ADDENDUM NO. 02

PROJECT: Fitzsimons Building 1 North Create Communication Space
PROJECT ADDRESS: 13001 East 17th Place, Aurora, CO 80045
OWNER: University of Colorado Anschutz Medical Campus
1945 North Wheeling Street, Aurora, CO 80045
ARCHITECT’S PROJECT NUMBER: 005902.04
DATE: 09/13/2019

The Drawings, Specifications, and Contract Documents on the project are modified, corrected, supplemented, and/or superseded as hereinafter described.

The following additions, deletions, changes, and information shall become a part of and modify all work shown or described in the drawings and project manual dated 07/25/2019. Acknowledge receipt of this addendum in the space provided on the Bid Form.

Addendum No. 2 consists of 5 cover pages and 39 sheet attachments for a total of 44 sheets.

All changes on attached drawing sheets are clouded and tagged with delta ‘2’

**General Narrative Information:**

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<td>Revised General note#1 to “1. COMPLY WITH ALL APPLICABLE CODES, RULES AND REGULATIONS. UNIVERSITY IS ITS OWN AUTHORITY HAVING JURISDICTION AND PERMIT ARE ISSUED THRU THE CAMPUS BUILDING OFFICIAL. NO FEE FOR PERMITTING. ALL WORK MUST BE INSPECTED AND APPROVED BY CAMPUS BUILDING OFFICIAL.”</td>
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<td>A1</td>
<td>G0001</td>
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<td>A0101</td>
<td>Revised General note - Reflected Ceiling Plan #12 as “5. ALL EXTERIOR WINDOWS WITHIN SCOPE OF WORK TO RECEIVE MANUAL OPERATED SINGLE ROLLER SHADE EXCEPT WHERE OTHERWISE NOTED AS PART OF ADD ALTERNATE NO.3.”</td>
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<td>A0101</td>
<td>Changed detail reference at General note - Reflected Ceiling Plan #11 as 11. TYPICAL PERIMETER SOFFIT AND MANUAL OPERATED SINGLE ROLLER SHADE SYSTEM AT EXTENT OF EXTERIOR WALLS PER DETAIL 1 &amp; 2/A0841, UON.” Refer to revised sheet A0101.</td>
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Revised General note - Reflected Ceiling Plan #12 as "12. UNDERSIDE OF (E) CONCRETE FLOOR DECK ABOVE MAY HAVE ABANDONED OPENINGS AND CIRCULAR CORES. PATCH OVER OPENINGS WITH 1-HOUR RATED CONSTRUCTION AS SHOWN IN DETAIL 10/A0841." Refer to revised sheet A0101.

Add text note “TYP” to keynote#12.01 at both locations. Revise General Note – Reflected Ceiling Plan #5 to “5. ALL EXTERIOR WINDOWS WITHIN SCOPE OF WORK TO RECEIVE MANUAL OPERATED SINGLE ROLLER SHADE EXCEPT WHERE OTHERWISE NOTED AS PART OF ADD ALTERNATE NO.3.”

Revised Key Notes 10.01 and 10.03 and delete 10.04 as follow:

10.01 10'-0"W X 4'-0"H BACK PAINTED GLASS WRITABLE SURFACE, OFOI, GC TO INSTALL BLOCKING IN WALL.
10.03 8'-0"W X 4'-0"H BACK PAINTED GLASS WRITABLE SURFACE, OFOI, GC TO INSTALL BLOCKING IN WALL.

Added detail 10/A0841 - 1-HR RATED HORIZONTAL SHAFT WALL FLOOR PATCH AND CORE INFILL.

Specifications

1 Table of Contents Revised Table of Contents in Specifications.

2 10 28 00 Added Specification Section 10 28 00 Toilet Accessories.

3 12 21 24 Revised Specification Section 12 21 24 Roller Window Shades.

4 28 31 00 Added Specification Section 28 31 00 Fire Detection and Alarm.

Bidders Questions

Question: General note #1 on Sheet G0001 calls for GC to obtain and pay for all permits and that all work must be inspected by local authority having jurisdiction. Please confirm that this not applicable and that CU will be procuring the building permit and providing necessary inspections.

Response: Revised General note#1 to “1. COMPLY WITH ALL APPLICABLE CODES, RULES AND REGULATIONS. UNIVERSITY IS ITS OWN AUTHORITY HAVING JURISDICTION AND PERMIT ARE ISSUED THRU THE CAMPUS BUILDING OFFICIAL. NO FEE FOR PERMITTING. ALL WORK MUST BE INSPECTED AND APPROVED BY CAMPUS BUILDING OFFICIAL”

Question: There are several calls for existing and/or abandoned floor and wall penetrations to be properly fire stopped. As it was impossible to identify all of the possibilities at the job walk, should an allowance be established to cover this portion if the scope?

Response: There should be minimal to none, any adjustment will be resolved in change order.

Question: Work note #2 on Sheet G0201 calls for contractor to notify owner of hazardous materials. Does this mean that the testing thereof is
the GC's responsibility or will testing and subsequent abatement be by Anschutz?

Response: The last renovation was done at 2008 and to our knowledge there was no asbestos or lead containing material.

Question: General note #12 – reflected ceiling plan -on Sheet A0101 calls for numerous abandoned rectangular and circular openings to be patched with one-hour construction. As it was impossible to identify all of the possibilities at the job walk, should an allowance be established to cover this portion of the scope?

Response: There should be minimal to none, any adjustment will be resolved in change order.

Question: General note #10 – floor plan – on Sheet A0101 calls for floor flattening throughout existing space to tolerances required for floor finishes. As it was impossible to identify all of the possibilities at the job walk, should an allowance be established to cover this portion of the scope?

Response: There should be minimal to none, any adjustment will be resolved in change order.

Question: Sheet A0601 Keynote 10.04 calls reference to spec section 103100 although this section is not in the specification book. Please advise

Response: Keynote 10.04 is not applicable to this project and is changed in this Addendum to 10.03. Refer to attached revised sheet A0601.

Question: Sheet A0601 Keynote 10.16 and 10.21 calls reference to spec section 102800 although this section is not in the specification book. Please advise

Response: Please refer to added specification Section 102800.

Question: Please confirm that all demountable glazing systems as note in Keynote 10.06 on Sheet A0601 are furnish and install by the furniture vendor

Response: Demountable glazing system will be furnished and installed by contractor per specification section 102219.

Question: Keynote 27.04 on Sheet A0601 calls for flat screen TVs CFCI RE: Technology. I see no drawing nor specification for reference. Please advise.

Response: Revise Keynote 27.04 to “FLAT SCREEN TV OFOI, CONTRACTOR TO PROVIDE CONDUIT AND INSTALL BACK BOX.” Contractors are responsible for pathway and backing.

