location and time/date.
All system activity/events shall be documented on the system printer.
Any remote or local Annunciator LCD/LED's associated with the supervisory zone shall be illuminated.
Transmit signal to the central station with point identification.

1.3.3.1.4 Trouble Operation

Upon activation of a trouble condition or signal from any device on the system, the following functions shall automatically occur:

The internal audible device shall sound at the control panel or command center.
Display the event on the graphical workstation and display a pictorial image.
The LCDXL keypad display shall indicate all applicable information associated with the trouble condition including; zone, device type, device location and time/date.
All system activity/events shall be documented on the system printer.
Any remote or local Annunciator LCD/LED's associated with the trouble zone shall be illuminated.
Transmit signal to the central station with point identification.

1.3.3.1.5 Monitor Activation

<The following representative tasks should be customized for each project>

Upon activation of any device connected to a monitor circuit, the following functions shall automatically occur:

<The internal audible device shall sound at the control panel or command center >
<Display the event on the graphical workstation and display a pictorial image.
<The LCD display shall indicate all applicable information associated with the status condition including; zone, device type, device location and time/date.>
<All system activity/events shall be documented on the system printer.>

Any remote or local Annunciator LCD/LED's associated with the status zone shall be illuminated.

1.3.3.2 Graphic Workstation

1.3.3.2.1 Graphic Workstation - Fire - Security - Access Control

Graphic Workstation Functions

All Events

Display the address of the alarm or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the event list shall automatically cause the other three quadrants (described below) to display information relating to the highlighted event.

Display color graphical representation of the area in which the alarm or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliasing, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.

Display a set of written operator instructions for each event, site programmability of the message must be provided allowing modification by the end user to suit occupancies and emergency plans. The Workstation must provide simple control via a two button mouse.

Display a preset CCTV video or stored image of the device

Log operator's comments for each event to history with time and date.

Log all events and operator actions to history for future review.

Fire alarms

Shall be capable of acknowledging, silencing, and resetting fire alarm functions.

Shall be capable of manually activating, deactivating, enabling, and disabling individual fire alarm points.

Shall be capable of generating status, maintenance and sensitivity reports for all fire alarm components.

Receipt of a fire alarm shall activate an audio WAV file over the workstation speakers alerting the operator to a fire alarm, and providing audible instructions.

Security Events

Shall be capable of acknowledging and silencing security event functions.

Shall be capable of manually activating, deactivating, arming, disarming, enabling, and disabling individual security points and /or partitions.

Shall be capable of generating status reports for all security devices.

Receipt of a security event shall activate an audio WAV file over the workstation speakers alerting the operator to a security event.

Access Control Events

Shall be capable of acknowledging access control event functions.

Shall be capable of manually activating, deactivating, arming, disarming, enabling, disabling, opening, unlocking, closing, and locking individual doors.

Shall be capable of manually enabling and disabling card readers.

Shall be capable of generating status reports for all card reader controllers.

Receipt of an access control event activate an audio WAV file over the workstation speakers alerting the operator to a security event.

Closed Circuit Television (CCTV)

Shall provide a video display on one quadrant of the workstation as received from

the CCTV switcher-multiplexer.
Shall command the switcher-multiplexer to direct the appropriate camera to the preset azimuth and elevation for each event, and sent this image to the workstation.
Shall provide manual pan, tilt, and zoom control signals to the switcher-multiplexer.

Maintenance and Control Functions
Control capability
Reports: status, sensitivity.

1.3.3.3 Security

1.3.3.3.1 Perimeter Security

Perimeter Security - Activation of any armed perimeter security device shall perform the following operations:

Show the location and type of alarm sensor on the keypad display.
Notify the remote central monitoring station(s) with the group, system location, and device location of the alarm event.
Activate local sounders or voice communication system.
Notify the building command center with the group, system location, and device location of the alarm event.
Display a graphic representation of the alarm location, device type, operator instructions and video call-up on the event driven graphic workstation.
Send a digital message to an alphanumeric pager(s) for designated employees.
Send a digital signal to the video controller, enabling alarm call-up and VCR recording of the alarm event.
Log and record the alarm event.

1.3.3.3.2 Interior Security

Interior Security - Activation of any armed interior security device shall perform the following operations;

Notify the location and type of alarm sensor on the keypad display.
Notify the remote central monitoring station(s) with the group, system location, and device location of the alarm event.
Activate local sounders or voice communication system.
Notify the building command center with the group, system location, and device location of the alarm event.
Display a graphic representation of the alarm location, device type, operator instructions and video call-up on the event driven graphic workstation.
Send a digital message to an alphanumeric pager(s) for designated employees.
Send a digital signal to the video controller, enabling alarm call-up and VCR recording of the alarm event.
Log and record the alarm event.

1.3.3.3.3 Opening and Closing

Opening and Closing Operation - When a group(s) of security protection are closed (secured) and opened (unsecured) the following shall occur:

The entry reader by the employee entrance door will open the door and deactivate the perimeter and interior security groups for the facility.
Upon securing the group(s) for the facility, the LCD keypad display will indicated the status of the security group(s) and the related devices. If the security group(s) are

secure, an authorized user will put the security code into the LCD keypad display and activate or secure the security groups authorized. An internal adjustable exit timer will activate shunting the employee entrance door until the entrance door is closed or the timer expires.

1.3.3.3.4 Hold up and Duress

Hold Up or Duress - Activation of any duress security device shall perform the following operations;

Notify the remote central monitoring station(s) with the group, system location, and device location of the alarm event.

Notify the building command center with the group, system location, and device location of the alarm event.

Display a graphic representation of the alarm location, device type, operator instructions and video call-up on the event driven graphic workstation.

Send a digital message to an alphanumeric pager(s) for designated employees.

Send a digital signal to the video controller, enabling alarm call-up and VCR recording of the alarm event.

Log and record the alarm event.

1.3.3.4 Access Control

1.3.3.4.1 Card Access Database Program

Card Access Database Application Program

The card access database (CAD) application program shall be designed to administer the functions necessary for access control. The program shall operate under Windows® 2000 with intuitive, easy to operate capabilities for any novice PC user. The CAD can be installed on a single PC or on a server allowing multiple users full access to the database. The CAD shall support multi-tenant applications, segregating databases for each tenant. The CAD shall employ an ODBC database engine that stores cardholder and system configuration information. The CAD shall enable the user to add, change or delete cardholder information, schedules, access levels, etc. The CAD shall contain the ability to retrieve, filter and generate reports uploaded from the card reader controllers. The CAD shall archive and log system activity and create history logs that will enable a user with the ability to retrieve the information as required.

1.3.3.4.2 Parking Gate

Parking Gate Operator - The following will occur when a parking gate operator is equipped with a card reader, gate arm, request to exit device and loop detector;

The card reader controller (CRC) shall read the credential code presented to the card reader and either deny or grant permission to the gate controller depending on the authorization permissions of the credential holder.

When a valid credential is presented, the green LED shall light continuous for a period determined by the reader capabilities or until another credential is presented.

When an invalid credential is presented, the red LED shall flash continuous for a period determined by the reader capabilities or until another credential is presented.

The parking gate reader shall have a read range of 3 feet minimum.

When a vehicle passes through and clears the gate and clears the vehicle detection device, the gate controller shall close the gate arm.

On egress, a vehicle detection device will activate the gate controller and lift the gate

arm to allow the vehicle clearance. When the vehicle clears the vehicle detection device on the other side, the gate controller will close the gate arm.

1.3.4 System Configuration

1.3.4.1 General - Fire - Security - Access Control

The system supplied under this specification shall utilize node to node, direct wired, multi-priority peer-to-peer network operations. The system shall utilize independently addressed, smoke detectors, heat detectors, input/output modules, intrusion detection and card reader controllers as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional member of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes.

All integrated life safety system equipment shall be arranged and programmed to provide an integrated system for the early detection of fire, the notification of building occupants, the automatic summoning of the local fire department, the override of the HVAC system operation, and the activation of other auxiliary systems to inhibit the spread of smoke and fire, and to facilitate the safe evacuation of building occupants. In all operating modes, the processing of fire alarms shall have the highest priority.

