

Table of Contents

Division 00 – Procurement and Contracting Requirements

00 10 00 – General Instructions to Design Teams

Division 01 – General Requirements

01 74 19 – Construction Waste Management and Disposal

01 77 00 – Closeout Procedures

01 81 10 – High Performance Building Standards

01 81 13 – Sustainable Design Requirements

01 81 13.01 – Attachment 01

Division 02 – Existing Conditions

02 41 10 – Demolition

Division 03 – Concrete; not used.

Division 04 – Masonry; not used.

Division 05 – Metals; not used.

Division 06 – Wood, Plastics, and Composites

06 40 00 – Interior Architectural Millwork

Division 07 – Thermal and Moisture Protection

07 14 13 – Hot Fluid-Applied Rubberized Asphalt Waterproofing

07 52 16 – SBS Modified Bituminous Membrane Roofing

Division 08 – Openings

08 71 00 – Door Hardware

Division 09 – Finishes

09 51 00 – Acoustical Panel Ceilings

09 68 00 – Carpeting

09 91 00 – Painting

Division 10 – Specialties

10 14 00 – Signage

10 28 00 – Toilet, Bath, and Laundry Accessories

10 44 00 – Fire Extinguishers and Cabinets

Division 11 – Equipment; not used

Division 12 – Furnishings; not used

Division 13 – Special Construction

13 10 00 – Design Criteria for Multimedia Classrooms

13 10 00.01 – Attachment 01

13 10 00.02 – Attachment 02

13 10 00.03 – Attachment 03

13 10 00.04 – Attachment 04

Division 14 – Conveying Equipment

14 20 00 – Elevators, Dumbwaiters, and Chair Lifts

14 20 00.01 – Attachment 01

Division 21 – Fire Suppression

21 10 00 – Fire Suppression Systems – General

Division 22 – Plumbing

22 10 00 – Plumbing Systems – General

Division 23 – Heating, Ventilating, and Air Conditioning

23 10 00 – HVAC Systems – General

23 50 00 – HVAC Chemical Cleaning and Water Treatment

23 73 00 – Air Handling Units

Division 25 – Integrated Automation

25 10 00 – Building Automation Systems

Division 26 – Electrical

26 10 00 – Electrical Systems - General

Division 27 – Technology For the below Division 27 Sections, use the following link:

<https://sites.google.com/a/case.edu/its-infrastructure-standards/utech-infrastructure-standards>

27 10 00 – CATV Distribution

27 20 00 – Process for Requesting IT Infrastructure

27 30 00 – Voice Communications

27 30 10 – Wireless Network Implementation

27 30 20 – Distribution and Backbone Fiber

27 30 30 – Network Faceplates and Premise Cabling

27 30 40 – Satellite Equipment Rooms (SER)

27 30 50 – UPS Requirements in Equipment Rooms

Division 28 – Electronic Safety and Security

28 13 00 – Access Control Systems

28 13 00.01 – Attachment 01

28 13 00.02 – Attachment 02

28 13 00.03 – Attachment 03

28 13 00.04 – Attachment 04

28 13 00.05 – Attachment 05

28 13 00.06 – Attachment 06

28 13 00.07 – Attachment 07

28 13 00.08 – Attachment 08

28 13 00.09 – Attachment 09

28 13 00.10 – Attachment 10

28 13 00.11 – Attachment 11

28 13 00.12 – Attachment 12

28 13 00.13 – Attachment 13

28 13 00.14 – Attachment 14

28 13 00.15 – Attachment 15

28 13 00.16 – Attachment 16

28 13 00.17 – Attachment 17

28 13 00.18 – Attachment 18

28 13 00.19 – Attachment 19

28 13 00.20 – Attachment 20

28 13 00.21 – Attachment 21

28 13 00.22 – Attachment 22

28 23 00 – Video Surveillance Systems

28 31 10 – Fire Detection and Alarm Systems – General

28 31 10.01 – Attachment 01

28 31 20 – Fire Detection and Alarm Systems – Demolition

28 31 30 – Fire Detection and Alarm Systems – Equipment

Division 31 – Earthwork; not used.

Division 32 – Exterior Improvements

32 10 00 – Concrete Paving and Surfacing

32 90 00 – Landscaping

Division 33 – Utilities

33 05 00 – Common Work Results for Utilities

SECTION 00 10 00 - GENERAL INSTRUCTIONS TO DESIGN TEAMS

1.1 SUMMARY

- A. These Facility Standards are intended to guide the Design Team as they proceed with the work of their Project. Each member of the Design Team shall review the entire contents of these Facility Standards and assure that their work complies in every way with these guidelines established by Case Western Reserve University and detailed herein.
- B. While the Design Team is encouraged to investigate new technologies and materials, all deviations from these Facilities Standards shall be authorized in writing by the Owner.
- C. These Facility Standards are organized using the 2004 CSI 49 Division Format, and are set up like a Project Manual, with the one exception being that each Section is addressed to the Design Team instead of the Builder, as would normally be the case in a Project Manual.
- D. These Standards do not relieve the Design Team of their responsibility to develop their own Specifications for inclusion with the Contract Documents, nor do they relieve the Design Team of their professional liability as Registered Architects and Engineers under the Ohio Administrative Code, for the design and specification of their Work.

1.2 GENERAL

- A. In each Section herein, general requirements are listed, and if appropriate, Owner preferred manufacturers are listed. The design shall be based around these preferred manufacturers, unless authorized in writing by the Owner.
- B. When designing remodeling project, attempt to match existing equipment whenever possible.
- C. Specifications have been placed in the most frequently used specification Section. If these types of goods, materials or systems need to be specified outside the Section noted, these Facilities Standards shall still be followed, e.g. if faucets are specified with hoods in Division 11, the Facilities Standards for faucets listed in Division 22 shall still be followed.
- D. Assure that the documents allow for the Owner to inspect all work, including materials and workmanship at all times during construction, provided that the Owner shall not unreasonably interfere with the performance of the work by Contractor. Neither the Owner's right of inspection, whether or not exercised, nor any other such inspection, shall relieve the Contractor of their responsibilities for the proper performance of the work.
- E. The General Specification for the CWRU Premise Cabling system shall be included in the final project documents, intact and without editing.
- F. All The Medical Center Company requirements shall be included in the final project documents, intact and without editing.
- G. When Contract/Bidding Documents are between 80-95% complete, Design Team shall deliver the following documents to the Owner. Owner shall have at least two (2) weeks to review these documents and will provide comments back to Design Team for incorporation into the final set of Contract/Bidding Documents.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.1 SUMMARY

- A. Design Team shall provide documentation to assure that Builder conducts construction waste management and disposal in accordance with Owner requirement for LEED Silver Certification and in accordance with this Section.
- B. Section includes administrative and procedural requirements for the following:
 - 1. Construction Waste Management Plan.
 - 2. Salvaging nonhazardous demolition and/or construction waste.
 - 3. Recycling nonhazardous demolition and/or construction waste.
 - 4. Disposing of nonhazardous demolition and/or construction waste.

1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Contractor: The term Contractor shall refer to the entity with a Contract with the Owner to perform the Work, whether that be the Construction Manager, Lead Contractor, or General Contractor.
- C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- E. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- F. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- G. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 QUALITY ASSURANCE

- A. Waste Management Coordinator: Assure that Contractor engages a LEED Accredited Professional, certified by the USGBC, as the Waste Management Coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project. Waste Management Coordinator may also serve as LEED coordinator.
- B. Refrigerant Recovery Technician Qualifications: Assure that Contractor engages a Certified by EPA-approved certification program.

SECTION 01 77 00 - CLOSEOUT PROCEDURES

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Definitions.
 - a. Substantial Completion.
 - b. Punch List.
 - c. Final Completion.
 - 2. Substantial Completion Procedures.
 - a. Submittals Due.
 - b. Procedures Due.
 - c. Request for Punch List Inspection.
 - 3. Final Completion Procedures.
 - a. Correction of Punch List items.
 - b. Re-Inspection.
 - c. Final Application for Payment.
 - 4. All submittals shall include one (1) digital format (PDF, unless specified otherwise) and two (2) hard copies.