Question: At the job walk, it was mentioned that any LEFTOVER furniture and accessories (including pianos and pool tables) will need to be relocated by the GC. Since we do not know what may be left at this point, nor do we know where these items may be going, should we establish an allowance for this portion of the scope?
Response: The remaining list of furniture is provided with this Addendum and will need to be removed or salvaged by contractor.

Question: Please forward the fire sprinkler and fire alarm contractors approved to work in the building.
Response: There is no Fire sprinkler approved sub-contractor list, they need to be licensed engineer and provide the university with stamped and signed shop drawings. Refer to added specifications section 28 31 00 – 2.02 for Approved Installers for Fire alarm.

Question: Which windows will be covered with roller shades? A0101 calls out keynotes in two places in Elevation 2 for roller shades. Can we assume all 13 windows will be covered?
Response: General note – Reflected Ceiling Plan #5 indicated that all exterior window will receive roller shade. Refer to revised note in this Addendum for clarifications. There should be a total of 14 roller shades.

Question: Is there a window schedule for window sizes? I have ~45”w x 85”h for the windows currently, pulled from A0601 Elevation 17.
Response: Existing window is roughly 3’-9” wide X 6’-10” high. Contractor to verify exact dimensions.

Question: Division 12 specifies both solar shade fabrics, and blackout fabrics, can we confirm which will be used where? Will there only be solar shades used? Dual shade systems with a blackout and solar screen?
Response: There is no blackout shade. Refer to revised spec section 122124.

Question: Are the Clarus Magnetic Marker Boards owner or GC supplied?
Response: Clarus Glass Boards are part of the Furniture Package by owner. Contractor to provide backing.

Question: What are the parking fees per day and per month?
Response: Parking Rates are $8 per day in Visitor Parking Lots and $35 per month in the Rock Lot north of Montview. The Ignacio Visitor Lot (Just North of Fitzsimons Building) is off limits to contractors.

Question: Are all permits through the UCD permits department (including electrical, plumbing, mechanical, fire alarm and fire sprinklers)
Response: Yes, to all permits.

Question: Is the project tax exempt for state and city?
Response: Yes, the university is tax exempt for both state and City of Aurora tax.

Question: Will we have a place to set a dumpster?
Response: Yes, there will be a dumpster location at the back side of Fitzsimons Building. Contractor will coordinate with university project manager for exact location at the time of mobilization.
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<th>Response</th>
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</thead>
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<tr>
<td>Will we be able to use the building rest rooms or do we need to include a temporary one?</td>
<td>Yes, contractor can use the restroom next to the area of work.</td>
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<tr>
<td>Is all the signage to be by the general contractor including the room identification signage per E/A0901?</td>
<td>Yes, refer to spec section 10 14 00.</td>
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<tr>
<td>Please confirm all furniture, game tables, exercise equipment, etc. removal and new is by others except for the possibility of a ping pong table.</td>
<td>The remaining list of furniture is provided with this Addendum and will need to be removed or salvaged by contractor.</td>
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<tr>
<td>Will CLARUS marker boards be by others?</td>
<td>Clarus Glass Boards are part of the Furniture Package by owner. Contractor to provide backing.</td>
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<tr>
<td>Please confirm temperature controls are by Siemens.</td>
<td>Yes, temperature controls are by Siemens.</td>
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<tr>
<td>Please confirm fire alarm system is EST.</td>
<td>Yes, Fire Alarm System is EST.</td>
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<tr>
<td>Please confirm lighting controls are Encelium.</td>
<td>Yes, lighting controls is Encelium.</td>
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END OF ADDENDUM NO. 02

See attachments
Remaining Furniture, Game Tables, Exercise Equipment etc. to be removed or salvaged by contractor

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<td>Stool</td>
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## Fitzsimons Building – 1 North / Communication Space

**Project No. 19-142923**

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1.01 SUMMARY

A. This Section includes the following:
   1. Paper towel dispensers.
   2. Liquid soap dispensers.

B. Related Sections:
   1. Division 06 Section "Rough Carpentry" for installation of blocking for mounting accessories.

C. References:
   1. ANSI A117.1 - "American National Standards from Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People".

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: Submit maintenance data for accessories to include in maintenance manuals specified in Division 01. Provide List of replacement parts and service recommendations.

B. Warranty Documents: Manufacturer's warranty documents for inclusion in O&M Manuals.

1.04 QUALITY ASSURANCE

A. Conform to requirements of ANSI A117.1 and UFAS for making facilities and accessories accessible to and usable by the physically handicapped.

B. Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same areas, unless otherwise acceptable to the Architect.

C. Stamped names and labels on exposed faces of units will not be permitted, except where otherwise indicated.
D. Provide locks where indicated, with the same keying for each type of accessory unit in the project wherever possible. Furnish two keys for each lock to Facilities Management Environmental Services office.

1.05 WARRANTY

A. Provide manufacturer’s guarantee that products are free from defects in materials and workmanship for 1 year from date of substantial completion.

1.06 COORDINATION

A. Coordinate locations of accessories with other work to prevent interferences with clearances required for handicap access, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Coordinate installation of concealed blocking with requirements of accessories provided by Owner.

PART 2 - PRODUCTS

2.01 TOILET ACCESSORIES

A. Paper Towel (Roll) Dispenser:
   2. Color: Black

B. Foam-Soap Dispenser:
   1. Product: Kimberly-Clark "Professional Cassette Skin Care Dispenser"; Product code 92145.
   2. Color: Black.

2.02 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide two keys for each locking device. Verify Owner's existing key system.
PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated on Drawings.

3.02 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.03 CONSTRUCTION WASTE MANAGEMENT

A. Manage construction waste in accordance with provisions of Division 01 Section "Construction Waste Management and Disposal."

END OF SECTION
SECTION 12 21 24

ROLLER WINDOW SHADES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
   1. Manually operated sunscreen roller shades.

B. Related Sections:
   1. Division 01 Section "Alternates" for bid alternates affecting the work of this section.
   2. Division 09 Section "Gypsum Board" for coordination with gypsum board assemblies for blocking, installation of shade pockets, closures and related accessories.
   3. Division 09 Section "Acoustical Tile Ceilings" for coordination with acoustical ceiling systems for blocking, installation of shade pockets, closures and related accessories.

1.02 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
   3. Storage and handling requirements and recommendations.
   4. Mounting details and installation methods.

B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.

C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

D. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade cloth samples and aluminum finish sample as selected. Mark face of material to indicate interior faces.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

B. Warranty Documents: Manufacturer's warranty documents for inclusion in O&M Manuals.
1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades system through one source from a single manufacturer with a minimum of ten years experience and minimum of five projects of similar scope and size in manufacturing products comparable to those specified in this section. This includes but is not limited to all required extrusions, accessories, controls and fabricated roller shades or else all stated and published warranties may be void.