Devices shall be listed for both fire and security applications. System performance shall not be degraded if fire and security devices are installed in the same system. Fire alarm, intrusion, access control and video functions shall be partitioned to permit virtual-independent operation.

All integrated system operation shall be based on application programming in order to provide the greatest flexibility in integrating fire, intrusion, access control and video functions, and assure compliance with all required codes and standards.

1.3.4.2 Power Supply

Standby power supply shall be an electrical battery with capacity to operate the system under maximum supervisory load for <insert 24 or 60> hours and capable of operating the system for <5> minutes in the alarm mode at 100% load. The system shall include a charging circuit to automatically maintain the electrical charge of the battery. The system shall automatically adjust the charging of the battery to compensate for temperature.

1.3.4.3 Display

The main display interface shall show the first and most recent highest priority system events without any operator intervention. All system events shall be directed to one of four message queues. Messages of different types shall never intermix to eliminate operator confusion. A "Details" switch shall provide additional information about any device highlighted by the operator.

1.3.4.4 Initiating Device Circuits

Initiating device circuits monitoring manual fire alarm stations, smoke and heat detectors, Waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be <Class A (Style "D" or "E")>< Class B (Style "A" or "B").> Initiating device circuits monitoring magnetic security contacts, motion detectors, duress station, glass break and intrusion type devices, shall be Class B (Style "A" or "B").

1.3.4.5 Notification Appliance Circuits

All notification appliance circuits shall be <Class A (Style "Z")><Class B (Style "Y")>. All notification appliance circuits shall have a minimum circuit output rating of: 2 amps @ 24 vdc; 50 watts @ 25V audio, and 35 watts @ 70V audio. The notification circuits shall be power limited. Non-power limited circuits are not acceptable.

1.3.4.6 Signaling Line Circuits

When a signaling line circuit covers more than one fire/smoke compartment, a wire-to-wire short shall not effect the operation of the circuit from the other fire/smoke compartments. The signaling line circuit connecting network panel/nodes, Annunciator, command centers, shall be <Class A (style 7)>< Class B (style 4).> The media shall be copper except where fiber optic cable is specified on the drawings.

The signaling line circuit connecting to addressable/analog devices including, detectors, monitor modules, control modules, isolation modules, intrusion detection modules and notification circuit modules shall be <Class A (style 6 or 7)>< Class B (style 4).>

The signaling line circuit connecting to the audio communications (pre-amp signal), amplifiers, and nodes shall be <Class A (style 6)>< Class B (style 4).> The circuit shall be power limited.

The signaling line circuit connecting to the two-way communications circuit (riser) shall be <Class A (style 6)>< Class B (style 4).>

The signaling line circuit connecting to access control card reader controller and keypads/displays shall be <Class A (style 6)>< Class B (style 4).>

1.3.4.7 Network Wiring

The system supplied under this specification shall utilize node to node, direct wired multi-priority peer-to-peer network operations. The system shall utilize independently addressed, smoke detectors, heat detectors and input/output modules <intrusion detection> as described in this specification. The peer-to-peer network shall contain multiple nodes consisting of the command center, main controller, remote control panels, LCD/LED annunciation nodes, and workstations. Each node is an equal, active functional node of the network, which is capable of making all local decisions and generating network tasks to other nodes in the event of node failure or communications failure between nodes.

When a network is wired in a Class B configuration, a single break or short on the network wiring isolates the system into two groups of panels. Each group continues to function as a peer-to-peer network working with their combined databases. When wired using a Class A configuration, a single break or short on the network wiring causes the system to isolate the fault, and network communication continues uninterrupted, without any loss of function. Should multiple wiring faults occur, the network re-configures into many sub-networks and continues to respond to alarm events from every panel that can transmit and receive network messages.

1.3.4.8 Network Nodes

The remote control panel(s) (network nodes) shall meet the same requirements as described in control panel section and shall contain the following;
<Common control switches with 168 character LCD display, as required.>
Integral power supply(s) with secondary stand-by power.

Signaling line circuits for communications with analog/addressable devices, as required.
Audio amplification, as required.
Notification appliance circuits, as required.
Auxiliary function circuits and operations, as required.

1.3.4.9 DACT

The system shall provide off premise communications capability (DACT) for transmitting system events to multiple Central Monitoring Station (CMS) receivers. The system shall provide the CMS(s) with point identification of system events using Contact ID or SIA DCS protocols. The system shall provide an individual CMS account for each tenant, and send the required signals to the one or more CMS(s) and account(s) specified by each tenant. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

<The system shall also transmit an alphanumeric system activity message, by event, to a commercial paging system of the owner's choice, using TAP Pager protocol.>

1.3.4.10 Security

All intrusion detection system equipment shall be arranged and programmed to provide an integrated system for the intrusion detection, local notification on premises, the notification of a UL listed central monitoring center, and the activation of other auxiliary systems required to annunciate and notify the proper authorities.

Intrusion detection devices shall be connected using intelligent distributed devices wired to a panel. Devices such as motions detectors, door position switches, dry-contact monitoring devices, glass break detectors, photoelectric beams, etc., shall be supported by intelligent monitoring devices or contain integral intelligent circuits required for monitoring. Security functions provided by the system shall include; partitioning, interior security, perimeter security, day security, bypassing, entry/exit delays, audible notification, bi-lingual support, international language support, and annunciation.

The one-way voice messaging system equipment shall be configured and programmed to provide a command and response messages related to access control and/or intrusion detection systems under normal or abnormal conditions.

1.3.4.11 Access Control

All access control equipment shall be configured and programmed to provide a distributed integrated system for the processing of credentials presented for ingress or egress of protected entry or exit areas and the activation of other auxiliary systems required to annunciate and manage the system on or off premise.

The card reader controller (CRC) shall be designed to accommodate complete information for up to 36,000 individuals and will process egress or ingress decisions based on the CRC database and permissions granted by each individual. The CRC shall be programmed to allow or disable event reporting to the network panel/node and shall have event storage capacity for up to 20,000 events.

Individual personnel information shall be programmed into the CRC using the node/panel network from an application program designed to administer and manage the access control system. The application program shall be Windows® 2000 or XP based and be able to operate on commercial off the shelf Intel based computers. The application program shall be able to operate as a single program or with other program applications operating on the computer. The computer shall connect through a direct RS-232 connection, fiber optic cable connection or IP connection. The application program shall

be able to store, report and manage event activities related to access control functions.

1.4 Submittals

1.4.1 Project

The contractor shall purchase no equipment for the system specified herein until the owner has approved the project submittals in their entirety and has returned them to the contractor. It is the responsibility of the contractor to meet the entire intent and functional performance detailed in these specifications. Approved submittals shall only allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications. The contractor shall submit three (3) complete sets of documentation within 30 calendar days after award of purchase order.

Each submittal shall include a cover letter providing a list of each variation that the submittal may have from the requirements of the contract documents. In addition the Contractor shall provide specific notation on each shop drawing, sample, catalog cut, data sheet, installation manual, etc. submitted for review and approval, of each such variation.

All drawings and diagrams shall include the contractor's title block, complete with drawing title, contractor's name, address, date including revisions, and preparer's and reviewer's initials

Product Data

Data sheets with the printed logo or trademark of the manufacturer for all equipment. Indicated in the documentation will be the type, size, rating, style, and catalog number for all items proposed to meet the system performance detailed in this specification. The proposed equipment shall be subject to the approval of the Architect/Engineer.

Shop Drawings

A complete set of shop drawings shall be supplied. The shop drawings shall be reproduced electronically in digital format. This package shall include but not be limited to:

Control panel wiring and interconnection schematics.

Complete point to point wiring diagrams.

Riser diagrams.

Complete floor plan drawing locating all system devices and 1/4" = 1'-0" scale plan and elevation of all equipment in the Fire Command Station. Including showing the placement of each individual item of fire alarm, security, and access control equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.

Detailed system operational description. Any Specification differences and deviations shall be clearly noted and marked.

Complete system bill of material.

All drawings shall be reviewed and signed off by an individual having a minimum of a NICETIII certification in fire protection engineering technology, subfield of fire alarm systems.

Samples

A sample of each smoke detector, intelligent modules, horn, strobes, card reader controller, card reader, and door locking mechanism shall be provided to the contractor for their familiarization.