1.2 DEFINITIONS

- A. Substantial Completion: That point in time, as determined by the Owner and Design Team, that the Contract Work, or an agreed upon portion of the Contract Work, is found to be completed enough that the Owner may legally occupy the space of the Contract Work and use that space for the purpose for which it was intended. There must be only minor items left to be repaired or installed.
- B. Punch List: A list of items to be completed or corrected before the Contract Work shall be considered Finally Complete.
- C. Final Completion: That point in time, as determined by the Owner and Design Team, when all Punch List items have been resolved to the Owner's satisfaction and the Contract Work is found to be complete and all Contract requirements satisfied.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

- A. Submittals Due: Prior to requesting a Punch List Inspection, Contractor shall prepare/obtain and submit the following items to the Owner, via the Architect.

1. Contractor's List of Incomplete Items: Contractor shall prepare a list of all remaining items to be completed and corrected, indicating the value of each item on the list and reasons why the Work is incomplete.
 2. Certificates of Release: Contractor shall obtain and submit all releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Such releases shall include but are not limited to:
 - a. Occupancy Permits.
 - b. Operating Certificates.
 3. Closeout Submittals: Contractor shall obtain and submit all closeout submittals indicated throughout the Contract Documents. Such submittals shall include but are not limited to:
 - a. Project (Contractor, Subcontractors and Suppliers) Directory.
 - b. Project Record Documents.
 - c. Operation and Maintenance Data.
 - d. Damage or Settlement Surveys.
 - e. Property Surveys.
 - f. Warranties.
 - g. Workmanship Bonds.
 - h. Maintenance Service Agreements
 - i. Maintenance material specified in individual Sections, including but not limited to:
 - 1) Tools.
 - 2) Spare Parts.
 - 3) Extra materials.
 4. Tests/Adjust/Balance Records: Contractor shall obtain and submit all test/adjust/balance records.
 5. Sustainable Design Submittals: Contractor shall obtain and submit all sustainable design submittals required in Division 01 Sections as well as individual Sections throughout the Specification.
 6. Changeover Information: Contractor shall obtain and submit all changeover information related to Owner's occupancy, use, operation, and maintenance.
- B. Procedures Due: Prior to requesting a Punch List Inspection, Contractor shall complete the following procedures and submit written evidence to the Owner, via the Architect, verifying that each procedure has been completed or satisfied.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups,

- 9. construction tools, and similar elements.
 - 10. Complete final cleaning requirements, including touchup painting.
 - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- C. Request for Punch List Inspection: After the above items and procedures have been completed, submitted, and accepted by the Owner, Contractor shall submit a written request to the Architect for a Punch List Inspection to determine if the Contract Work is Substantially Complete.
- 1. Upon receipt of this written request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements that, in their opinion, indicate that the Punch List Inspection would be premature.
 - 2. If the Architect proceeds with the inspection, they will prepare a Punch List of minor items that are unacceptable, incomplete or missing. They will also prepare a Certificate of Substantial Completion indicating that they found the Contract Work to be Substantially Complete with the exception of the minor items contained in the Punch List.

1.4 FINAL COMPLETION PROCEDURES

- A. Correction of Punch List items: Contractor shall correct or complete all Punch List items, to the satisfaction of the Owner, within thirty (30) days of the date of Substantial Completion, unless otherwise agreed to in writing by the Owner.
- B. Re-inspection: When the Contractor has corrected or completed all the Punch List items, they shall submit a written request to the Architect for a re-inspection of the Punch List items to verify that the Contract Work is Finally Complete.
- 1. Upon receipt of this written request, Architect will either proceed with re-inspection or notify Contractor of unfulfilled requirements that, in their opinion, indicate that the re-inspection would be premature.
 - 2. If the Architect verifies that all Punch List items have been corrected or completed, they shall notify the Owner and Contractor in writing of their finding and declare the Contract Work Finally Complete.
- C. Final Application for Payment: If the Architect's re-inspection indicates that the Contract Work has been found to be Finally Complete, then the Contractor may submit their Final Application for Payment.

END OF SECTION

SECTION 01 81 10 – HIGH PERFORMANCE BUILDING STANDARDS

1.1 SUMMARY

- A. In March of 2007, Case Western Reserve University established the following set of High Performance Building Standards. The Architect or Engineer in Responsible Charge shall assure, to the greatest extent practical, that these ideals are goals and strategies are incorporated into the design and construction of all New Construction and Major Renovation Projects on this Campus.
- B. Unless directed otherwise in writing, all renovation and new construction on this Campus shall be designed to achieve USGBC LEED Silver.

1.2 SITE DEVELOPMENT

A. Site Development Goals:

- 1. Build near existing public utilities and street infrastructure; avoid building in environmentally sensitive areas such as wetlands or animal habitats.
- 2. Maintain or restore the ecology of the site.
- 3. Respond to the microclimate such as solar and wind orientation, to improve energy efficiency and comfort.

B. Site Development Strategies:

- 1. Build on sites with existing municipal services.
 - a. Reuse existing, available and appropriate urban and industrial in-fill sites instead of building on environmentally sensitive areas or green spaces.
 - 1) Build on land that was previously built upon and attached to municipal services.
 - 2) Build on land that was not previously built upon but is or was attached to municipal services.
- 2. Maintain and enhance the biodiversity and ecology of sites.
 - a. Assure that development enhances the existing biodiversity and ecology of the site by strengthening the existing natural site systems and making connections to the surrounding site context.
 - 1) Select a site where the development process will cause minimum alteration and ecological disturbance.
 - 2) Design the site to reconnect fragmented landscapes and establish contiguous networks with other natural systems both within the site and beyond its boundaries.
 - 3) Avoid major alterations to significant and/or sensitive topography, vegetation, riparian corridor, and wildlife habitat.
 - 4) Preserve ecologically significant and/or sensitive topography, vegetation, riparian corridor, and wildlife habitat.

- 5) Minimize the area of the site dedicated to the building, parking, and access roads.
 - 6) Increase the size of usable open space on-site, compared to previous site use.
 - 7) Develop the site to create traffic patterns that cause minimum site disruptions.
 - 8) Site the building(s) to create minimal impact on the natural ecology of the site.
3. Use microclimate and environmentally responsive site design strategies.
- a. Develop the site and site elements to optimize site-specific microclimate conditions such as solar and wind.
 - 1) Locate trees and shrubs to support passive heating and cooling in outdoor spaces and buildings, and to create seasonally appropriate heat sinks and natural ventilation corridors.
 - 2) Locate site features such as walks, plazas, patios, etc. to take advantage of seasonal sun angles, solar access, and solar orientation.
 - 3) Locate site elements at the appropriate elevation to maximize heating and cooling benefits, reduce erosion, ensure drainage, and to make pedestrian/vehicular movements safe and coherent.
 - 4) Design the overall site to reduce the “heat island” effect. Provide shade on at least 30% of the non-roof impervious surfaces on the site such as parking, walkways, plazas, etc., use light colored high-albedo materials with at least 30% reflectance, use high-reflectance roofing, and/or consider other related alternatives.
 - 5) Design site lighting to eliminate light trespass from building and site and to minimize impact on nocturnal environments, while always maintaining campus safety.
 - 6) Orient buildings to attain maximum interior benefit of daylight.
4. Use native trees, shrubs, and plants.
- a. Develop site with native, climatically appropriate, vegetation to conserve water, reduce pesticide use, reduce plant mortality, and lower operational maintenance costs.
 - 1) By species, assure that a minimum of 75% of all species planted on the site are Mediterranean Type (low irrigation plants) or native plants.
 - 2) By quantity, assure that a minimum of 75% of all trees and shrubs are native materials.
 - 3) Develop an integrated pest management system to be used to reduce the need for chemical pest control and to reduce site toxicity.
5. Develop the site to encourage the use of resource efficient modes of transportation.
- a. Assure that alternative forms of transportation to the automobile are included in the design of the site to discourage dependence on the automobile, reduce the amount of pavement impacting natural systems, and to allow for more ecologically responsive approaches to the site.
 - 1) When possible, site building(s) within 1/4 mile of bus stops or light rail stations, and within 1/4 mile of retail and public services.