B. Installer Qualifications: Engage an installer, which shall assume responsibility for installation of all system components, with the following qualifications.
   1. Installer for roller shade system shall be trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Shadecloth Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, and ATCC9645.

E. PVC-Free Shadecloth: Comply with the following.
   1. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply "PVC Free" without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
   2. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogenes. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.
   3. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
   4. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.
1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver components in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.06 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.07 WARRANTY

A. Warranty: Provide manufacturer's standard warranties, including the following:
   1. Roller Shade Hardware: Manufacturer's standard non-depreciating twenty-five year limited warranty.
      a. Shadecloth: Manufacturer's standard non-depreciating 10-year limited warranty.
   2. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to access to the work above 12-feet AFF, which are the responsibility of others.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: To establish a standard of quality, design, and function desired, subject to compliance with requirements, provide window shades as manufactured by Hunter-Douglas: www.hunterdouglascontract.com, or one of the following:

2.02 SHADE BANDS

A. Shade Bands: Construction of shade band includes the fabric, the enclosed hem weight, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
   1. Concealed Hembar: Shall be continuous extruded aluminum for entire width of shade band and with the following characteristics:
      a. Hembar shall be heat sealed on all sides.
      b. Open ends shall not be accepted.
2. Shade Band and Shade Roller Attachment:
   a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection.
   b. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable/replaceable with a "snap-on - snap-off" spline mounting, without having to remove shade roller from shade brackets.
   c. Mounting Spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
   d. Any method of attaching shade band to roller tube that requires the use of adhesive, adhesive tapes, staples, and/or rivets, does not meet the performance requirements of this specification and shall not be accepted.

2.03 ROLLER SHADE FABRICATION

A. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design.

B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shade bands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

C. For railroaded shade bands, provide seams in railroaded multi-width shade bands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shade bands.

D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shade bands.

2.04 ROLLER SHADE COMPONENTS

A. Access and Material Requirements:
   1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
   2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
3. Use only Delran engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and/or polyester, or reinforced polyester shall not be accepted.

B. Manual Operated Chain Drive Hardware and Brackets:
   1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
   2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
   3. Provide shade hardware system that allows for removable regular and/or reverse roll fasciae to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
   4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer’s design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
   5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
   6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
   7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
   8. Drive Bracket / Brake Assembly:
      a. Drive Bracket shall be fully integrated with all other accessories, including, but not limited to: SnapLoc fascia, room darkening side/sill channels, center supports and connectors for multi-banded shades.
   9. Drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
      a. The brake shall be an over running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
      b. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
      c. The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
   10. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.
2.05 ROLLER SHADE SCHEDULE

A. Roller Shade Schedule: Refer to the Drawings for locations.
   1. Shade Type WT-1: Manual operating, chain drive, sunscreen roller shades in all exterior windows of rooms and spaces shown on the Drawings.
      a. Shade pockets.
      b. Fascias.

2.06 SHADECLOTH

A. Room Darkening (PVC Free) Shadecloth with Opaque Acrylic Backing: Hunter-Douglas Contract, "Avila Twilight", blackout material comprised of 100% polyester. Openness factor = 0%
   1. Color: "Linen" or as selected by Architect from manufacturer's standard colors. (ADD. #2)

B. Environmentally Certified Shadecloth : "SheerWeave 200" group by Phifer, Inc. www.phifer.com, fabricated from TPO for both core yarn and jacket, single thickness, 0.018 opaque coated reinforced yarn, non-raveling 0.030 inch thick fabric.
   1. Basket Weave: 5 percent open 2x2 basket weave
   2. Dense Basket Weave: 3 percent open 2x2 basket weave
   3. Color: As selected by Architect from manufacturer's standard colors.

2.07 ROLLER SHADE ACCESSORIES

A. Shade Pocket: For recessed mounting in acoustical tile or drywall ceilings as indicated on the Drawings.
   1. Either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
   2. Provide built-in "No Cost" pocket and white removable closure trim / closure mount (recessed into ceiling cavity).
   3. Pockets shall be vented such that there will be a minimum of four 1 inch diameter holes per foot allowing the solar gain to flow above the ceiling line.

B. Fascia:
   1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
   2. Fascia shall be able to be installed across two or more shade bands in one piece.
   3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
   4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
PART 3 - EXECUTION

3.01 EXAMINATION
A. Do not begin installation until substrates have been properly prepared. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION
A. Clean surfaces thoroughly prior to installation. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION OF ROLLER SHADES
A. Contractor Furnish and Install Responsibilities:
1. Window Covering Contractor (WC) shall provide an onsite, Project Manager, and shall be present for all related jobsite scheduling meetings.
2. WC shall supervise the roller shade installation, and setting of intermediate stops of all shades to assure the alignment of the shade bands within a single EDU group, which shall not exceed +/- 0.125 inches, and to assure the alignment between EDU groups, which shall not exceed +/- 0.25 inches.
3. WC shall be responsible for field inspection on an area-by-area basis during construction to confirm proper mounting conditions per approved shop drawings.
4. Verification of Conditions: Examine the areas to receive the work and the conditions under which the work would be performed and notify General Contractor and Owner of conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected. Commencement of installation shall constitute acceptance of substrate conditions by the installer.
5. WC shall provide accurate to 0.0625 inch; field measurements for custom shade fabrication on the Roller Shades manufacturers input forms.
6. WC Installer shall install roller shades level, plumb, square, and true according to manufacturer's written instructions, and as specified here in. Blocking for roller shades installed under the contract of the interior General Contractor shall be installed plumb, level, and fitted to window mullion as per Architect's design documents and in accordance with industry standard tolerances. The horizontal surface of the shade pocket shall not be out-of-level more than 0.625 inch over 20 linear feet.
7. Shades shall be located so the shade band is not closer than 2 inches to the interior face of the glass. Allow proper clearances for window operation hardware.
8. Adjust, align and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
9. Installer shall set Upper, Lower and up to 3 intermediate stop positions of all motorized shade bands, and assure alignment in accordance with the above requirements.
10. WC shall certify the operation of all motorized shades and turn over each floor for preliminary acceptance.
11. The WC shall participate and cooperate with the electrical contractor, the window shade manufacturer and the Commissioning agent to verify and certify the installation is in full conformance with the specifications and is fully operational. This work to occur during the commissioning stage and is in addition to preliminary acceptance required for each floor.

12. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

13. WC shall train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

14. Protect installed products until completion of project.

15. Touch-up, repair or replace damaged products before Substantial Completion.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.05 CONSTRUCTION WASTE MANAGEMENT

A. Manage construction waste in accordance with provisions of Division 01 Section "Construction Waste Management and Disposal."