Quality Assurance/Control Submittals

Installer's Certification

The engineered systems distributor must be licensed in the state of project location and have been recognized or incorporated in the business in the state of Georgia for a minimum of 10

years. The distributor must be a registered MBE. The distributor must be registered as ISO 9001. Submit a copy of the system supplier's training certification issued by the manufacturer of the integrated life safety system, and a copy of the installing technician's NICET certification.

System Calculations

Complete calculations shall be provided which show the electrical load on the following system components:

Each system power supply, including stand alone booster supplies.

Each standby power supply (batteries).

Each notification appliance circuit.

Each auxiliary control circuit that draws power from any system power s

1.4.2 Close Out

Two (2) copies of the following documents shall be delivered to the building owner's representative at the time of system acceptance. The close out submittals shall include:

Project specific operating manuals covering the installed integrated life safety system. The manual shall contain a detailed narrative description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations. Manufacturer's data sheets and installation manuals/instructions for all equipment supplied. A generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.

As-Built drawings consisting of: a scaled plan of each building showing the placement of each individual item of the Integrated Life Safety System equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.

All drawings shall be provided in standard .DXF format. A vellum plot of each sheet shall also be provided.

The application program listing for the system as installed at the time of acceptance by the building owner and/or local AHJ (disk, hard copy printout, and all required passwords).

Provide the name, address and telephone of the authorized factory representative.

A filled out Record of Completion similar to NFPA 72, 1999 edition figure 1-6.2.1.

1.5 Quality Assurance

1.5.1 Qualifications of Contractor

1.5.1.1 Fire - Security - Access Control

The contractor shall have successfully installed similar system <fire detection, evacuation voice and visual signaling control components; access control, card readers; security detectors and controls, video surveillance equipment> on a previous project of comparable size and complexity. The owner reserves the right to reject any control components for which evidence of a successful prior installation performed by the contractor cannot be provided.

The contractor shall be licensed in the state of project location and have been recognized or incorporated in the business in the state of Georgia for a minimum of 10 years. The contractor shall be a registered MBE. The contractor shall be registered as ISO 9001. Submit a copy of the system supplier's training certification issued by the manufacturer of the integrated life safety system, and a copy of the installing technician's NICET certification.

The contractor shall have in-house engineering and project management capability consistent with the requirements of this project. Qualified and approved representatives of the system manufacturer shall perform the detailed engineering design of central and remote control equipment. Qualified and approved representatives of the system manufacturer shall produce all panel and equipment drawings and submittals, operating manuals. The contractor is responsible for retaining qualified and approved representative(s) of those system manufacturers specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with these specifications.

1.5.2 Pre-installation Meetings

1.5.2.1 Pre-Installation Requirements

The provider shall submit a detailed project plan that will describe in detail how the provider will approach the project, from inception to finalization. The plan must include at a minimum the following information:

- Project Staging
- Project Management
- Equipment Schedules
- Installation Time Lines
- Other Trade Requirements
- Final Acceptance Testing
- Personnel Resumes
- Progress Report Sample

All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the manufacturer's riser/connection diagram and details for all specific system installation/termination/wiring data.

1.5.2.2 Start and Completion Dates

The starting and completion dates for this work will be established at the pre-bid meeting.

1.5.2.3 Submission of Bid

Bids will be due at or before 3:00 P.M., local time, on <Insert Date> at: <Insert Name & Address>

Copies to: <Insert Name & Address>

Bids shall be submitted on the bid form. Four (4) copies of the bid form shall be

submitted and one copy retained by the bidder for his records. All blank spaces for bid prices shall be filled using ink or typewritten. Any exceptions to the bid documents or qualification of the bidder's bid shall be fully explained where indicated on the bid form.

1.6 Project Conditions

1.6.1 Project Conditions

It shall be the Contractor's responsibility to inspect the job site and become familiar with the conditions under which the work will be performed. Inspection of the building may be made by appointment with the Owner. Contractors are requested to inspect the building prior to the pre-bid meeting.

A pre-bid meeting will be held to familiarize the Contractors with the project. Failure to attend the pre-bid meeting may be considered cause for rejection of the Contractor's bid. The minutes of this meeting will be distributed to all attendees and shall constitute an addendum to these specifications.

All work, except for <INSERT>, may be conducted during normal working hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, by properly coordinating the work with the Owner. Noise restrictions do apply. The core drilling, testing of evacuation signals and other work disruptive to occupants will be prohibited between 6:00 a.m. and 6:00 p.m., Monday through Friday, and will be explained at the pre-bid meeting. <NOTE: Add exclusion as needed for kitchens and other areas>. <OPTIONAL all system switch over shall be done during unoccupied hours or over weekends. Contractor is to include, in his base bid, all overtime necessary to complete his work.

The Contractor shall be responsible for prior coordination of all work and demolition with the Owner.

1.7 Warranty and Maintenance

1.7.1 Spare Parts

1.7.1.1 Spare Parts - Fire - Security - Access Control

The Contractor shall supply the following spare parts:

Automatic detection devices - Two (2) percent of the installed quantity of each type.

Manual fire alarm stations - Two (2) percent of the installed quantity of each type.

Glass rods or panels for break glass manual fire alarm stations (if used) - Ten (10) percent of the installed quantity, but no less than two devices.

Audible and visible devices - One (1) percent of the installed quantity of each type, but no less than two (2) devices.

Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.

Ten (10) Access control cards

1.7.2 Warranty

The contractor shall warranty all materials, installation and workmanship for one (1) year

from date of acceptance, unless otherwise specified. A copy of the manufacturer's warranty shall be provided with close-out documentation and included with the operation and installation manuals.

The System Supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation. Any defects that render the system inoperative shall be repaired within 24 hours of the owner notifying the contractor.

1.8 Training

1.8.1 Training

The System Supplier shall schedule and present a minimum of 8 hours of documented formalized instruction for the building owner, detailing the proper operation of the installed System.

The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

Instruction shall be made available to the Local Municipal Fire Department if requested by the Local Authority Having Jurisdiction.

PART 2 Products

2.1 Manufacturer

2.1.1 Fire - Security - Access Control

The manufacturer of the system equipment shall be regularly involved in the design, manufacture, and distribution of all products specified in this document. These processes shall be monitored under a quality assurance program that meets the ISO 9000 requirements.

All System components shall be the cataloged products of a single supplier. All products shall be listed by the manufacturer for their intended purpose.

Edwards Systems Technology, Inc. products constitute the minimum type and quality of equipment to be installed.

All control panel assemblies and connected field appliances shall be both designed and manufactured by the same company, and shall be tested and cross-listed as to ensure that a fully functioning is designed and installed. The system supplied under this specification shall be a microprocessor-based, direct wired, multi-priority peer-to-peer networked system. The system shall utilize independently addressed, microprocessor-based smoke detectors, heat detectors, intrusion detection sensors, modules, and card reader controllers as described in this specification.

2.2 Panel Components & Functions

2.2.1 General

2.2.1.1 General - Fire - Security - Access Control

The control panel(s) shall be a multi-processor based networked system designed specifically for fire, one-way and two-way emergency audio communications, smoke control, <extinguishing agent releasing system>, guard patrol, security and access control applications. The control panel shall be listed and approved for the application standard(s) as listed under the General section.

The control panel shall include all required hardware, software and site specific system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any application can be configured, and modified using software provided by a single supplier. The control panel(s) operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.

The control panel shall include the following capacities:

Support up to 2500 analog/addressable points.

Support up to 124 reader controllers.

Support up to 124 keypad displays

Support network connections up to 63 other control panels and Annunciator.

Support multiple digital dialers and modems

Support multiple communication ports and protocols

Support up to 1740 chronological events.

The network of control panels shall include the following features:

Ability to download all network applications and firmware from the configuration computer from the configuration computer from a single location on the system.

Provide electronic addressing of analog/addressable devices.

Provide an operator interface control/display that shall annunciate command and control system functions.

Provide an internal audible signal with different programmable patters to distinguish between alarm, supervisory, trouble and monitor conditions.

Provide a discreet system control switch provided for reset, alarm silence, panel silence, drill switch, previous message switch, next message switch and details switch.

Provide system reports that provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.