- 2) Provide carpool parking to encourage its use by occupants. Carpool parking, pick-up areas, and covered waiting spaces shall be clearly marked and within close proximity of the building entrance. Work with Campus Services and Parking.

1.3 WATER MANAGEMENT

A. Water Management Goals:

1. Preserve site watersheds and groundwater aquifers.
2. Conserve and re-use storm water.
3. Maintain appropriate levels of water quality on the site and in the building(s).
4. Reduce potable water consumption.
5. Reduce off-site treatment of waste water.

B. Water Management Strategies:

1. Manage site storm water
 - a. Select a site that will require minimum alterations and ecological impacts to the watershed.
 - b. Develop design strategies that minimize disturbances to the watershed.
 - c. Use biologically based storm water management features such as swales; sediment control ponds, pools, and wetlands along drainage courses; and infiltration basins to retain and treat storm water on site.
 - d. Retain and/or maximize pervious and vegetated areas of the site.
 - e. Minimize hardscapes and use permeable paving and surface materials to maximize site water absorption.
 - f. Design pavements and locate them in such a manner as to reduce storm water velocity between pavements and to facilitate water infiltration into the soil.
 - g. Capture rainwater from impervious areas of the building for groundwater recharge.
2. Minimize irrigation and specialty-water use.
 - a. Try to eliminate the need for irrigation through selection of drought resistant plant species and/or use systems that maximize efficient use of water in the landscape.
 - b. If irrigation cannot be eliminated, apply options below that are appropriate to the project:
 - 1) Specify irrigation systems and vegetation that minimizes water consumption such as drip irrigation, and systems with moisture sensor controls and weather data based controls.
 - 2) Use cisterns to collect rainwater for irrigation purposes.
 - 3) Use rainwater for non-potable water uses such as irrigation, toilets, vehicle washing, sewage transport, HVAC/process make-up water, etc.
 - 4) Use re-circulating water in fountains and water displays.
3. Control erosion.
 - a. Prevent soil erosion before, during, and after construction by controlling storm water runoff and wind erosion. Consider silt fencing, sediment traps, construction phasing, stabilization of slopes, and maintain and enhancing vegetation and groundcover.

- b. Protect hillsides using adequate erosion control measures such as hydroseeding, erosion control blankets, and/or sedimentation ponds to collect runoff.
- 4. Conserve building water consumption.
 - a. Design strategies and systems to exceed the building water conservation requirements of the *Energy Policy Act (EPACT) of 1992* (not including irrigation).
 - 1) Use low flow or dual flush toilets. EPACT requirement is 1.5 gallons per flush (gpf) maximum.
 - 2) Use lavatory faucets with flow restrictors for a maximum rate of 0.5 gallons per minute (gpm), or use metering faucets at 0.25 gallons per cycle.
 - 3) Use infrared faucet and flush valve sensors.
 - 4) Use domestic dishwashers that use 10 gallons per cycle or less.
 - 5) Use commercial dishwashers (conveyor type) that use 120 gallons per hour or less.
 - 6) Use low flow showerheads.
 - 7) Use low flow kitchen faucets.
 - 8) Do not use waterless urinals.
- 5. Conserve cooling tower water consumption.
 - a. Select cooling tower systems that maximize water conservation (i.e. automated blowdown systems, conductivity probes, deduct water meters, and delimiters to reduce drift and evaporation).
 - 1) Orient HVAC equipment to permit capture of condensate from AHUs to be pumped into cooling tower sumps as make up water. Where possible, use gravity piping systems.
 - 2) Design piping systems to return condensate from AHUs to cooling towers as make up water. Where possible, use gravity piping.

1.4 ENERGY MANAGEMENT

A. Energy Management Goals:

- 1. Reduce total energy consumption of buildings.
- 2. Reduce air pollution, contributions to global warming, and ozone depletion impacts of energy sources.
- 3. Reduce depletion of fossil fuels reserves.

B. Energy Management Strategies:

- 1. Reduce building energy loads.
 - a. Optimize building placement and configuration for energy performance.
 - 1) Place, orient, and configure the building on the site to minimize energy use by means of daylighting, solar heating, natural ventilation, and shading from vegetation or other buildings.
 - 2) Place, orient, and configure the building on the site to optimize passive solar opportunities for heating, cooling, and daylighting.

- a) Maximize opportunities for daylighting and desired solar heat gain.
 - b) Maximize passive solar gains and/or control unwanted solar heat gain (including the use of existing vegetation, land forms, and buildings to provide shading).
 - c) Minimize thermal losses due to wind-driven infiltration.
 - d) Maximize opportunities for natural ventilation.
- b. Optimize building envelope thermal performance.
- 1) Reduce heating and cooling energy consumption by heat losses or heat gains through the building envelope. Ensure the integrity of the building envelope to provide thermal comfort and prevent condensation.
 - a) Size openings, select glazing, and utilize shading devices (interior or exterior) to optimize daylighting and glare control while minimizing unwanted heat loss and heat gain. Glazing with a high Visible Transmittance (VT) is desirable for daylighting.
 - b) Solar Heat Gain Coefficient (SHGC) and Shading Coefficients (SC) requirements depend on desire for maximizing passive solar heating (higher SHGC) or minimizing heat gain (lower SHGC).
 - c) Install glazing with a low U-Factor to minimize energy use and optimize HVAC equipment requirements.
 - d) Optimize insulation amounts to reduce heating and cooling energy consumption by heat losses or heat gains through opaque portions of the building envelope.
 - e) Moderate interior temperature extremes by using thermal mass where appropriate.
 - f) Ensure the integrity of the building envelope to provide thermal comfort and prevent condensation.
 - g) Use best air/vapor barrier practices and avoid thermal bridging.
 - h) Install roofing technologies which have high albedo levels to reduce “heat island” effect, or vegetative materials to maximize cooling, absorb rainwater, and sequester CO₂.
- c. Provide daylighting integrated with electric lighting controls
- 1) Design building to maximize daylighting. Assure that daylighting is designed in coordination with the electric lighting system to reduce energy consumption while maintaining desired lighting characteristics.
 - a) Shape the architectural plan and section and use appropriate strategies to maximize the amount of useful, controlled daylight that penetrates into occupied spaces (roof monitors, clerestory windows, atriums, and courtyards).
 - b) Use shading devices such as overhangs on south elevations, vertical fins on east and west elevations, and/or vegetation to let in natural light but reduce glare and overheating.
 - c) Use light shelves combined with higher, more reflective ceilings, to bring natural light deeper into perimeter spaces and control glare and excessive contrast.
 - d) Use daylight sensors that adjust electric lighting in response to available daylight.
2. Design efficient systems.