END OF SECTION
SECTION 28 31 00

FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.01 DESIGN REQUIREMENTS

A. Provide a microcomputer based system using multiplex techniques for alarm reporting, central monitoring, signaling, and selection of audible and visual signal circuits. The fire alarm system should be capable of making reverse 911 messages and emergency announcements. The fire alarm subcontractor should work closely with the campus Information technology department working through the University Project Manager to make this work.

B. Provide individually identified fire alarm sensors; pull stations, indicating devices, and compatible monitor and control devices. Provide a unique address for each device, with operator-assigned English language descriptor.

1. The system shall include the following major components
   a. Fire Alarm Control Panel (FACP)
   b. Fire Alarm Annunciator Panel (FAAP) and LCD Display.
   c. Fire Alarm Voice/Evacuation Panel (FVEP)
   d. Fire Alarm Computer Terminal (FACT) – FACE refers to the individual building and University Police Building FACT.
   e. Fire Alarm System Printer (FAP) – If building type requires a Fire Command Center.
   f. Fireman Two Way Telephone Panel (FTP) – If required by the building type.

2. Conventional fire alarm initiating devices (smoke detectors, heat detectors, manual stations, water flow and tamper switches, pressure switches) shall each be individually addressable via, and shall report to the FACP.

3. Control relays shall be individually commanded by the system to respond automatically in case of an alarm by related sensors or other devices. Manual control of fans, dampers and required relays shall be provided, as well as automatic control where required by code. Control sequences shall be as indicated on related mechanical systems control drawings.

C. The system shall operate as a low voltage, zone-annunciated Fire Management System and shall include the following subsystems:

1. FACP to monitor addressable initiating and control devices, annunciate the alarm device exact location, initiate alarm and evacuation signals, and capture and recall elevators.

2. FACP and Associated Auxiliary panels shall be provided with Class “A” wiring.

3. Interconnection of FACP, including supervision, shall be via fiber optic (FO) cable between buildings and via copper cable in the buildings. Coordinate FO cable requirements with Campus IT Group.

4. All FO transmit and receive modules and required hardware shall be integral with associated fire alarm equipment.
D. Provide UL listed system. If required as a condition requisite to establishing UL listing of the entire installation as a system, the Contractor shall arrange for, and pay all costs associated with, any required off-site or on-site review, supervision, and/or inspection which may be required for gaining such UL listing.

E. Conform to the following NFPA requirements:
   1. Initiating Device Circuits (IDC) shall be Class B
   2. The Signaling Line Circuits (SLC) shall be configured as follows:
      a. Class A for signaling line circuits connecting intelligent devices to the FACP.
      b. Loss of connectivity between FACP and the facility’s Central Control FACP shall not hamper functions of the fire alarm system within the building.
   3. The Notification Appliance Circuit (NAC) shall be Class B

F. ANSCHUTZ MEDICAL CAMPUS SYSTEM LAYOUT
   1. General:
      a. All campus buildings will be equipped with a FACP. Locate near the main entry and a FVEP located near the FACP per the building design, for all non high-rise buildings.
      b. Each FACP shall be networked into the campus network and accessible from the Campus FACT. Any FVEP shall be accessed from the Campus FCC FVEP microphone and/or the Campus Police Station FVEP microphone.
      c. One FACP and FACT in one university high-rise building FCC and one university high-rise building FCC will be designated alternate locations for the Campus FCC FACP. All information residing in the FACP/FACT of the Campus will be duplicated at these two locations.
      d. A FACT with FAP or a FAAP with LCD indicating building in alarm shall be located at the University Police Building. The Police Station shall be capable of accessing any FVEP via local microphone.
      e. Every building will be equipped with a weatherproof speaker/strobe located at each exterior door.
      f. Include the Following Front Panel Controls:
         1) Each floor shall have a disable button
         2) Disable all
         3) Elevator disable
         4) Fan/shut-down disable
         5) Pager disable
         6) Door disable
         7) Separate speaker and strobe disable
         8) Manual page by floor
         9) Amplifier test tone button

G. Provide interface with the Building Automation System to report all “alarm” and “supervisory” actions. Refer to Division 23.

1.02 PERFORMANCE REQUIREMENTS

A. General:
I. Normal operator interface, through the FACP located in each individual building where required, and at the designated FACT located in the Anschutz Medical Campus University Police Building in the Police Dispatch. All system early-warning pre-alarm, alarm, and trouble messages shall be annunciated on the FACT in a color-graphic format with English language descriptors.

B. High-Rise Buildings.
   1. The fire alarm sequence of operation shall be in accordance with the requirements for high-rise buildings, including but not limited to the following:
      a. The alarm and activate the strobes for the floor in alarm and the floors above and below.
      b. Initiate stair pressurization and pressurization of the floors above and below the floor in alarm.
      c. Release of stair, held-open doors, and re-entry doors.
      d. Upon activation of the elevator, elevator shafts, or elevator lobby detectors, recall the elevators to the main exit level or alternate floor.
      e. Activate refuge area communications link.
      f. Annunciate the alarm to the building FACP, and FAAP, and to University Police FACT.
      g. Annunciate the alarm condition and location to the building FAAP and local floor FAAP.

2. The Command Center of the High Rise Buildings shall also be equipped, under another contract, with the following remote status/control panels:
   a. Buildings electrical distribution system.
   b. Building fire pump.
   c. Elevator status and control panel.
   d. Building voice paging system and/or voice evacuation system (i.e., Office Building) via zone interface panel and microphone.
   e. CCTV system monitors and keyboard.
   f. Smoke control panel.
   g. Generator control panel.

3. The FD will use these panels for viewing or controlling each of the above systems.

C. The FD will respond to the FACP of the building in alarm and to the Campus Police. The Campus Police FACT shall be automatically activated into the graphics mode to show the current status of all devices in alarm. The FD will take command of the Building's FACT to monitor the current response to the fire alarm condition. Using a "mouse driven" graphic menu, the FD shall be able to "zoom in" or "zoom out" of the graphic screens to view the current alarm condition.
   1. The FD will use the building's FCC PC graphic system to view and control the response of the fire alarm system by viewing special graphic screens such as:
      a. A smoke control system status and control screen.
      b. Any building within the complex connected to the fire alarm system.
      c. Any preprogrammed screen existing within the fire alarm system.
      d. Or other specialty screens that may be created at the request of the university Facilities Operations.
2. Using the assigned FD Identification Code (ID password), the FD may use the FCC PC to alter the preprogrammed fire fighting response to the present alarm condition. A printer will provide hard copy documentation of all alarm conditions, ID password log on commands, and the system response to the specific fire alarm condition.