Provide an authorized operator with the ability to operate or modify system functions like system time, date, passwords, holiday dates, restart the system and clear control panel event history file.

Provide an authorized operator to perform test functions within the installed system.

The control panel shall contain a standby power supply that automatically supplies electrical energy to the system upon primary power supply failure. The system shall include a charging circuit to automatically maintain the electrical charge of the battery.

2.2.2 Operator's Interface

2.2.2 Operator's Interface

2.2.2.1 Annunciation - Audio

The system shall be designed and equipped to receive, monitor, and annunciate signals from devices and circuits installed throughout the building. Standard LED Annunciator may be combined in common enclosures provided that the groups of LED's comprising each of the required Annunciator are separated from one another (Detection, Supervisory, Status, and Security) and clearly labeled.

Manufacturers' standard control switches shall be acceptable if they provide the required

operation, including performance, supervision and position indication. If the manufacturers' standard switches do not comply with these requirements, fabrication of custom manual controls acceptable to the Owner is required.

Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device. The integral audible devices shall produce a sound output upon activation of not less than 85 dBA at 10 feet. The Annunciator shall contain the following system status indicators:

960 character Backlit Liquid Crystal Display
System Normal Indicator
System Common Alarm Indicator
System Common Trouble Indicator
System Common Supervisory Indicator
System Ground Fault Indicator
System Common Security Indicator
System Disabled Point(s) Indicator
System Reset Switch with Indicator
System Alarm Silence Switch with Indicator
System Trouble Silence Switch with Indicator
System Message Queue Scroll Switches.
10-Digit Keypad to Enable/Disable System and Functions.

The LED Annunciator rows shall contain the following format:

Provide one row of red (alarm) and yellow (trouble) LED's. LED's in each row shall be arranged in columns, one column per type of alarm initiating device, and shall illuminate upon receipt of an alarm signal from the associated device(s) (i.e., electrical room smoke detector).

Provide one row of red (alarm) LED's. LED's in each row shall be arranged in columns, one column per type of alarm initiating device, and shall illuminate upon receipt of an alarm signal from the associated device(s) (i.e., electrical room smoke detector).

Provide one row of yellow (supervisory) LED's. LED's in each row shall be arranged in columns, one column per type of supervisory type device, and shall illuminate upon receipt of an supervisory signal from the associated device(s) (i.e., 2nd floor sprinkler valve supervisory switch)

The LED Annunciator shall be provided with <25>% spare LED's minimum. Each pair of LED's shall be labeled "Spare".

The LED Annunciator shall contain the following switches:

Provide two-position switch to manually unlock all stairwell doors.

Provide eight (8) two position switches for system by-pass functions. Actual switch function shall be determined by the owner.

Provide a one-way emergency voice communication system Annunciator with the following design:

This standard LED Annunciator shall incorporate the microphone for the one-way and telephone handset for the two-way voice communication systems, including all required zone select and manual override control switches and the following LED indicators:

3-Position Switch

Provide 3-position switch for each evacuation signaling zone, with "Voice," "Auto" and "Evacuate" positions identified and two LED status indicators for each audio visual evacuation signaling "zone", one red and one yellow. These LED's shall illuminate to indicate respectively: 1) Evacuation signals activated (red), 2) Trouble in audio (speaker)

or visual (strobe) circuit(s) (yellow).

2-Position Switch

Provide 2-position switch for each evacuation signaling zone, with "Voice" and "Auto" positions identified and two LED status indicators for each audio visual evacuation signaling "zone", one red and one yellow. These LED's shall illuminate to indicate respectively: 1) Evacuation signals activated (red), 2) Trouble in audio (speaker) or visual (strobe) circuit(s) (yellow).

All Call Switch 2- Position

Provide 2-position switch for "All-Call" to activate all the evacuation signaling zones, with "Voice" and "Auto" positions identified and two LED status indicators for each audio visual evacuation signaling "zone", one red and one yellow. These LED's shall illuminate to indicate respectively: 1) Evacuation signals activated (red), 2) Trouble in audio (speaker) or visual (strobe) circuit(s) (yellow).

All Call Switch 3-Position

Provide 3-position switch for "All-Call" to activate all the evacuation signaling zones, with "Voice", "Off" and "Auto" positions identified and two LED status indicators for each audio visual evacuation signaling "zone", one red and one yellow. These LED's shall illuminate to indicate respectively: 1) Evacuation signals activated (red), 2) Trouble in audio (speaker) or visual (strobe) circuit(s) (yellow).

Emergency Two-Way Voice Communication

Provide two LED status indicators for each two telephone zone, one red and one yellow. These LED's shall illuminate to indicate respectively: 1) Telephone calling-in and call connected (red), 2) Trouble in circuit(s) (yellow).

2.2.3 Audio

The system shall be capable of delivering 8 channel audio messages simultaneously over copper and/or fiber media. All audio messages and live pages shall originate at the one-way audio control unit. The one-way audio control unit shall store pre-recorded audio messages digitally. These messages shall be automatically directed to various areas in a facility under program control. The system shall support remote cabinets with zoned amplifiers to receive, amplify and send messages through speakers over supervised circuits.

The one-way emergency audio control shall provide control switches to direct paging messages as follows:

"All Call" to direct the page messages to all areas in the facility, overriding all other messages and tones.

"Page to Evacuation Area" to direct the message to the evacuation area(s), overriding all other messages and tones.

"Page to Alert Area" to direct page messages to the area(s) receiving the alert message and tones, overriding all other messages and tones..

"Page to Balance Building" to direct page messages to the areas) in the facility NOT receiving either the evacuation area or alert area messages.

"Page by Phone" switch to select the firefighter's telephone system as the source for paging.

The system shall be capable of delivering multiple audio messages simultaneously over copper and / or fiber media. All audio messages and live pages shall originate at the one-way emergency audio control unit. The one-way emergency audio control unit shall store pre-recorded audio messages digitally. These messages shall automatically direct to various areas in a facility under program control. The system shall support remote panels with zoned amplifiers to receive, amplify and distribute messages through speakers over supervised circuits.

The two-way voice communications control unit shall provide two-way communications between remotely located phones and the command center. The control unit shall provide the ability to individually select and display each two-way voice communication circuit support up to five (5) remote telephones in simultaneous two-way voice communications.

Audio Amplifiers (Multi-Channel)

Provide as minimum one twenty (20) watt audio amplifier per paging zone. The system software shall be capable of selecting the required audio source signal for amplification. To enhance system survivability, each audio amplifier shall automatically provide a local 3-3-3 1000 Hz temporal pattern output upon loss of the audio communications with the one-way audio control unit, during an alarm condition. Audio amplifiers shall be power limited and protected from short circuits conditions on the audio circuit wiring. Each amplifier output shall include a dedicated, selectable 25/70 Vrms output. Provide a standby audio amplifier that will automatically sense the failure of a primary amplifier, and replace the function of the failed amplifier.

2.2.3 DACT Dialer

The system shall provide off premise communications capability using a digital alarm communications transmitter (DACT) for sending system events to multiple central monitoring station (CMS) receivers. The system shall provide the CMS(s) with point identification of system events using Contact ID or SIA DCS protocols. <The system shall also transmit an alphanumeric system activity message, by event, to a commercial paging system of the owners choice, using TAP Pager protocol.> The system shall provide an individual CMS account for each tenant, and send the required signals to the one or more CMS(s) and account(s) specified by each tenant. In the event of a panel CPU failure during a fire alarm condition, the DACT degrade mode shall transmit a general fire alarm signal to the CMS.

2.2.4 Power Supply

System power supply(s) shall provide multiple power limited 24 VDC output circuits as required by the panel.

Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functions.

Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.

All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately annunciated as battery trouble and identify the specific power supply affected.

All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.

All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 72 - The AC power circuit shall be installed in conduit raceway. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside the each control panel the disconnect serves.

2.2.5 Reports

The system shall provide the operator with system reports that give detailed description of the status of system parameters for corrective action, or for preventative maintenance programs. The system shall provide these reports via the main LCD, and shall be capable of being printed on any system printer.

The system shall provide a report that gives a sensitivity listing of all detectors that have less than 75% environmental compensation remaining. The system shall provide a report that provides a sensitivity (% Obscuration per foot) listing of any particular detector.