- a. Provide efficient electric lighting systems and controls.
 - 1) Minimize electric lighting energy use while still meeting project requirements and improving visual quality. The electric lighting systems and components are designed for optimum efficiency and human comfort.
 - a) Use high efficiency lamps and luminaires with electronic ballasts.
 - b) Install controls to reduce energy consumption of lighting system (e.g. dimmers, occupancy sensors, photocells, energy management system, and time clocks).
 - c) Use low levels of ambient light with task lighting where appropriate. Direct/indirect lighting fixtures illuminate ceilings and walls producing low level ambient light that minimizes glare in workplaces.
 - d) Lighting power density levels shall conform to current ASHRAE Standard 90.1.
 - b. Maximize mechanical systems performance.
 - 1) Design the building mechanical systems to minimize energy usage while maintaining standards for indoor air quality and occupant comfort.
 - a) Design boilers and chillers using high efficiency equipment, multiple modular boilers (to allow more efficient partial-load operation), and high efficiency condensing boilers.
 - b) Modulate ventilation air according to occupancy, activities, and operations.
 - c) Zone the building to use separate air handling units for areas with different hours of occupancy and loads. Use occupancy sensors or other demand ventilation technologies and variable-air-volume distribution systems to minimize unnecessary heating and cooling.
 - d) Use heat recovery systems, thermal storage (ice or water to reduce peak loads), and desiccant dehumidification to reduce heating and cooling energy use.
 - e) Install glycol based “closed loop” cooling systems for all process cooling loads. These systems should be designed to facilitate free cooling in the winter months and be tied to campus central chilled water in the summer months.
 - f) Use high efficiency motors and variable speed drives in the mechanical system equipment.
 - g) Use zero CFC-based refrigerants in HVAC and refrigeration equipment. Complete a comprehensive CFC phase out conversion.
 - c. Use efficient equipment and appliances.
 - 1) Design and/or select all building equipment and appliances to minimize energy usage.
 - a) Select equipment with high efficiency motors and variable speed drives.
 - b) Select equipment and appliances that meet Energy Star criteria.
 - c) Install steam and water converters to heat and supply service water to building.
3. Use energy sources with low environmental impact.

- a. When possible, use renewable or other alternative energy sources.
 - 1) Consider the application of renewable energy sources such as photovoltaic panels, wind turbines, fuel cells, and geothermal energy to minimize environmental impacts of burning fossil fuels such as air pollution and global warming.
 - a) Where feasible, supply 10% - 30% of the building's total energy load through building-integrated or utility provided renewable or other low impact energy systems.
- 4. Simulate "Total Building Energy Use."
 - a. Integrate all systems and reduce total building energy use.
 - 1) Reduce total energy consumption of building by using computer simulations and analysis of total performance with integrated systems. A building energy analysis is conducted to evaluate and optimize the building energy performance.
 - a) Building energy consumption should meet or exceed the requirements of current, applicable ASHRAE Standards.

1.5 INTERIOR ENVIRONMENT QUALITY

A. Interior Environment Quality Goals:

1. Design/Engineer environments that enhance human comfort, well-being, performance, and productivity.
2. Minimize production and transmission of air pollution.
3. Provide the full range of supportive sensory conditions, olfactory, thermal, vibroacoustic, tactual, and visual for occupants.
4. Provide appropriate operational control of systems to occupants.

B. Interior Environment Quality Strategies:

1. Provide good indoor air quality.
 - a. Provide for a clean and healthy environment.
 - 1) Provide good indoor air quality by minimizing and controlling air pollution from the site and surroundings.
 - a) Minimize air pollution from the building site by analyzing and/or testing to identify potential sources of air pollution using current, applicable ASHRAE Standards.
 - b) Work with the Owner to eliminate as many pollutant-generating activities from the building as feasible. If they must occur within the building, they should be zoned to an isolated area of the building having a separate ventilation system. Use low VOC emitting materials.
 - c) Clean the air with filtration systems that meet or exceed the efficiency ratings of the current, applicable ASHRAE Standards.

- b. Control moisture to prevent microbial contamination.
 - 1) Provide good indoor air quality by controlling moisture and microbial contamination. Where moisture precautions are needed, materials should be specified to discourage microbial growth. Mechanical systems shall be designed in compliance with current, applicable ASHRAE Standards and recommendations for prevention of standing water. Where a cooling tower has been used it shall be designed in compliance with current recommendations and specifications for the prevention of Legionnaires Disease.
 - c. Provide proper ventilation for pollutant control and thermal comfort.
 - 1) Design mechanical systems to provide proper ventilation to maintain indoor air quality free from particulates, VOCs, and fumes.
 - a) Design and engineer ventilation systems to comply with current, applicable ASHRAE Standards for Ventilation for Acceptable Indoor Air Quality.
 - b) Design and engineer carbon dioxide detectors to be used to assess air quality and air ventilation rates.
 - c) Design and engineer air intakes to be separated from pollution sources with an adequate separation distance to minimize risk of capture of contaminated air.
 - d) Design and engineer ducted return air systems within the building.
 - e) Do not design or engineer internal duct insulation.
2. Provide for quality human comfort.
- a. Provide appropriate thermal conditioning.
 - 1) Create a healthy, comfortable, supportive and flexibly controllable thermal environment for the users.
 - a) Design and engineer mechanical systems to comply with current ASHRAE Standard 55, *Thermal Environmental Conditions for Human Occupancy*.
 - b) Assure that the thermal design addresses environmental and seasonal considerations for dry bulb temperature and radiant temperature profile, relative humidity, and occupants' activities and mode of dress.
 - b. Provide effective electric lighting.
 - 1) Assure visual performance and comfort for occupants by providing light levels and control of those levels in the most energy efficient manner.
 - a) Employ design strategies and features to assure that the Illuminance Levels and Luminance Ratios are appropriate for the users, activities, and tasks. The Illuminating Engineering Society of North America (IESNA) Recommended that Illuminance Categories and Weighting Levels be used to determine appropriate illuminance levels for different users, activities, and tasks.

- b) Employ design strategies and features to assure that color temperature, color rendering, and modeling of light are appropriate for the users, activities, and tasks.
 - c) Employ design strategies and features (e.g. selection of lighting fixtures, installations, and controls) to avoid glare and veiling reflections and render the environment in ways that support the program, user purposes, and preferences.
 - c. Provide appropriate building acoustical and vibration conditions.
 - 1) Provide an interior environment with acoustic and vibration qualities that are healthy and functionally supportive of the user and programmed activities of the building.
 - a) Employ design features and strategies to control sources of externally and internally induced vibrations from wind loads, passing traffic, interior foot traffic, building HVAC systems, and interior machinery.
 - b) Employ design features and strategies to control sources of noise from mechanical and electrical equipment and from sources exterior to the building. Develop wall and partition assemblies with appropriate Sound Transmission Class (STC) ratings based on the conditions of the site, building program, and activities. Address noise elimination, control, or isolation from equipment through acoustic zoning, equipment selection, construction, and appropriately designed ducts, piping, and electrical systems.
 - c) Employ design features and strategies to create appropriate sound reverberation levels, background sound levels, sound rendition, and speech interference levels so as to produce the proper “soundscape” for the building program and expected variations in user activities.
 - d) Design interior spaces to minimize room to room sound transmission through walls, partitions, ceilings, borrowed lites, and doors.
 - d. Provide views, view spaces, and connection to the natural environment.
 - 1) Provide access to windows and natural views to assure a high level of visual and psychological comfort; enhance occupant wellbeing; and improve human performance and satisfaction with the built environment.
 - a) Employ design strategies to provide windows, skylights, and/or clerestories for outside view access from all work areas or regularly occupied spaces or to provide contact with patterns and textures of the natural world through interior recreations (e.g. atria, plazas, gardens, courtyards, plantings, and similarly restorative interior design treatments).
 - b) Employ design strategies to create connected interior and exterior view spaces which provide the proper combinations of spaciousness, privacy, personal security, visual access to routes and settings within and to the outside of the building.

1.6 PRODUCT AND MATERIAL SELECTION

A. Product and Material Selection Goals:

1. Minimize consumption and depletion of non-renewable material resources.
2. Maximize the use of recycled, renewable, and re-used materials.
3. Minimize the life cycle impact of materials on the environment.
4. Minimize the impact of materials on indoor environment quality.