D. The Campus Control Center fire alarm computer will provide monitoring and secondary back up of the fire alarm computers located in the various fire command centers. If an equipment trouble alarm is initiated from a fire alarm device, it shall be reported at the FCC FACP of the building in alarm and the Campus Control Center PC.

E. If a fire alarm condition is received and the FD cannot initiate an appropriate response from the building's FCC PC (i.e., fire in the Buildings' FCC room, or a failure of the FCC PC), then an override ID password command can be used by the FD to make any system PC the primary PC for the manual fire fighting override response. The selected PC shall be able to alter a building's preprogrammed response to the alarm condition. The selected PC shall be able to access and control all PC graphic screens that reside within the system.

F. It shall be possible for all authorized personnel, using the proper ID password, to place the facility into smoke control operation through the graphic screens from the University Police (FACT), or the Building's FCC FACP.

G. Automatic Actions:
   1. Activation of an alarm-initiating device, as specified herein shall cause the following:
      a. Annunciation of the alarm condition, type, and device address at the FACP, FACT and FAAP in a LCD format at the building FAAP. An audible signal shall sound and the alarm condition shall flash until acknowledged. The alarm condition and its location shall also be displayed at the University Police FACP, FACT, and FAAP per the building design.
      b. The appropriate audio and visual alarms shall be transmitted throughout the building in alarm or to predetermined zones of the building in alarm.
      c. Disable the elevator call system and recall the elevators to the level of discharge exit or to the alternate floor.
      d. Initiate smoke control procedures and functions automatically (position dampers and control fans) from the building FACP.
      e. Release self-closing fire and smoke doors in specified control zone when the system goes into alarm.
      f. Provide control relay at each access control panel to unlock all secured doors in activated control zone. Guidelines and Design Standards
      g. Provide digital paging notification to select university personnel as determined by the University Project Manager.
   2. Provide smoke detector circuits with alarm verification with field-adjustable time from 0 to 60 seconds. Only verified alarms shall initiate the specified sequences.
   3. Activation of a sprinkler valve supervisory switch shall initiate supervisory alarm at the corresponding building FACP, FAAP, FACT, and FAP and initiate a supervisory alarm signal at the University Police FACT. Supervisory alarms shall be differentiated from a trouble condition on the circuit.
4. A break in the initiating circuit or detector power wiring shall be annunciated as a trouble condition on the building FACP and the University Police FACT.

5. A break in the audio/visual circuit wiring shall be annunciated as a trouble condition on the building FACP and the University Police FACT.

H. Failsafe Operation: To increase the system's ability to survive damage from fire, malicious or accidental damage, premature component failure, etc., the fire alarm system shall provide the following functionality:

1. Each building FACP shall operate in a stand-alone manner, independent of any other FACP or FACT. The building FACP shall contain the complete data file for all connected devices, regardless of the building, and shall operate the same way whether connected to any other FACP or FACT. This includes:
   a. Annunciation of device address and condition. One hundred percent of all connected devices shall be capable of operating for alarm simultaneously.
   b. Logical Point Grouping annunciation and control. Each Logical Point Group shall contain up to 15 physical points and shall be capable of initiating a sequence of control actions.
   c. Event-initiated control, signaling and/or annunciation sequences. One hundred percent of all connected devices shall be capable of being operated simultaneously.
   d. Priority display of multiple alarms.
   e. Complete supervision of all connected devices with no degraded operation.
   f. Complete reset capabilities at FACP and FACT.

2. Standby batteries capable of operating the FACP, FACT (except those supported by non-interruptible power supply systems), FAAP, FVEP, smoke detectors and alarm horns, strobes, secondary PC terminals, video display units and printers, shall be provided to automatically back up the emergency power source. The system shall have the capacity to operate FACP, as required per NFPA PCs for two hours, and then operate the fire alarm indicating devices for at least 15 minutes, per NFPA requirements. When commercial power is restored, the system shall transfer automatically to primary power. System power supply shall be equipped with battery charging circuits sufficient to recharge fully depleted batteries to within 70 percent of their maximum capacity within 12 hours.

3. System operating software and data file shall be resident in nonvolatile memory. Loss of power, momentary or for a sustained period shall not require reloading of the software.

4. All plug-in circuit boards shall be electrically supervised to assure that the proper board is in the proper position. Systems that use electrical continuity to supervise the presence of plug-in boards, but that do not assure that board positions have not been exchanged, shall provide additional means for the specified supervision, beyond that provided by locking covers.

5. The FACT shall be provided with battery backup or individual dedicated UPS.

I. Color code and minimum wire sizes for the fire alarm system as follows:
   1. All wire is solid copper:
   2. All insulation colors shall be continuous for the full length of the wire.
3. Wire Jackets shall be stamped with the “Circuit Type” designation or shall have an affixed label designating the “Circuit Type” every twenty lineal feet at a minimum.

<table>
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<tr>
<th>Circuit Type</th>
<th>Colors</th>
<th># Of Conductors</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiating Circuits</td>
<td>(+) Red (-) Black</td>
<td>2</td>
<td>I8 (THHN)</td>
</tr>
<tr>
<td>Signaling Circuits</td>
<td>(+) Red (-) White</td>
<td>2</td>
<td>I6 Twisted</td>
</tr>
<tr>
<td>Speaker Circuits</td>
<td>(+) Orange (-)</td>
<td>2</td>
<td>I4 Twisted</td>
</tr>
<tr>
<td>Strobe Circuits</td>
<td>(+) Yellow (-) Blue</td>
<td>2</td>
<td>I4 Twisted</td>
</tr>
<tr>
<td>Fire Fighter Phone Circuit</td>
<td>(+) Red (-) White</td>
<td>2</td>
<td>I4 Twisted/Shielded</td>
</tr>
<tr>
<td>Fire Fighter Phone Riser Circuit</td>
<td>(+) Red (-) White</td>
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<td>I4 Twisted/Shielded</td>
</tr>
<tr>
<td>RS-485 Circuit</td>
<td>(+) Blue (-)</td>
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</tr>
<tr>
<td>Damper Control</td>
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<td>I4 THHN</td>
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<td>AHU Shutdown Circuit</td>
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<tr>
<td>24VDC Power Circuit</td>
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<tr>
<td>Fire Alarm Remote Light Circuit</td>
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<td>Speaker Phone Cut Out Circuit</td>
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<td>Low Level Audio Riser Circuit</td>
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<td>High Level Audio Riser Circuit</td>
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<td>Door Holder Circuit</td>
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<td>I4 Twisted</td>
</tr>
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</table>

J. Intelligent Features:
1. The following additional features shall be provided:
   a. The fire alarm detector cleaning shall be annunciated at the FACP as a trouble condition by the device.
   b. Dual Alarm threshold for day or night settings.