The system shall provide a report that gives a listing of the sensitivity of all of the detectors on any given panel in the system, or any given analog/addressable device loop within any given panel.

The system shall provide a report that gives a chronological listing of up to the last 1740 system events.

The system shall provide a listing of all of the firmware revision listings for all of the installed network components in the system.

2.2.6 System Printer

The event and status printer shall be a 9-pin, impact, dot matrix printer with a minimum print speed of 232 characters per second. The printer shall be capable of serial or parallel communications protocol. The communications speed for RS-232 communications protocol shall be adjustable from 300 to 9600 Baud. The printer shall list the time, date, type and user defined message for each event printed.

2.3 Graphic Command Workstation

2.3.1 Fire - Security - Access Control

2.3.1.1 General

The command center shall function as the center point for all operational and administration functions required for the systems provided within the specification. The command center shall contain a console that will display and house any equipment necessary for system operation. Console space shall be provided for other equipment provided under other sections of the specifications. A single graphical command workstation shall be provided that will enable primary control of the systems provided by this specification. An operator shall not have to operate multiple workstations to receive, view, process and record system events for each system provided. Equipment included in the command center shall be:

System annunciation and controls for.

Fire detection.

Fire suppression.

Fire pump status

Firefighters smoke control.

Intrusion detection.

Access control monitoring and administration.

Video surveillance.

Door unlocking system controls.

Emergency one-way voice communications.

Video imaging and badging.

<Standby generator status indication and controls.>

<Automatic transfer switch status indication and controls.>

<Radio communications>

<Public intercom>
<Public telephone>
<Video event recording>
<Elevator monitor, status and controls>

2.3.1.2 Graphical Command Workstation

The graphical command workstation(s) shall display a different color text for each message type and color graphic diagrams/floor plans. The graphical command workstation shall simultaneously display the following system event views; system event display, graphical diagram display, event video, detailed event message/instructions, and user event log. The workstation shall be an IBM-compatible personal computer listed for UL Standards 864 (Control Units for Fire-Protective Signaling Systems) under categories UOJZ, APOU, and UUKL; UL 1076, (Proprietary Burglar Alarm Units and Systems) under category APOU as applicable; and UL 294 (Access Control System Units). The workstation(s) shall be capable of annunciation and control of all fire detection, smoke control, intrusion detection and access control points.

The computer shall be minimum of a Pentium Grade Processor 2.4 GHz, with a 533MHz front side bus, 512 MB RAM, 80 GB Hard Drive, and 18" LCD monitor. Installation of the computer or monitor can be either desk top or floor mounting or rack/panel mounting.

The software shall provide multitasking type environment that allows the user to run several applications simultaneously. The operating program shall run within a 32-bit operating system such as Windows® XP. These Windows applications shall run simultaneously with other programs. The mouse or Alt-Tab keys shall be used to quickly select and switch between multiple applications. The operator shall be able to work in Microsoft Word, Excel and other Windows based software packages, while concurrently annunciating on-line alarms and monitoring functions.

Graphic Workstation Operations

The graphic display screen shall be displayed into four areas. When any event occurs:

The "list of events area" shall display the address of the alarm or off normal point with type and description and time of the event in a prioritized color-coded event list. Highlighting an event in the event list area shall automatically cause the display of a graphical map and other three panels areas (described below) to display information relating to the highlighted event.

The "map area" shall display color graphical representation of the area location in which the alarm or off normal device is located. It shall be possible for the operator to manually zoom down to any portion of a vector-based graphic without aliasing, artifacting, or pixilation of the image. Preset zoom levels shall not be considered equal.

The "event action area" shall display a customized set of written operator instructions for every state (alarm, trouble, restore, etc.) of each point. An event log shall record all events and operator actions to history for future review. An operator's log shall record operator's comments for each event in system history with time and date.

The "image area" shall display a <preset CCTV video> and/or <stored image of the device> relating to the event highlighted in the event list area.

When processing fire alarm events the graphic workstation:
Shall be capable of acknowledging, silencing, and resetting all fire alarm functions.

Shall be capable of manually activating, deactivating, enabling, and disabling individual fire alarm points.

Shall be capable of generating status, maintenance and sensitivity reports for fire alarm components.

Receipt of a fire alarm shall activate an audio WAV file over the workstation speakers alerting the operator to a fire alarm<, and providing audible instructions.>

When processing security events, the graphic workstation:

Shall be capable of acknowledging and silencing security event functions.

Shall be capable of manually activating, deactivating, arming, disarming, enabling, and disabling individual security points.

Shall be capable of generating status reports for all security devices.

Receipt of a security event shall activate an audio WAV file over the workstation speakers alerting the operator to a security event.

When processing access control events, the graphic workstation:

Shall be capable of acknowledging access control event functions.

Shall be capable of manually activating, deactivating, arming, disarming, enabling, disabling, opening, unlocking, closing, and locking individual doors.

Shall be capable of manually enabling and disabling card readers.

Shall be capable of generating status reports for all card reader controllers.

Receipt of an access control event activate an audio WAV file over the workstation speakers alerting the operator to a security/access event.

Upon receipt of any event, the workstation:

Shall command the CCTV switcher-multiplexer to direct the appropriate camera to the preset azimuth and elevation for each specific event, and sent send this image to the workstation.

Shall display the video image on one area of the workstation as received from the CCTV switcher-multiplexer.

Shall provide manual pan, tilt, and zoom control signals to the switcher-multiplexer.

2.4 Access Control

2.4.1 Access Control Database Program

The access control database application program shall be designed to administer the functions necessary for management of the access control services. The program shall operate under Windows®, 98, ME and 2000 with intuitive, easy to operate capabilities for any novice PC user. The program can be installed on a single PC or on a server allowing multiple users full access to the database over commercial LAN/WAN infrastructures. The program shall support multi-tenant applications, segregating databases for each tenant. The program shall employ an ODBC database engine that stores cardholder, system configuration information and assuring standard connectivity with other database applications. The program shall enable the user to add, change or delete cardholder information, schedules and access levels. The program shall contain the ability to retrieve, filter and generate reports uploaded from the card reader controllers. The program shall archive and log system activity and create history logs that will enable a user with the ability to retrieve the information as required.

2.4.2 Access Cards

A quantity of <xx> proximity access cards shall be provided. The card shall use passive

technology for transmitting its encoded badge number to the reader. For security purposes, the card's internal data storage format shall be unique to the system supplier, and not be available from third party vendors. Cards must be compatible with the card readers supplied for the project.

The card shall be the approximate size and weight of a standard credit card, 2.125" x 3.375", (540mm x 857mm).

The card shall be suitable for direct printing with a video badging system.

The card shall accept a slot for either horizontal or vertical hanging, without affecting card operation.

2.4.3 Badging System

A video badging system shall be provided for the capture, storage, and attachment of photographic images for each cardholder profile and printable to a badge. The system shall operate in using a Windows® 98, ME or 2000 operating platform and contain an ODBC compliant database. The video badging system shall interface with the Access Control Database Program to extract cardholder information for each cardholder. The video badging system shall contain management and storage functions for each card holder profile, image and badge background(s) for the creation of a photo identification badge.

Badge graphic design content and cardholder information shall be the responsibility of the owner.

2.4.4 Badge Printer

A color dye sublimation badge printer shall be provided as the output device from the video badging software. The printer shall contain current Windows® software drivers capable of communicating to Windows® 98, ME and 2000 operating systems.

A color resin thermal transfer badge printer shall be provided as the output device from the video badging software. . The printer shall contain current Windows® software drivers capable of communicating to Windows® 98, ME and 2000 operating systems.

The printer shall be capable of printing on one <two> card sides.

2.5 Field Mounted System Components

2.5.1 Fire Initiating Devices

2.5.1.1 Smoke Detectors & Accessories

2.5.1.1.1 Analog Addressable Smoke -- General

Each analog addressable smoke detector's sensitivity shall be capable of being programmed individually as: most sensitive, more sensitive, normal, less sensitive or least sensitive. In addition to the five sensitivity levels the detector shall provide a prealarm sensitivity setting, which shall be settable in 5% increments of the detector's alarm sensitivity value.