B. Product and Material Selection Strategies:

1. Manage the extraction of raw materials.
 - a. Select new products and materials with low environmental impact during their life cycle.
 - 1) Select building products and materials manufactured with a low environmental impact during their life cycle. The phases of the life cycle are: Raw Material Extraction, Production, Distribution, Installation, Use and Maintenance, and Eventual Reuse or Recycling. Low environmental impact refers to reducing greenhouse gas and toxic air emissions, water pollutants, and minimizing waste in each phase.
 - a) Materials shall be evaluated using a life-cycle methodology (such as Athena or BEES assessment tools) focusing on those used in large quantities or with significant negative environmental impact.
2. Manage the production of products and materials.
 - a. Select salvaged and remanufactured products and materials where appropriate.
 - 1) Conserve the embodied energy of salvaged products and materials (such as floor tile, granite, marble, brick, timber, windows, doors, door frames, bathroom accessories, toilet partitions, sinks, lavatories, cabinets, furniture, and hardware) instead of consuming natural resources to manufacture new materials. Use remanufactured products and materials in order to extend the life of an existing product and reduce the amount of raw materials required on the project.
 - a) Salvaged Products and Materials: For new construction, 10% of total products and materials used are made up of salvaged building products and materials. For renovations, 10% of total products and materials used are made up of existing building products and materials or salvaged products and materials from an off-site source.
 - b) Remanufactured Products and Materials: For new construction, 10% of total products and materials used are remanufactured building products and materials. For renovations, 10% of products and materials used are made up of existing building products and materials, or remanufactured products and materials from an off-site source.
 - b. Select recycled content products and materials where appropriate.
 - 1) Use products and materials with a recycled content instead of those manufactured using virgin materials.

- a) 50% of total products and materials used contain at least 10% post-consumer recycled content or a minimum of 50% post-industrial recycled content.
- c. Select products and materials made from renewable sources where appropriate.
 - 1) Use products and materials made from renewable resources, especially those that are agriculturally based. Avoid building materials manufactured from raw materials that are scarce or finite, which include concrete, steel, and petroleum-based materials.
 - a) 10% of products and materials are from renewable raw sources (e.g. certified wood, wheat, cotton, cork, bamboo, etc.).
- 3. Manage the distribution of products and materials.
 - a. Select locally manufactured products and materials where appropriate.
 - 1) Use products and materials manufactured locally to save energy and resources in the transportation of those products and materials as well as the installation of those products and materials. This goal includes locally supplied or manufactured products and materials that are supported by local installers and reuse or recycling programs.
 - a) 25% of the products and materials are manufactured within 500 miles of the Project site.
- 4. Manage the installation of products and materials.
 - a. Select low VOC emitting products and materials.
 - 1) Select products that have minimal chemical emissions and emit low or no volatile organic compounds (VOCs) and install materials with minimal VOC producing compounds or no-VOC mechanical attachment methods to contribute to good indoor air quality during building operations.
 - a) At a minimum, all adhesives and sealants must meet VOC limits of the current Ohio EPA.
 - b) At a minimum, all paints, coatings, carpet, and furniture systems must meet the requirements of State of Washington Department of General Administration Indoor Air Quality "Compliance Table."
 - c) Carpet must conform to the current Carpet and Rug Institute and EPA VOC emission rate of 0.5 milligrams per square meter per hour.
 - d) Material Safety Data Sheets (MSDS) for all materials contributing significantly to indoor air quality are submitted.
 - 2) Select materials from manufacturers who have reduced toxicity emissions at their manufacturing plants and whose products do not contain toxic compounds and ingredients.
- 5. Select durable products and materials.

- a. Conserve natural resources by specifying materials that are durable and long lasting instead of those that need to be replaced frequently which consumes additional natural resources.
 - 1) 50% of total products and materials are durable with a life cycle of at least 50 years.
 - 2) Design interior surfaces that do not require repetitive maintenance (over and above routine cleaning) such as painting, stripping, or refinishing. Examples include but are not limited to glass, masonry, ceramic, or metal.
- 6. Select products and materials that are reusable, recyclable, or biodegradable.
 - a. Select products and materials that are reusable, recyclable, and biodegradable materials to reduce the consumption of natural resources and decrease the landfilling of building materials. Reusable, recyclable, and biodegradable materials are used to conserve energy and reduce the consumption of natural resources.
 - 1) 30-60% of total materials are reusable, recyclable, or biodegradable.

1.7 WASTE MANAGEMENT

A. Waste Management Goals:

- 1. Minimize waste of resources.
- 2. Minimize waste generated from construction, renovation, and demolition of buildings.
- 3. Minimize waste generated during building occupancy.
- 4. Direct better waste management.

B. Waste Management Strategies:

- 1. Design to conserve resources.
 - a. Reuse existing buildings where appropriate.
 - 1) Conserve the existing building's embodied energy by reusing existing buildings where appropriate.
 - b. Design for less material use.
 - 1) Reduce the consumption of natural resources by designing materials efficient structural systems, avoiding materials which serve no functional purpose, or are sized inefficiently.
 - a) Employ design strategies to use less materials, including reducing the size of the building and spaces; eliminating unnecessary structural, architectural, and finish materials; using modular and standard dimensioning; and using strategies that decrease waste during construction.
 - c. Design building(s) for adaptability.

- 1) Design the building to accommodate modifications and upgrades that will satisfy changing programmatic, spatial, and infrastructure needs, and to facilitate flexible occupation throughout the life of the building. Interior or exterior design options are incorporated into the project to facilitate building adaptability.
 - a) Consider site planning and building configuration to accommodate future additions and alterations.
 - b) Plan for maximum standardization or repetition of building elements and details to increase the ease of adapting the structure for future alterations and upgrades.
 - c) Design cladding to accommodate future alterations and upgrades such as shading devices, more efficient glazing, and lighting controls.
 - d) Design cladding systems that are fixed by snap release connectors, friction, or other joints that do not require sealants. Use joints and connections that facilitate adaptability, including bolts, screws, and clips.
 - e) Consider spatial configurations, floor deck, structure, mechanical, and ceiling options to facilitate adaptability (13-14 feet maximum is common).
 - f) Provide a plenum space between the ceiling to floor level for structure, sprinklers, supply and return ductwork, lighting fixtures, and ceiling system, allowing the space to be more easily altered.
 - g) Provide a raised floor systems for power and telecommunications wiring to accommodate reconfiguration of spaces and information technology support.
 - h) Provide modular space planning and partitions.

d. Design building(s) for disassembly.

- 1) Design the building to use components, assemblages, and systems to facilitate disassembly for reuse (i.e. fixtures, hollow metal frames, trusses, casework, etc.), salvage (i.e. timber frame, carpet, countertops), or recycling (i.e. metals, glass, concrete materials). Interior or exterior design options are incorporated into the project to facilitate building disassembly.
 - a) Provide structural systems, cladding systems, and non-load bearing partition systems that facilitate disassembly.
 - b) Provide structure/shell systems that maintain integrity when demounted or disassembled (i.e. steel, glass, or concrete and panel claddings).
 - c) Select products, materials, systems, and components that can be recycled or reused in whole or in part.
 - d) Select products, materials, systems, and components that are durable, weather well, and last more than one building lifetime (including masonry, steel, glass, and some timber products such as beams, columns, floorboards, etc.).
 - e) Select products, materials, systems, and components that can be assembled or fastened in a manner that facilitates reassembly into new construction or remodeling.
 - f) Select snap release connectors, friction, or other joints which do not require sealants.
 - g) Select joints and connections that facilitate disassembly, including bolts, screws, and clips.

- h) Select homogeneous materials rather than composite materials, as they are easier to separate and recycle. Avoid materials that are composites such as reinforced plastics and carpet fibers and backing which are generally more difficult to recycle than homogeneous materials.
 - i) Select modular systems and materials to facilitate deconstruction and reuse of building materials.
 - j) Consider labeling building materials with identification information to facilitate recycling.
2. Include waste management directions.
- a. Provide for the salvaging and recycling of demolition waste.
 - 1) Conserve resources by salvaging building materials (brick, wood flooring, windows, doors, cabinets, plumbing fixtures, lighting fixtures, mechanical and electrical equipment, ductwork, framing lumber, hardware, wiring, piping, and other materials) for reuse on-site or resale. The goal is also to recycle or divert from landfill demolition waste such as metals, wood, or carpet.
 - a) 50% by volume of demolition waste is diverted from landfill through salvage, recycling and/or recovery.
 - b. Provide for the salvaging and recycling of construction waste.
 - 1) Conserve resources and save money by recycling construction waste (including metals, wood, concrete, and cardboard).
 - a) 50% by volume of waste from construction is diverted from landfills through recycling and/or recovery.
 - c. Provide for the reduction and recycling of packaging waste.
 - 1) Reduce and recycle construction packaging waste and encourage manufacturers to ship their products using reusable, recyclable, returnable, or recycled content packaging.
 - a) 50% of all packaging material, by weight, is reused or returned to suppliers or manufacturers.
 - d. Provide for the reduction and recycling of waste from building users.
 - 1) Reduce water production and encourage recycling of waste from building users (e.g. white and mixed paper, aluminum cans, plastic, glass, corrugated cardboard, and organic food waste).
 - a) Dedicated recycling facilities are provided for processing of aluminum, glass, plastic, white and mixed paper and cardboard.
 - b) Design infrastructure to process waste streams efficiently.