K. Interface With Other Systems:
1. Interface design of fire alarm system with closed circuit television (CCTV) system and FO signal transmission system.
2. The Electronic Security Department (ESD) will provide software to interface with the CCTV and fire alarm systems. CCTV and fire alarm manufacturers shall provide software protocol, for their systems, to ESD.
3. Consultant may purchase copy of specifications for interfacing systems from the university for the purpose of determining interfacing requirements.
4. Interface voice notification with the campus RAV system.

1.03 SUBMITTAL
A. Provide shop drawings as follows:
   1. Floor plans with device layout, address and wiring.
   2. FACP layout.
   3. Riser diagrams.
   4. Battery calculation.
   5. Sequence of operation
   6. Equipment cut sheets
   7. FAAP layout.

B. CADD generated layouts for FACT screen graphics.

C. Operating and Maintenance Manuals.

D. Project Record Documents:
   1. Prior to submittal of the as-built documents, submit a complete package of shop
drawings to the university Facilities Operations Fire and Safety office for review.
Drawings shall include floor plans and graphic maps for each building and/or floors.
   2. Submit record documents in accordance with the requirements of Section 01 78
39 and the following:
      a. As-built point-to-point wiring diagrams depicting every device, including correct
university room numbers.
      b. Revised schematic, wiring, and interconnection diagrams of all circuits, internal
and external, for all equipment installed and exact locations for all devices.
These schematics shall include the conductor color-coding and terminal number
identification system, location of all terminal boxes complete with numbering
and each device address.
      c. Complete, as-installed, riser diagrams indicating the wiring sequence of all alarm
initiating devices, supervisory devices, and all signaling appliances on all
signaling circuits.
      d. A complete description of the system operation, including a schedule of relay
abbreviations used on the drawings, list of relay functions, and the sequence
of relay operation during supervisory trouble and alarm conditions.
      e. Complete wiring and control diagrams for control and shutdown circuits for fan
systems.

1.04 QUALITY ASSURANCE

A. Manufacturer: Company specializing in Intelligent Fire Management Systems.

B. Installer: Company with certified personnel specializing in smoke detection and fire alarm
systems with five years’ documented experience as a fire alarm installing contractor.
C. Fire Management system installer shall keep all smoke heads in the building covered until final building turn over. Failure to comply will mandate a complete cleaning of the individual heads on the system.

PART 2 - PRODUCTS

2.01 MANUFACTURERS
   A. Edwards System Technology (Sole Sourced)

2.02 APPROVED INSTALLERS
   A. Metroplex Control System (MCS) – 6950 South Tucson Way, Unit D, Centennial, CO 80112, (720) 875-0303.
   B. Advanced Electronic System – 801 Main Street, Windsor, CO 80550, (970) 686-6200
   C. FAS (Fire Alarm Services) – 4800 W 60th Ave, Arvada CO, 80003 (303) 466-8800
   D. Meridian Fire and Security – 7173 S. Havana St Ste 400 Centennial CO, 80112 (303) 790-2520
   E. Other Edward System Technology installers will be considered if they have successfully completed 3 similar projects (in size and complexity) in the past 5 years in the Denver Metro area. The installer must have a demonstrated ability to provide ongoing service to any system it installs. Alternate installers must be approved in writing by the University Project Manager through Facilities Operations 5 working day prior to Bidding on the project. Installers should be NICET certified.

2.03 MATERIALS, GENERAL
   A. All equipment and materials used shall be standard components, regularly manufactured, and regularly utilized in the manufacturer's system.
   B. All systems and components shall have been thoroughly tested and proven in actual use.
   C. All equipment shall be listed and labeled by Underwriters Laboratories.
   D. All sensors shall be of the intelligent type and shall mount on a common base. This base shall be incompatible with conventional detectors.
   E. Where equipment of different manufacturers is used, such equipment shall be included under the required over-all UL system listing as a component of the integrated fire alarm system.
F. The system shall be designed to operate with unshielded wire, to the maximum practicable extent. Shielded wire may be used. FO cable shall be utilized, as required or as indicated by the design documents.

G. FACPs shall be provided with tamper switches on cabinet doors to protect against unauthorized access to internal devices. The panel shall provide commandable outputs, which can operate relays or logic level devices.

H. Memory data shall be contained in EEPROM non-volatile memory. If non-volatile battery-backed RAM provides memory, removal of the board shall not cause loss of memory contents.

I. The Fire Alarm annunciator panels shall be LCD types.

J. Site Specific Customizing Software:
   1. General:
      a. Provide software and Programs with technical support and training for the university’s Facilities Operations staff during installation of system and completion.
      b. Alarm display shall include, as a minimum:
         1) Indication of alarm condition, i.e. ABNORMAL OFF, HI ALARM/ LO ALARM, analog value or status, and English group and point identification such as "SMOKE DETECTOR BUILDING “A” - 2ND FLOOR-ROOM 202".
         2) A discrete per point alarm action taking message, such as "CALL MAINTENANCE DEPT. EXT 556!", of up to 480 characters.
      c. System shall automatically transmit alarm and troubles to selectable university pagers via a commercial carrier such as "AT&T Wireless".
      d. The network routing properties for a panel's common controls determine which panels will respond when an operator presses the corresponding control command switch (Reset, Alarm Silence, Panel/Trouble Silence, Drill, Alternate Sensitivity) on the 3-LCD module.
         Only the panels defined in the selected network routing group will respond to the command. Any building connected by a bridge or other structure shall annunciate to its opposite number(s) alarm, supervisory, and trouble conditions via single LEDs on its front panel.