An alternate alarm sensitivity level shall be provided for each detector, which can be set to any of the five (5) sensitivity settings manually or automatically using a time of day event. In addition to the five alternate sensitivity levels the detector shall

provide an alternate prealarm sensitivity setting, which shall be settable in 5% increments of the detector's alternate alarm sensitivity value.

The detector shall be able to differentiate between a long drift above the prealarm threshold and fast rise above the threshold.

The detector's sensing element reference point shall automatically adjust, compensating for background environmental conditions such as dust, temperature, and pressure. Periodically, the sensing element real-time analog value shall be compared against its reference value. The detector shall provide a maintenance alert signal that 75% to 99% compensation has been used. The detector shall provide a dirty fault signal that 100% or greater compensation has been used.

The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced. System shall display an off-normal condition until the proper detector type has been installed or change in the application program profile has been made.

2.5.1.1.2 Duct Detector Housing

Provide smoke detector duct housing assemblies to mount an analog/addressable detector along with a standard, relay or isolator detector mounting base. The housing shall also protect the measuring chamber from damage and insects. The housing shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Drilling templates and gaskets to facilitate locating and mounting the housing shall also be provided. The housing shall be finished in baked red enamel. Remote alarm LED indicators and remote test stations shall be provided.

2.5.1.1.3 Smoke Detector - Ionization

Provide analog/addressable ionization smoke detectors at the locations shown on the drawings. The system shall have the ability to uniquely set the sensitivity and alarm verification values of each detector on a circuit. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting prealarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 75% and 100% of the allowable environmental compensation value.

2.5.1.1.4 Smoke Detector - Multi-Sensor Ion Photo Thermal

Provide analog/addressable multisensor photoelectric thermal smoke detectors at the locations shown on the drawings. Alarm condition shall be based upon the combined input from the photoelectric and thermal detection elements. Separately mounted photoelectric detectors, ionization detectors and heat detectors in the same location, clustered at the manufacturer's listed spacing is an acceptable alternative.

The detector shall have the ability to set the sensitivity and alarm verification of each individual detector on the circuit. It shall be possible to automatically change the

sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting prealarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 75% and 100% of the allowable environmental compensation value.

2.5.1.1.5 Smoke Detector - Multi-Sensor Photo Thermal

Provide analog/addressable multisensor smoke detectors at the locations shown on the drawings. Alarm condition shall be based upon the combined input from the photoelectric and thermal detection elements. Separately mounted photoelectric detectors and heat detectors in the same location, clustered at the manufacturer's listed spacing is an acceptable alternative. The detector shall have the ability to set the sensitivity and alarm verification of each individual detector on the circuit. It shall be possible to automatically set the sensitivity of individual analog/addressable detectors for the day and night periods.

Each smoke detector shall be capable of transmitting prealarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 75% and 100% of the allowable environmental compensation value.

2.5.1.1.6 Smoke Detector - Photoelectric

Provide analog/addressable photoelectric smoke detectors at the locations shown on the drawings. The detector shall have the ability to set the sensitivity and alarm verification of each of the individual detectors on the circuit. It shall be possible to automatically change the sensitivity of individual analog/addressable detectors for the day and night periods. Each smoke detector shall be capable of transmitting prealarm and alarm signals in addition to the normal, trouble and need cleaning information. It shall be possible to program control panel activity to each level. Each smoke detector may be individually programmed to operate at any one of five (5) sensitivity settings. Each detector microprocessor shall contain an environmental compensation algorithm that identifies and sets ambient environmental thresholds approximately six times an hour. The microprocessor shall monitor the environmental compensation value and alert the system operator when the detector approaches 75% and 100% of the allowable environmental compensation value.

2.5.1.1.7 Smoke Detector Guards

Smoke detector guards shall be installed at the locations shown on the drawings. The guards shall be Underwriters Laboratories tested and listed by for use with the smoke detectors they protect. Guard design shall not affect the detector operating sensitivity and shall not reduce the listed detector spacing. The guards shall be constructed of 16-gauge steel with a baked white finish to match the detectors. Tamperproof mounting hardware shall be provided.

2.5.1.2 Detector Bases

2.5.1.2.1 Detector Base - Standard

Provide standard detector mounting bases suitable for mounting on either North American 1-gang, 3½ or 4 inch octagon box and 4 inch square box, or European BESA or 1-gang box. The base shall, contain no electronics and support all series detector types.

2.5.1.3 Manual Stations

2.5.1.3.1 Manual Station - Double Action Single Stage

Provide analog/addressable double action, single stage fire alarm stations at the locations shown on the drawings. The fire alarm station shall be of polycarbonate construction and incorporate an internal toggle switch. A locked test feature shall be provided. The station shall be finished in red with silver "PULL IN CASE OF FIRE" lettering. The manual station shall be suitable for mounting on North American 2 ½ (64mm) deep 1-gang boxes and 1 ½ (38mm) deep 4 square boxes with 1-gang covers.

2.5.2 Notification Appliances

2.5.2.1 Speakers

2.5.2.1.1 Low Profile Speaker

Provide low profile wall mount speakers at the locations shown on the drawings. The low profile speaker shall not extend more than 1" (2.5cm) past the finished wall surface, and provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.

Wattage setting shall be visible with the cover installed. When the cover is installed, no mounting hardware shall be visible. In and out screw terminals shall be provided for all wiring. The low profile speaker shall mount in a North American 4" x 2 1/8" square electrical box, without trims or extension rings.

The low profile wall mount speaker shall be EST Genesis G4 series.

2.5.2.1.2 Speaker-Ceiling Mount-8in

Provide 8" ceiling mounted speakers at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Speaker baffles shall be round or square steel with white finish as required. Provide square surface mount boxes with matching finish where required. Speakers shall provide 1/2w, 1w, 2w, and 4W power taps for use with 25V or 70V systems. At the 4 watt setting, the speaker shall provide a 94 dBA sound output a frequency of 1000 Hz. when measured in an anechoic chamber at 10 ft.

2.5.2.1.3 Speaker-Cone-4in

Provide 4" <white> <red> speakers at the locations shown on the drawings. Speakers shall have a 4" mylar cone, paper cones are not acceptable. The rear of the speakers shall be completely sealed protecting the cone during and after installation. In and

out screw terminals shall be provided for wiring. Speakers shall provide 1/4w, 1/2w, 1w, and 2w power taps for use with 25V or 70V systems. At the 2 watt setting, the speaker shall provide a 90 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480.

2.5.2.1.4 Speaker-Reentrant Surface

Provide 4" surface re-entrant speakers at the locations shown on the drawings. Speakers shall provide 2w, 4w, 8w, and 15w power taps for use with 25V or 70V systems. The re-entrant speakers shall utilize a high efficiency compression drivers. Cone type drivers are not acceptable. At the 15 watt setting, the speaker shall provide a 102 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480. Weatherproof boxes shall be provided for outdoor mounting.

2.5.2.2 Speaker-Strobes

2.5.2.2.1 Low Profile Speaker-Strobe

Provide low profile wall mount speaker/strobes at the locations shown on the drawings. The low profile speaker/strobe shall not extend more than 1" (2.5cm) past the finished wall surface, and provide a switch selectable audible output of 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464.

Strobes shall provide synchronized flash output, which shall be switch selectable for output values of 15cd, 30cd, 75cd & 110cd. Wattage and candela settings shall be visible with the cover installed. When the cover is installed, no mounting hardware shall be visible. In and out screw terminals shall be provided for all wiring. The low profile speaker/strobes shall mount in a North American 4" x 2 1/8" square electrical box, without trims or extension rings.

The low profile wall mount speaker/strobes shall be EST Genesis G4 series.

2.5.2.2.2 Speaker-Strobe 4in

Provide 4" <white> <red> speakers/strobes at the locations shown on the drawings. Speakers shall have a 4" mylar cone, paper cones are not acceptable. The rear of the speakers shall be completely sealed protecting the cone during and after installation. In and out screw terminals shall be provided for wiring. Speakers shall provide 1/4w, 1/2w, 1w, and 2w power taps for use with 25V or 70V systems. At the 2 watt setting, the speaker shall provide an 87 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480. Strobes shall provide synchronized flash. Strobe output shall be determined as required by its specific location and application from a family of 15/75cd, 30cd, & 110cd devices.