END OF SECTION

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

1.1 SUMMARY

- A. Case Western Reserve University has established a requirement that all new Construction and Major Renovations shall be LEED Silver Certified, unless directed otherwise in writing.
- B. Design Team shall design the Project in accordance with all applicable sustainability guidelines so that this LEED Silver Certification can be achieved.
- C. Design Team shall prepare appropriate Contract Documents and provide appropriate direction to the Builder so that this LEED Silver Certification is achieved.
- D. The University has used the USGBC LEED Checklist to prepare a University Master LEED Checklist, indicating the sustainability items that are important to them and that they have had success with in the past. A copy of that Checklist is included herein as Attachment 01 81 13.01. The Design Team shall use this University Master LEED Checklist as a guide, both in their design considerations and in completing the actual USGBC LEED Checklist for submittal to the USGBC for LEED Silver Certification.
- E. The Design Team shall develop the building envelope and mechanical systems such that the final facility exceeds the current ASHRAE 90.1 requirements by at least 30%.
- F. Design Team shall include in their Contract Documents, general requirements and procedures for compliance with USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification based on USGBC's "LEED 2009 for New Construction and Major Renovations."

1.2 SUBMITTALS

- A. LEED Checklist / Scoresheet: Design Team shall register the Project with the USGBC and complete a LEED Checklist / Scoresheet demonstrating strategies for achieving LEED Silver Certification.
 - 1. This LEED Checklist / Scoresheet shall be submitted for Owner review and comment, with the 100% Design Development Documents.

1.3 QUALITY ASSURANCE

- A. LEED Coordinator: Design Team shall engage an experienced LEED-Accredited Professional to act as the LEED Coordinator for this Project.

1.4 COMMISSIONING AGENT

- A. The Owner will engage the services of an independent Commissioning Agent (CxA). This CxA shall be notified of the Project Kick-Off Meeting, and all Design Review Meetings so that they may be in attendance.
- B. The Owner may choose to go for Basic Commissioning or Enhanced Commissioning.

END OF SECTION

SECTION 02 41 10 - DEMOLITION

1.1 SUMMARY

- A. Structural Demolition: Demolition and removal of buildings and site improvements.
- B. Selective Demolition: Demolition and removal of selective portions of existing buildings and site improvements.

1.2 QUALITY ASSURANCE

- A. Quality Standards: ANSI/ASSE A10.6 and NFPA 241.

1.3 PROJECT CONDITIONS

- A. Owner may occupy portions of a building immediately adjacent to selective demolition area. If they do, Contractor shall provide sound and dust barriers between occupied areas and construction areas.
- B. Hazardous Materials: Owner will coordinate removal of all known hazardous materials from the Area of Work prior to start of the Work.
 - 1. Contractor shall be responsible for actual removal of all identified hazardous materials.
 - 2. Owner will be responsible for disposal of those same hazardous materials.
 - 3. If any additional hazardous materials are encountered subsequent to this effort, Contractor shall notify Owner immediately.
- C. Historic removal or dismantling may be required.

1.4 PREPARATION

- A. Refrigerant: Remove according to 40 CFR 82.
- B. Utility Shut Off: Arrange with Owner for all utility shut offs.
 - 1. Owner must have at least five (5) business days advance notice for utility shut offs in residence buildings.
 - 2. Owner must have at least 72 hours advance notice for utility shut offs in all other buildings.
- C. Remove and return all lamps and ballasts to Owner for proper disposal.

1.5 WARRANTY

- A. Existing Warranties: Conduct selective demolition work in such a manner that existing material and equipment warranties are kept intact.

1.6 DEMOLITION

- A. Site Access and Temporary Controls: Minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities
- B. Temporary Facilities:
 - 1. Temporary barricades to prevent injury to people.
 - 2. Temporary weather protection.
 - 3. Protection of existing finish work to remain.
 - 4. Protection of furnishings and equipment.
- C. Use of explosives is not permitted.
- D. Open Flames: See Owner's Environmental Health and Safety Guidelines for direction on the use of open flames.
- E. Salvage: Items to be salvaged and delivered to Owner shall be coordinated by the Architect and indicated on Contract Documents.
- F. Below-Grade Construction: Demolish and remove completely.
- G. Existing Abandoned Utilities: Demolish and remove completely.

1.7 SITE RESTORATION

- A. Below-Grade Areas: Rough grade.

1.8 DISPOSAL OF DEMOLISHED MATERIAL

- A. Remove demolished material from Project site and dispose of according to Division 01 Section, "Construction Waste Management and Disposal."

END OF SECTION

SECTION 06 40 00 - INTERIOR ARCHITECTURAL MILLWORK

1.1 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in Architectural Woodwork Institute's (AWI) Quality Certification Program.

1.2 PROJECT CONDITIONS

- A. Assure that either wood or metal strap backing is provided behind gypsum board, to support all shelving and cabinetry.

1.3 PLASTIC-LAMINATE-FACED AND WOOD VENEERED CABINETS

- A. Grade: AWI Premium.
- B. Manufactured within 100 miles of Project site.
- C. Wood products shall be certified and made from trees grown and harvested under the Forest Stewardship Council (FSC) certified wood products.

1.4 MATERIALS

- A. Composite Wood Products: Urea formaldehyde free.
- B. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer plus one-half of preconsumer recycled content not less than 50 percent.
- C. Adhesives: Urea formaldehyde free.
- D. Millwork Hardware: The following is provided as a Basis of Design to establish quality. Subject to Owner's approval, all millwork hardware shall be as manufactured by Blum and Knappe & Vogt (KV) unless otherwise noted or directed by the Owner.
 1. Hinges: Frameless, concealed, Blum 70T6540B, 170-Degree Opening Angle.
 2. Door and Drawer Pulls: As selected by Owner and Architect.
 3. Standards for Adjustable Shelf Brackets: KV-80, steel, to be inset into dado cut.
 4. Adjustable Shelf Brackets: KV-180, in depths as required from 4 inches to 20 inches.
 5. Standards for Adjustable Shelf Supports: KV-255, steel, to be inset into dado cut.
 6. Adjustable Shelf Supports: KV-256, steel.
 7. Built-in Adjustable Shelf Rests for 5 mm hole: KV-332 or KV-345, with KV-326 Grommet.
 8. Clothes Rod: KV-750 5-Round Rod, chrome, 1-5/16 O.D., with KV-764CHR Closed, Round Rod Support and KV-766 Open Top, Round Rod Support.
 9. Drawer Slides: KV-8800 Heavy Duty, Full Extension, 200 pound class.
 10. Sliding Glass Door Assembly: KV-P1092

11. Door and Drawer Locks: KV-986-NP for 7/8" thick material or KV-987-NP for 3/4" material.
12. Sliding Glass Door Locks: KV-965-NP
13. Glass for Doors and Shelving: ASTM C1048, Kind FT (Fully Tempered), Condition A, Type I, Class 1 (Clear), Quality Q3, thickness as required but not less than 6 mm thick.
14. Exposed Hardware Finishes: As selected by Owner and Architect.

END OF SECTION

SECTION 07 14 13 - HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

1.1 SUMMARY

- A. This Section includes materials and systems for waterproofing foundations and plaza deck surfaces.