   2. Point summary reports:
      a. Point summary reports shall include the current value/status and condition.
      b. Trend reports shall allow the operator to randomly select logical arrays of points.
      c. Dynamic trends shall provide up to six points and show real time activity of the associated points.
      d. Alarm reports shall be automatically issued.
      e. A custom report capability shall be provided to allow the user to format reports of any mix of text, points with status/value and descriptors, and points with status/value only.
K. Fire Alarm System Devices:
   I. General:
      a. Each device shall be assigned a unique address. Address selection by jumpers is not acceptable. Devices which take their address from their position in the circuit are unacceptable. It is preferred that the address of the intelligent device be part of the device base rather than the device itself.
      b. Devices shall receive power and communication from the same pair of wires. For fault-tolerant circuits, any separate power wiring shall also be made fault-tolerant.
   2. Analog Sensors (Photoelectric and Thermal):
      a. Each sensor shall contain an LED, which blinks each time it is scanned by the FACP. The sensor LED is to remain illuminated to indicate alarm. All sensors not visible from the corridor shall have a remote light mounted in the corridor as shown on the drawings.
      b. Each sensor shall be capable of being tested for alarm via command from the FACP or FACT. The values of the sensor shall be displayed at building FACP and FACT, and the University Police FACT.
   3. Monitor Modules:
      a. The Monitor Module shall provide an addressable input for N.O. or N.C. contact devices such as manual stations, water-flow switches, sprinkler supervisory devices, door contacts, intrusion detectors, etc.
      b. The Module shall mount in a standard electrical box.
   4. Control Modules:
      a. The Control Module shall provide an addressable output for a separately powered alarm-indicating circuit or for a control relay.
      b. The relay contacts shall be SPST (Form "C" rated at 2 amps at 28V DC).
      c. The module shall mount in a standard electrical box.
      d. Control voltage’s connected to intelligent control relays shall not exceed 24VAC/24VDC. Isolation relays shall be used on control voltages on excess of 24VAC/24VDC.
   5. Fault Isolator Module (only if approved by the University Project Manager):
      a. The Fault Isolator Module shall detect and isolate a short-circuited segment of a fire-alarm loop.
      b. Modules shall be placed on every floor to limit the number lost addressable devices in case of a short-circuit on the intelligent circuit.
   6. Intelligent manual pull stations shall be single action, mounted on standard electrical box.
      a. For public places, use single action pull stations with "Stopper II" cover.
   7. Magnetic door holders shall be wall- or floor-mount on a standard electrical box.
   8. Linear beam smoke detectors shall have cross-zone capabilities and be provided where shown on the drawings. Detectors shall consist of a transmitter and receiver unit utilizing infrared light to detect smoke between the units. These detectors shall have discriminating circuitry to differentiate between actual smoke, momentary blockage of the beam, and long-term blockage.
a. Contractor shall provide a weatherproof enclosure for each pair of devices, utilizing transparent panels to allow light transmission. Ensure range of detector is adequate to compensate for passage through this glass.

L. Other Devices:
I. Speaker/Strobes:
   a. Strobes shall be synchronized.
   b. The speaker shall provide for minimum sound level of 95 dBA at 10 feet.

2. Analog Air Duct Detectors:
   a. Duct detectors shall be mounted exterior of duct with air sampling tube. Program duct detectors for supervisory indication only.
   b. Provide fire alarm remote light red LED, mounted on a standard plate fitted to a standard electrical box. When device is not visible, labeled plate with the name of the device served.
   c. Fire alarm remote light/test switch combination shall be utilized for each duct detector. The device shall have a red LED and two positions test switch mounted on a standard plate fitted to a standard electrical box. Plates shall be labeled with the name of the equipment served.

3. Tamper Switches: Installed under Division 2l.
4. Flow Switches: Installed under Division 2l.
5. Sprinkler Pre-action Solenoid and Deluge Valves: Installed under Division 2l
8. Relays provide addressable control and/or monitor module for each device indicated in paragraphs P. 3, 4, 5, 6 And 7 above. Include wiring to the device and to the fire alarm loop as required.
9. Provide control relays as required to accomplish functions such as fan shutdown, damper positioning, door release, etc.
10. Fire/Smoke dampers and smoke dampers will be provided under Division 23. The 24V wiring, including low voltage transformer P.E. switch, will be provided under Division 23. The 120V AC wiring will be provided under this section.

II. Voice Evacuation Speaker/Strobe units shall be UL listed for use in voice evacuation systems.
Audible and visual indications shall operate independently or in unison.

I2. Animal Care Facilities
   a. Provide “Silentone” horns or approved equal throughout all animal care facilities. Provide red lensed strobe in animal holding rooms.
   b. Provide speakers in the office areas of the animal facility.

M. Special System Requirements:
I. The communications board shall include two FO transmit and two FO receive modules mounted as an integral part of the board. Detached FO transmit and receive modules will not be permitted. All FO transmit and receive modules shall include automatic gain control.

N. FO Jumper Cable:
1. Provide plenum-rated FO cable, tight buffer type, with attenuation less than 3.5 dB/Km at 850 nm.

2. Jumper shall consist of two type ST connectors and the required length of 50/125 or 62.5/125 micron FO cables. Jumper cable to match trunk system cable to which the FACP is to be connected to.

3. Connectors shall meet or exceed the following requirements:
   a. Attenuation: < 1.0 dB at 850 nm per mated pair.
   b. Durability: < 0.2 dB increase in attenuation per 1000 matings.
   c. Operating temperature: -40° to +60°C.
   d. Connector construction shall incorporate ceramic ferrule, nickel-plated zinc housing and estane boot.

O. Voice Evacuation System:

1. The Contractor shall provide all work required for installation of a Voice Evacuation System for the buildings indicated by the drawings. Scope of this Contractor's work will be as described by this section of the specifications and as shown on the drawings.

2. Buildings that are defined as high rise shall have the following: An Audible Alarm on the floor where that event is detected and a general message to all other floors stating, “A fire Alarm has been detected on (indicate floor number). Remain alert and evacuate if there are indications of fire. If no danger is noted, you may await further instruction. Elevators have been recalled to level I (or alternate floor if the fire alarm is on level I) until the fire alarm is over.”

3. Fire Alarm Voice Evacuation Panel (FVEP):
   a. The FVEP shall be located in conjunction with the FACP and shall provide evacuation signals, pre-recorded fire alarm messages, and one-way communication (paging) on a selective.
   b. FVEP equipment shall include the following:
      1) Voice paging, hand-held, push-to-talk microphone with dynamic noise canceling. Frequency response shall be flat within + 3 dB from 200 to 5,000 Hz.
      2) Zone paging selector switches and LED's, with one selector switch and two LED's provided for each speaker zone.
      3) "Manual Fire Evacuation Tone" switch and LED.
      4) "Silencing" fire evacuation tones (self-restoring switch) and LED.
      5) "Pre-recorded Message" switch and LED.
      6) "All Call", switch and LED, with the switch enabling the operator to simultaneously page all speaker zones on both risers.
      7) Reset switch.
      8) Lamp test switch.
      9) "Page" LED, which will light when the paging microphone is used.
      10) The FVEP shall also be equipped with LED's to indicate trouble conditions for the following:
          a) Each individual speaker zone.
          b) Amplifier, preamplifier, fire tone, pre-recorded messages, and voices paging
      11) All switches and LED's shall be clearly identified with engraved labels.
Each group of LED's shall have distinctive colors, such as:

- Fire Tone - Red
- Silence - Yellow
- Page - Green
- Trouble - Yellow
- Pre-recorded Message - Red

c. The fire evacuation signal shall be applied to any specific zone automatically from the FACP or FACT, or shall be selected manually by the speaker zone switch.