2.5.2.2.3 Speaker-Strobe Ceiling 8in

Provide 8" ceiling mounted speaker/strobes at the locations shown on the drawings. In and out screw terminals shall be provided for wiring. Speaker baffles shall be round or square, steel with white finish as required. Provide square surface mount boxes with matching white finish as required. Speakers shall provide 1/2w, 1w, 2w, and 4W power taps for use with 25V or 70V systems. At the 4 watt setting, the speaker shall provide a 94 dBA sound output a frequency of 1000 Hz. when measured in an anechoic chamber at 10 ft. Strobes shall provide synchronized flash

outputs. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 75cd, and 110cd devices.

2.5.2.2.4 Speaker-Strobe Re-entrant

Provide 4" <white> <red> <surface> <flush> re-entrant speaker/strobes at the locations shown on the drawings. Weatherproof boxes shall be provided for outdoor mounting. Speakers shall provide 2w, 4w, 8w, and 15w power taps for use with 25V or 70V systems. The re-entrant speakers shall utilize a high efficiency compression drivers. Cone type drivers are not acceptable. At the 15 watt setting, the speaker shall provide a 102 dBA sound output over a frequency range of 400-4000 Hz. when measured in reverberation room per UL-1480. Strobes shall provide synchronized flash. Strobe output shall be determined as required by its specific location and application from a family of 15cd, 30cd, 75cd, & 110cd devices.

2.5.3 Initiation & Control Modules

2.5.3.1 Intelligent Modules -- General

It shall be possible to address each intelligent module without the use of DIP or rotary switches. Devices using DIP switches for addressing shall not be acceptable. The personality of multifunction modules shall be programmable at site to suit conditions and may be changed at any time using a personality code downloaded from the Analog Loop Controller. Modules requiring EPROM, PROM, ROM changes or DIP switch and/or jumper changes shall not be acceptable. The modules shall have a minimum of 2 diagnostic LEDs mounted behind a finished cover plate. A green LED shall flash to confirm communication with the loop controller. A red LED shall flash to display alarm status. The module shall be capable of storing up to 24 diagnostic codes which can be retrieved for troubleshooting assistance. Input and output circuit wiring shall be supervised for open and ground faults. The module shall be suitable for operation in the following environment:

- Temperature: 32°F to 120°F (0°C to 49°C)
- Humidity: 0-93% RH, non-condensing

2.5.3.2 Control Relay Module

Provide intelligent control relay modules. The Control Relay Module shall provide one form "C" dry relay contact rated at 2 amps @ 24 Vdc to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware. The control relay module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

2.5.3.3 Dual Input Module

Provide intelligent dual input modules. The Dual Input Module shall provide two (2) supervised Class B input circuits each capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers. The dual input module shall support the following circuit types:

- Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
- Normally-Open Alarm Delayed Latching (Waterflow Switches)
- Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
- Normally-Open Active Latching (Supervisory, Tamper Switches)

2.5.3.4 Dual Input Signal Module

Provide intelligent dual input signal modules. The Dual Input (Dual Riser Select) Signal Module shall provide a means to selectively connect one of two (2) signaling circuit power risers to one (1) supervised output circuit. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes. The dual input signal module shall support the following operation:

- Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A, 25 Vrms @ 50w or 70 Vrms @ 35w of Audio)

2.5.3.5 Isolator Module

Provide intelligent fault isolators modules. The Isolator Module shall be capable of isolating and removing a fault from a class A data circuit while allowing the remaining data loop to continue operating. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes.

2.5.3.6 Monitor Module

Provide intelligent monitor modules. The Monitor Module shall be factory set to support one (1) supervised Class B Normally-Open Active Non-Latching Monitor circuit. The monitor module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

2.5.3.7 Single Input Module

Provide intelligent single input modules. The Single Input Module shall provide one (1) supervised Class B input circuit capable of a minimum of 4 personalities, each with a distinct operation. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers. The single input module shall support the following circuit types:

- Normally-Open Alarm Latching (Manual Stations, Heat Detectors, etc.)
- Normally-Open Alarm Delayed Latching (Waterflow Switches)
- Normally-Open Active Non-Latching (Monitor, Fans, Dampers, Doors, etc.)
- Normally-Open Active Latching (Supervisory, Tamper Switches)

2.5.3.8 Single Input Signal Module

Provide intelligent single input signal modules. The Single Input (Single Riser Select) Signal Module shall provide one (1) supervised Class B output circuit capable of a minimum of 2 personalities, each with a distinct operation. When selected as a telephone power selector, the module shall be capable of generating its own "ring tone". The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4" square boxes with 2-gang covers, or European 100mm square boxes. The single input signal module shall support the following operations:

- Audible/Visible Signal Power Selector (Polarized 24 Vdc @ 2A, 25Vrms @50w or 70 Vrms @ 35 Watts of Audio)
- Telephone Power Selector with Ring Tone (Fire Fighter's Telephone)

2.5.3.9 Universal Class AB Module

Provide intelligent class A/B modules. The Universal Class A/B Module shall be capable of a minimum of fifteen (15) distinct operations. The module shall be suitable for mounting on North American 2 ½" (64mm) deep 2-gang boxes and 1 ½" (38mm) deep 4"

square boxes with 2-gang covers, or European 100mm square boxes. The universal class A/B module shall support the following circuit types:

- Two (2) supervised Class B Normally-Open Alarm Latching.
- Two (2) supervised Class B Normally-Open Alarm Delayed Latching.
- Two (2) supervised Class B Normally-Open Active Non-Latching.
- Two (2) supervised Class B Normally-Open Active Latching.
- One (1) form "C" dry relay contact rated at 2 amps @ 24 Vdc.
- One (1) supervised Class A Normally-Open Alarm Latching.
- One (1) supervised Class A Normally-Open Alarm Delayed Latching.
- One (1) supervised Class A Normally-Open Active Non-Latching.
- One (1) supervised Class A Normally-Open Active Latching.
- One (1) supervised Class A 2-wire Smoke Alarm Non-Verified.
- One (1) supervised Class B 2-wire Smoke Alarm Non-Verified.
- One (1) supervised Class A 2-wire Smoke Alarm Verified
- One (1) supervised Class B 2-wire Smoke Alarm Verified
- One (1) supervised Class A Signal Circuit, 24Vdc @ 2A.
- One (1) supervised Class B Signal Circuit, 24Vdc @ 2A.

2.5.3.10 Waterflow-Tamper Module

Provide intelligent Waterflow/tamper modules. The Waterflow/Tamper Module shall be factory set to support two (2) supervised Class B input circuits. Channel A shall support a Normally-Open Alarm Delayed Latching Waterflow Switch circuit. Channel B shall support a Normally-Open Active Latching Tamper Switch. The Waterflow/tamper module shall be suitable for mounting on North American 2 ½" (64mm) deep 1-gang boxes and 1 ½" (38mm) deep 4" square boxes with 1-gang covers.

2.5.4 Two-Way Audio

2.5.4.1 Telephone Handsets

Provide four (4) firefighter's telephone handsets for use with the firefighter's telephone jack stations. The telephone handsets shall be red in color and have a 5 ft (1.3m) coiled cord.

2.5.4.2 Telephone Jacks

Provide stainless steel firefighter's telephone jack stations at the locations shown on the drawings. The jack station shall be clearly identified with the words "FIRE FIGHTER'S TELEPHONE" for use with portable fire fighter telephone handsets.

2.5.4.3 Warden Stations

Provide remote firefighter's telephone stations / warden stations at the locations shown on the drawings. The station shall consist of a red telephone handset housed within a locked break glass surface or flush mounted enclosures as shown on the drawings. The enclosure shall have a red finish, and shall be clearly marked "FIRE FIGHTERS TELEPHONE" in large letters for easy identification.

2.5.5 Security

2.5.5.1 Security Keypad

Provide a keypad display that contains a backlit, 8-line graphic LCD display at the locations specified on the drawings. The keypad shall provide tactile and audible user feedback telephone style 12-key keypad. The keypad shall illustrate all system events

programmed for the display. The keypad shall have UL 864 (Fire), UL 294 (Access Control), UL 609 (Burglary), ULC S527(fire), and ULC S303 (Burglary) listings. The keypad display shall support menu driven applications, bi-lingual operation, bypass functions, arm/disarm security partitions, provides common controls for fire and stores 500 event transactions. A context sensitive help system shall be available to the user at any time.