1.2 QUALITY ASSURANCE

- A. Installer: An authorized representative, who is trained and approved by manufacturer.

1.3 WARRANTY

- A. Water tightness Warranty: Ten (10) years from date of Substantial Completion.
- B. Installer's Warranty: Two (2) from date of Substantial Completion.

1.4 MATERIALS

- A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane: Single component; 100 percent solids; 215 mils thick, fabric reinforced; hot fluid-applied, rubberized asphalt; with water vapor permeability not less than 0.018 perms when tested per ASTM E96, Procedure E, CGSB-37.50-M89.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc; Monolithic Membrane 6125.
 - b. Carlisle Coatings & Waterproofing Inc; CCW-500R.
 - c. Soprema, Inc.
 - d. Tremco Incorporated; Tremproof 150.
 - B. Elastomeric Flashing Sheet: Manufacturer approved membranes.
 - C. Protection Course:
 - 1. Manufacturer approved, semirigid, reinforced-asphaltic core sheets, or
 - 2. Fiberglass-reinforced rubberized asphalt sheets, or
 - 3. Modified bituminous sheet.
 - D. Molded-Sheet Drainage Panels: Manufacturer approved, nonwoven or woven-geotextile-faced, molded-plastic-sheet drainage core.
 - E. Insulation: Manufacturer approved, extruded-polystyrene board.
 - F. Insulation Drainage Panels: Manufacturer approved, extruded-polystyrene board insulation, geotextile faced, with grooved drainage channels.

- G. Plaza Deck Pavers: Heavyweight concrete units.
- H. Paver Supports: Adjustable or stackable.

1.5 INSTALLATION

- A. Unreinforced Membrane: 180-mil (4.5-mm) minimum thickness.
- B. Reinforced Membrane: 215 mils (5.5 mm) minimum thickness.

1.6 FIELD QUALITY CONTROL

- A. Full-time site inspection representative.
- B. Each deck area flood tested.
- C. For green roofs, provide Electric field vector mapping (EFVM).

END OF SECTION

SECTION 07 52 16 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

1.1 PREINSTALLATION MEETINGS

- A. Pre-Installation Roofing Meeting.

1.2 LEED SUBMITTALS:

- A. Product Test Reports for Credit SS 7.2: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirement.
- B. Product Data for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Laboratory Test Reports for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1.3 WARRANTY

- A. Manufacturer's Materials and Workmanship Warranty: Twenty (20) years from date of Substantial Completion.
- B. Installer's Warranty: Two (2) years from date of Substantial Completion.

1.4 PERFORMANCE REQUIREMENTS

- A. Roofing System Design:
 - 1. Note: Structural Drawings shall include all design live and dead loads including wind loading on the roof.
 - 2. Corner Uplift Pressure: Provide for **lbf/sq. ft. uplift** as indicated on the Structural Drawings.
 - 3. Perimeter Uplift Pressure: Provide for **lbf/sq. ft. uplift** as indicated on the Structural Drawings.
 - 4. Field-of-Roof Uplift Pressure: Provide for **lbf/sq. ft. uplift** as indicated on the Structural Drawings.
- B. Cool-Roof Performance: LEED - low slope.
- C. Exterior Fire-Test Exposure: Class A.

1.5 MANUFACTURERS

- A. **Basis-of-Design Product:** Subject to compliance with requirements, provide comparable product by one of the following:

- 1. Siplast, Inc.
- 2. Soprema, Inc.

1.6 MATERIALS

- A. Walkway Pads: Reinforced asphaltic composition pads with mineral-granule surface to match Roofing Cap Sheet.
- B. Roofing Cap Sheet: SBS-modified asphalt sheet, reinforced with polyester fabric, glass fibers, or a combination of polyester fabric and glass fibers; with white granule surface.
- C. Roofing Membrane Sheets: SBS-modified asphalt sheet, reinforced with polyester fabric, glass fibers, or a combination of polyester fabric and glass fibers.
 - 1. Two Plys.
- D. Roof Insulation: Polyisocyanurate boards in two layers with joints staggered.
 - 1. Tapered Insulation: **1/4 inch per 12 inches.**
- E. Substrate Board (Thermal Barrier): Type X, Glass-mat, water-resistant gypsum substrate.
- F. Vapor Retarder: Self-adhering, rubberized asphalt sheet.
- G. Insulation cant strips.

1.7 INSTALLATION

- A. Roof Insulation: Mechanically fastened.
- B. Roofing System:
 - 1. Deck Type: C (concrete or nonnailable).
 - 2. Adhering Method: T (torched), M (mopped), or L (cold-applied adhesive), as applicable for conditions of work.
 - 3. Base Sheet: One, installed over sheathing paper.
 - 4. Number of Glass-Fiber Base-Ply Sheets: Two.
 - 5. Number of SBS-Modified Asphalt Sheets: One.
 - 6. Surfacing Type: M (mineral-granule-surfaced cap sheet).

1.8 FIELD QUALITY CONTROL

- A. Full-time site inspection representative.
- B. Each deck area flood tested.

C. For green roofs, provide Electric field vector mapping (EFVM).

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

1.1 SUMMARY

- A. All locksets shall be heavy duty mortise type with lever handles meeting ADA requirements.
- B. Keying schedules will be done by the University Department of Physical Security Services in conjunction with affected departments. All cylinders shall be installed under the University's Key Control System.
- C. Note: Due to the use of a restricted keyways and keys, Medeco will not ship cylinders to the contractor. The contractor shall arrange for direct shipment to the University locksmith at the Physical Security Services Department. The Physical Security Services Department will issue cylinders and keys to the contractor as required.
- D. Reference Divisions 25, 26, 27, and 28 of the CWRU Facility Standards, to ascertain how electronic exits or panic bars are connected to other systems.
- E. All maintenance, housekeeping and CWRU net rooms shall be storeroom function lockset, i.e., no unlocking capability without a key.
- F. Functional capabilities of locksets for all other rooms shall be determined and reviewed with the user.
- G. Heavy duty hinges shall be used on all doors over three feet in width and on door openings less than three feet in width that require an extra heavy duty door.
- H. All existing, unused cylinders shall be returned to the Physical Security Services Department prior to Substantial Completion of the Work.
- I. Coordinate with CWRU Keyshop for final design approval.

1.2 WARRANTY

- A. Materials and Workmanship: Three (3) years from the date of Substantial Completion.

1.3 DOOR HARDWARE PRODUCTS AND MANUFACTURERS

- A. Rim and Mortise Cylinders for High Security Locksets (All with 6 Pins)
 - 1. Assa Abloy, Medeco OPC-FN-KY
 - 2. Series 10-0100, 10-0200, 10-0500, 10-0510 etc.
 - 3. Cam: CT-Z01 (or match new hardware)
 - 4. 1-1/8 inch up to 8 inch Mortise Cylinder
 - 5. Metal Finish as selected by Owner from following.
 - a. Bright Brass #605 (US3).
 - b. Satin Brass #606 (US4).

- c. Oil Rubbed Bronze #613 (US10B).
 - d. Bright Chrome #625(US26).
 - e. Satin Chrome #626 (US26D) (Standard).
 - f. Match existing where appropriate.
 - 6. Keyway: KY-106600-0100
 - 7. Pin Kit: K-1002
 - a. 10 Series Bottom and Drivers Pins
- B. Rim and Mortise Cylinders for Von Duprin Exit Devices
- 1. Assa Abloy, Medeco OPC-FN-KY
 - 2. Series 10-0400H
 - 3. Stem: CT-Y02
 - 4. 1-1/8 inch Rim Cylinder
 - 5. Metal Finish as selected by Owner from following.
 - a. Bright Brass #605 (US3).
 - b. Satin Brass #606 (US4).
 - c. Oil Rubbed Bronze #613 (US10B).
 - d. Bright Chrome #625(US26).
 - e. Satin Chrome #626 (US26D) (Standard).
 - f. Match existing where appropriate.
- C. Rim and Mortise Cylinders for Schlage Locksets (Grade 1, D Series)
- 1. Assa Abloy, Medeco OPC-FN-KY
 - 2. Series 20-200HI
 - 3. Stem: CT-Y02
 - 4. 1-1/8 inch Rim Cylinder
 - 5. Metal Finish as selected by Owner from following.
 - a. Bright Brass #605 (US3).
 - b. Satin Brass #606 (US4).
 - c. Oil Rubbed Bronze #613 (US10B).
 - d. Bright Chrome #625(US26).
 - e. Satin Chrome #626 (US26D) (Standard).
 - f. Match existing where appropriate.
- D. Cylinders for Dormitory Room Door Locksets and Doors Controlled by Card Reader Access.
- 1. Best Access/Stanley IE74-C4-PP Mortise Cylinders and IE72-52-RP3 Rim Cylinders.
 - a. RP Standard Rims Package
 - b. IE-R3 and IE-R5 Rings or RP-1 Ring Package
- E. Cylinders for Sliding Door Locksets.
- 1. Best/Stanley 4S Series Sliding Door Cylinders.