4. FVEP Audio Cabinet:
   a. 100% redundant tone generators, preamplifiers, and amplifiers shall be provided.
   b. The audio trunk shall be electronically supervised and shall be automatic switchover from one audio signal path to the other.
   c. Each amplifier module shall be provided with two 40-watt amplifiers, and shall power a minimum of 8 speaker zones.
   d. Pre-recorded message shall be programmed and recorded in a memory chip. Tape cassette players are not acceptable.
   e. The FVEP audio cabinet shall be capable of remote "All Page" activation via local microphone from the University Police Station. The system shall allow the selection of individual building or "All" buildings for "Disaster Messages".
   f. Provide capability of testing and adjusting audio amplifier outputs. Provide test switch at the FACP.

P. Spare Parts: Refer to Section 01 78 46 – Extra Stock Materials.

PART 3 - EXECUTION

3.01 INSTALLATION – FIRE ALARM

A. Fire Alarm layouts:
   1. General:
      a. Provide a fire alarm system for each building.
      i) Actual detection required per building shall be determined by National codes, Local codes and the university CBO, whichever is more stringent.
      b. Provide shunt trip circuit breaker for connection to elevators with sprinkle red shafts.
   2. Regardless of building occupancy rating, the following areas shall be provided with detection:
      a. Laboratories
      b. Electrical Rooms
      c. Mechanical Rooms
      d. Telecommunications Rooms
      e. Data Centers
      f. Dedicated Storage Rooms
      g. Kitchens
   3. In general, the following type of detection shall be provided in each type of room:
a. Photoelectric Smoke Detection:
   1) Electrical/Telecommunication Rooms
   2) Office Corridors (except where sprinkled)
   3) Offices (except where sprinkled)
   4) Laboratories
   5) Mechanical Ducts
   6) Elevator Shafts/Machine Rooms
   7) Dedicated Storage Rooms
   8) Linear Equipment Rooms

b. Thermal Detection:
   1) Restrooms
   2) Mechanical Rooms
   3) Kitchens/Break rooms
   4) Environmental Services (Janitor) Rooms
   5) Elevator Shafts/Machine Rooms
   6) Generator Rooms
   7) Autoclaves

c. Flame Detection:
   1) Generator Rooms

4. Provide control module at each access control panel for interface with access control system.

B. Installation shall be supervised and tested by the manufacturer of the system equipment.

C. Low Voltage/Wire and Cable: All LV/W&C shall be run in conduit in floors, walls and non-accessible spaces. In hallways, LVW/C can be run in bridle rings attached to the common telecom and other low voltage system cable tray. LV/W&C must be run in a conduit sleeve, minimum 2” dia. with plastic bushings, from the point it leaves the bridle ring on the cable tray to the interior side of a room. Once the LV/W&C enters the room it can be supported from bridle rings or j-hooks. Wiring shall comply with Division 27 and approved NEC.

D. Low Voltage/Wire and Cable and Hallway Devices: LV/W&C running from the cable tray to devices in the hallway shall be protected by plenum rated flexible sleeving or flexible metal conduit. LV/W&C in sleeving or flexible metal conduit shall be supported per NEC and installed with UL approved connectors and plastic bushings on both ends.

E. Outlet pull and junction boxes shall be painted red on the exterior.

F. Devices: Locate devices per ADA standards

G. In construction areas where there is existing equipment, the equipment must be protected during construction and the devices taken off line to eliminate false alarms. All devices associated with modifications to an existing system must match existing devices.

H. Contractor is liable for damage. The university must be notified at the completion of each project to ensure that the system is returned to normal.
I. If room numbers are changed or new room numbers established, the University Project Manager must be notified before implementation so that the system can be re-programmed and is accurate in the event of an alarm.

J. All devices mounted in ceiling tile to be supported by T-bar hanger bracket and appropriate box. Plaster ring is not acceptable.

K. Labeling:
   1. Observe the university fire alarm color code guide.
   2. Label each splice with correct information.
   3. Label each initiating device with correct device address. Use Kroy labeler or equal.
   4. Final, correct university room numbers (not design/construction room numbers) must be provided for correct programming.
   5. All detectors to have factory dust covers installed until after the final inspection and clean up is complete.
   6. All duct detectors to have individual remote LED/test stations installed. Mount at 6'-0" AFF in main corridor adjacent to area served. Label as directed by the University Project Manager.
   7. All shielded wiring to be bonded together at each device and insulated from contact with the conduit or box.
   8. All equipment and associated wiring removed from service will be returned to the University Project Manager for proper disposal.
   9. Avoid locating detectors above countertops and/or shelving.
  10. Locate detectors at least eight feet from supply or return air diffusers.
     11. Use fixed heat detectors near autoclaves and steam sterilizers.
     12. Mount remote lights for room detectors above door to corridor, centered.

L. Construction Requirements:
   1. Integrity of Structure: Do not drill or pierce structural members without prior approval from the University Project Manager and Structural Engineer.
   2. Penetration of Walls, Etc.: Fire caulks or seal all penetrations made through walls, floors, and ceilings around the conduit. Maintain the integrity of fire ratings within the structure. Where visible, paint to match surface.
   3. Wherever possible, install conduits and raceways in a concealed manner, except at surface-mounted cabinets.
   4. Access to Existing Facilities: Install all conduit and pull boxes to maintain or provide access to existing valves; covers to existing pull boxes; wire ways or access doors; electrical outlets; switches; motors, etc.
   5. Support bridle rings/"J" Hooks independently from structure, may have separate point of attachment to cable tray.
   6. No other wiring or systems to be installed with fire alarm.

M. Prior to start of construction, disable existing fire alarm devices, as necessary. A minimum of two working days notice, prior to construction, shall be coordinated through the University Project Manager.
3.02 TESTING, CLEANING AND CERTIFICATION

A. When installation is complete, system shall be tested in accordance with NFPA72 requirements. A representative of the system manufacturer shall submit a written report of the findings to the A/E with copy of to the FD. System testing shall include, at the least, verifying the following:

1. The functional operation of each re-settable initiating device (manual stations, detectors, etc.) and circuit.
2. All notification appliances shall be tested for a minimum of ten minutes under normal alarm conditions.
3. The functional operation of each and every alarm device and circuit.
4. The functional operation of each monitored device circuit.
5. The functional operation of each control circuit, including fan controls.
6. The supervision functions of each initiating, indicating, monitoring, control and supply circuit.
7. Control station automatic signaling.
8. That all software protocol, access codes and operation instructions have been supplied.
9. All installed or modified fire alarm systems for remodels or new projects shall be tested and certified by a Factory Representative. Upon a system test completion a “Letter of Certification” shall be issued to the university.

B. All testing and verifications shall be conducted in the presence of the university Facilities Operations Fire and Safety personnel.

C. There shall be an operational test by the FD.

3.03 COMMISSIONING (DEMONSTRATION)

A. The equipment supplier shall provide a minimum of 8 hours of system training for the university Facilities Operations personnel training for each new system.

END OF SECTION