2.5.5.2 Door Position Switch-Surface

Provide hermetically sealed surface mount door position switches at the doors indicated on the drawings. The contact shall be rated for 10 million cycles and shall not exceed a gap tolerance +/- 20%.

2.5.5.3 Door Position Switch-Concealed

Provide hermetically sealed concealed mount door position switches at the doors shown on the drawings. The contact shall be rated for 10 million cycles and shall not exceed a gap tolerance +/- 20%.

2.5.5.4 PIR Motion Detector

Provide a Passive Infrared (PIR) motion sensor as shown on the drawings. The Passive Infrared Motion Detector shall utilize adaptive signal processing with gliding focus mirror optics to analyze the size, speed and shape to determine the alarm threshold. The unit shall be configurable for up to seven different patterns, have a range of 34 feet and a 90-degree view. The unit shall wire directly to the same intelligent device loop as the intelligent fire detection and control where permitted by the authority having jurisdiction. The unit shall not require power from an external source. The unit addressing shall be electronic, jumpers or DIP switches shall not be considered as equivalent to electronic addressing. Removing the cover shall automatically activate the tamper switch and put the unit in the alignment mode. The unit shall be constructed of thermoplastic housing with integral (removable) cover and integral tamper switch.

2.5.6 Access Control

2.5.6.1 Card Reader-Proximity with Keypad

At the doors indicated on the plans, provide proximity type card readers that require the access control card be presented in close proximity from the card reader for the card to be read. Insertion of or swiping of the card through the card reader is not acceptable. The encoded data from the access card shall be sent to the card reader controller for processing. The card reader shall provide both audible and visual indication of a properly read card. The LED shall provide a different flash rate when a PIN number, visitor escort or second cardholder is required for access. The card reader shall incorporate an integral, weatherized keypad capable of transmitting personal identification numbers (PINs) to the card reader controller. The card reader output shall utilize the standard Wiegand output protocol and feature a re-present mode to prevent multiple reads from a single card presentation. The reader housing shall be constructed of polycarbonate material, suitable for mounting on a single gang electrical box. The card reader shall be fully weatherized and shall have an operating temperature of -22°F to 150°F (-30°C to 65°C) and shall have an operating range of 5 to 95% humidity, non-condensing.

2.5.6.2 Card Reader-Proximity-Mullion Mount

At the doors indicated on the plans, provide proximity type card readers that require only that the access control card be held in close proximity from the card reader for the card to be read. Insertion of or swiping of the card through the card reader is not acceptable.

The encoded data from the access card shall be sent to the card reader controller for processing. The card reader shall provide both audible and visual indication of a properly read card. The LED shall provide a different flash rate when a visitor escort or second cardholder is required for access. The card reader output shall utilize the standard Wiegand output protocol and feature a re-present mode to prevent multiple reads from a single card presentation. The reader housing shall be constructed of polycarbonate material, suitable for mounting on a doorframe or mullion. The card reader shall be fully weatherized and shall have an operating temperature of -22°F to 150°F (-30°C to 65°C) and shall have an operating range of 5 to 95% relative humidity, non-condensing.

2.5.6.3 Card Reader-Proximity-Standard

At the doors indicated on the plans, provide proximity type card readers that require that the access control card be held in close proximity from the card reader for the card to be read. Insertion of or swiping of the card through the card reader is not acceptable. The encoded data from the access card shall be sent to the card reader controller for processing. The card reader shall provide both audible and visual indication of a properly read card. The LED shall provide a different flash rate when a visitor escort or second cardholder is required for access. The card reader output shall utilize the standard Wiegand output protocol and feature a re-present mode to prevent multiple reads from a single card presentation. The reader housing shall be constructed of polycarbonate material, suitable for mounting on a single gang electrical box. The card reader shall be fully weatherized and shall have an operating temperature of -22°F to 150°F (-30°C to 65°C) and shall have an operating range of 5 to 95% relative humidity, non-condensing.

2.5.6.4 Card Reader Controller

Provide a card reader controller for each reader-equipped door, as required. The card reader controller shall have UL 864 (Fire), UL 294 (Access Control), UL 609 (Burglary), UL 1610 (Burglary), ULC S527 (fire), and ULC S303 (Burglary) listings. The card reader controller shall provide all the required intelligence to authorize or deny personnel access to the door. The card reader controller shall support a minimum of 8,000 card holders and shall be capable of supporting a maximum of 36,000 card holders. The card reader controller shall hold a minimum of 10,000 event history transactions and shall be capable of supporting a maximum of 20,000 event history transactions. The card reader controller shall support a minimum of one ingress reader/keypad, one egress reader/keypad, one locking device, one request to exit device, one door monitor input, one automatic door opener output and one optional sounder for local door annunciation. The card reader controller shall be capable of supporting standard reader and keypad formats. The card reader controller shall contain the database for all user information including schedules and holidays. The database shall be contained in non-volatile memory. The card reader controller shall not require communication from the host computer to maintain door access functionality.

2.5.6.5 Door Strike

Provide a heavy duty electric strikes at the doors indicated on the plans. The strike shall contain an internal electrically operated solenoid mechanism having field selectable 12/24VDC operating voltage, and feature built in transient voltage suppression. The strike shall provide 20 lbs. resistance to side load pressure and be designed to accommodate cylindrical or non-deadbolt mortise locksets. The strike shall have a stainless steel housing, and provide horizontal adjustments. The strike shall be UL listed for A Label fire-rated openings and for burglary.

2.5.6.6 Lock-Magnetic-1650 Pound

Provide a surface mount magnetic locks at the doors indicated on the plans. The magnetic lock shall provide 1650 lbs. of direct holding force. The magnetic lock shall contain no moving parts to wear. The magnetic lock shall be UL listed as auxiliary locks for a 3 hour fire-rated opening and burglary resistance. Input voltage shall be 12 or 24VDC with built in voltage spike suppression.

2.5.6.7 Lock-Magnetic-650 Pound

Provide a surface or mortise mount magnetic locks at the doors indicated on the plans. The magnetic lock shall provide 650 lbs. of direct holding force. The magnetic lock shall contain no moving parts to wear. Input voltage shall be 12 or 24VDC with built in voltage spike suppression.

2.5.6.8 Request-To-Exit Pushbutton

Provide a heavy-duty push button switch to be used for egress at the doors shown on the plans. The push button shall be configured with either single pole double throw (SPDT) or double pole, double throw (DPDT) contact switches rated at .5 amps at 24V per switch. The heavy-duty switch shall be of standard size that will mount in a single gang box, surface or semi-flush.

2.5.6.9 Request-To-Exit-PIR

Provide a request to exit passive infrared (PIR) sensor at the doors indicated on the plans. The sensor shall be capable of being mounted on a wall, doorframe or the ceiling. The sensor shall contain dual relay outputs and have an adjustable range setting. Input voltage shall be either 12 or 24 VDC. The sensor shall be UL rated for the application.

PART 3 Execution

3.1 Field Quality Control

3.1.1 Test & Inspection

All intelligent analog addressable devices shall be tested for current address, sensitivity, and user defined message.

All wiring shall be tested for continuity, shorts, and grounds before the system is activated.

All test equipment, instruments, tools and labor required to conduct the tests shall be made available by the installing contractor.

The system including all its sequence of operations shall be demonstrated to the Owner, his representative, and the local fire inspector. In the event the system does not operate properly, the test shall be terminated. Corrections shall be made and the testing procedure shall be repeated until it is acceptable to the Owner, his representatives and the fire inspector.

At the final test and inspection, a factory trained representative of the system manufacturer shall demonstrate that the system functions properly in accordance with these specifications. The representative shall provide technical supervision, and participate during all of the testing for the system.

All fire alarm testing shall be in accordance with National Fire Alarm Code, NFPA 72 - 1999, Chapter 7.

A letter from the Contractor certifying that the system is installed entirely in accordance with

the system manufacturer's recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer's certified representative, and that the system is in proper working order.