- a. 4573 4573 7 pin (J) 7 pin
 - b. 1C7J1-KS473-KS800 Operating Key.
- F. Fire Department Boxes for Elevator Keys (except building in Cleveland Heights which uses Knox Boxes)
 - 1. Key Systems (1-800-888-3553
 - 2. Chit-Key Vault
 - 3. Standard Size 18 gauge brushed
 - 4. Stainless Steel / with Best ICJ-Cores – 7 pin
- G. Padlocks
 - 1. Assa Abloy, Medeco brass body padlocks, 0100 K/W
 - 2. Best/Stanley Masterlocks.
- H. Special Security
 - 1. Folger Adams Products Sliding Devices
 - 2. Best for dormitories.
- I. Specialty Locks
 - 1. AdamsRite Miscellaneous Locks
- J. Door Closers:
 - 1. LCN Heavy Duty Closers only.
- K. Locksets and Latchsets:
 - 1. Schlage.
 - a. CM Locking System.
 - b. Schlage Computer managed CM Locks are stand-alone.
 - 2. Best/Stanley.
 - a. Security Solutions.
 - b. 45HBV7Designs
 - c. Mortise Basis of Design.
 - 3. Sargent.
 - a. Mortise Deadbolt.
 - b. Number 4870 Series.
 - c. Number 8200 Series Deadbolt.
 - 4. Corbin-Russwin.
 - 5. Security Guard Mortise Locksets for Classrooms.
 - 6. Some Brinks and Southern Steel Institutional mortise locksets occur on campus.

L. Gate Locks:

1. Marks Gate Locks
 - a. 3700 Series for Swing Gates.
 - b. 3800 Series for Sliding Gates.

M. Exit Devices:

1. 33 and 99 Von Duprin only.
2. All doors that are monitored or provided with access control devices shall be provided with mechanical exit devices hardware that has the ability to be manually locked in the event of a failure with the Access Control System.

N. Electric Strikes:

1. Assa Abloy, HES, 1006 Series, 12 volt.

O. Locksets:

1. Schlage.
2. Sargent.
3. Best.
4. Corbin/Russwin.

P. Door Hardware:

1. Ives.

Q. Key Cabinets:

1. HPC.

1.4 FIELD QUALITY CONTROL

- A. Post-occupancy Adjustment: Six (6) months after the date of Substantial Completion.

END OF SECTION

SECTION 09 51 00 - ACOUSTICAL PANEL CEILINGS

1.1 SUMMARY

- A. Acoustical panels and exposed suspension systems.

1.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.
- B. Acoustical Characteristics:
 - 1. NRC: 55-65.
 - 2. STC: 40 minimum.

1.3 PRODUCTS

- A. New Construction: Basis-of-Design Product: Subject to compliance with requirements, provide acoustical panel ceiling systems as manufactured by the following:
 - 1. Armstrong World Industries, Inc.
 - 2. USG.
- B. Renovation: When renovating areas, match existing acoustical panel ceiling systems to the greatest extent possible.

1.4 INSTALLATION

- A. Installation: ASTM C 636.

END OF SECTION

SECTION 09 68 00 - CARPETING

1.1 SUMMARY

- A. Tile Carpeting and Sheet Carpeting

1.2 WARRANTY

- A. Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, and delamination.
 - 3. Warranty Period: Ten (10) years from date of Substantial Completion.

1.3 PRODUCTS

- A. All Carpet material shall be:
 - 1. Fiber Content: 100 percent solution dyed nylon with unitary backing, and permanent static control.
 - 2. Pile Characteristic: Level-loop pile.
 - 3. Face Weight: 35 - 40 oz./sq. yd.
 - 4. Emissions: Carpet complies with The Carpet and Rug Institute's "Green Label Plus" program.
- B. All carpet material shall have factory applied fiber stain resistance protection and comply with specifications of The Carpet and Rug Institute.
- C. Base:
 - 1. Carpet Base: Provide a minimum 4 inch high carpet base with bound top edge.
 - 2. Resilient Base: Provide Vinyl or Rubber Coved Base.
- D. Installation Adhesive: Manufacturer's recommended, with VOC content of 50 g/L or less.

END OF SECTION

SECTION 09 91 00 - PAINTING

1.1 SUMMARY

- A. Interior and Exterior, Opaque Finishes.

1.2 PAINT, GENERAL

- A. VOC Content: Complying with LEED-NC Credit EQ 4.2.

1.3 SCHEDULE

- A. Basis of Design shall be Sherwin Williams Company products.
- B. Provide manufacturer's recommend paint systems with Topcoats as follows:
 - 1. Interior: SW ProMar 200 Zero VOC or SW ProMar Industrial Zero VOC as applicable.
 - 2. Exterior: Sherwin Williams product as recommended by manufacturer for substrate.
- C. Sheens:
 - 1. Hollow Metal Doors and Frames: Semigloss.
 - 2. Vertical surfaces: Eggshell.
 - 3. Ceilings: Flat.

END OF SECTION

SECTION 10 14 00 - SIGNAGE

1.1 ROOM NUMBERING

- A. Regional Materials: Dimensional letter signs shall be manufactured within 500 miles of Project site.
- B. All room signs shall conform to current ADA requirements.
- C. All spaces, including Rest Rooms, SER, Mechanical Rooms, Electrical Rooms, and Corridors, as well as assignable spaces, shall have unique room numbers assigned and be so labeled.
- D. All rooms at grade or above shall be numbered with three unique digits. No number may be used more than once. The floor accessed from grade is typically labeled with 100 series numbers. The floor above that, 200 series, etc.
- E. Floors immediately below the 100 series floor shall be numbered with two digits: 01 to 99. In special cases where buildings are located on hillsides, and separate floors are both accessible from a "grade," Architects shall confer with their designated contact at the University for specific instructions.
- F. Suffixes shall only be used within a specific discrete office complex, e.g., when the main entrance to an office is labeled 100, then within that office area rooms shall be labeled 100A, 100B, etc. Labeling on these inner rooms should start with the left most inner room when entering the suite and continue in a clockwise direction around the space.
- G. Prefixes, such as N101 and S101, are not acceptable.
- H. Sign materials and colors shall be approved by the Architect's designated contact at the University.
- I. All drawings, including construction drawings, shall reflect this numbering system.
- J. All drawings shall also include, by room number, the square footage of the individual spaces.
- K. All schedules in construction documents (materials, equipment, finishes, etc.) shall utilize this numbering convention.
- L. Generally, even numbers are used on one side of the corridor and odd numbers on the other.
- M. Adhesives: VOC content of 70 g/L or less.
- N. Adhesives: Comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- O. Stairwell signage shall be manufactured and installed in accordance with the current Ohio Fire Code, Section 1022.8.
- P. All stairwell signs shall be reviewed and approved by the CWRU EHS – Fire Safety prior to

manufacturing and installation.

END OF SECTION

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

1.1 SUMMARY

- A. The following Toilet, Bath and Laundry Accessories shall be furnished by the Owner and installed by the Contractor

1.2 PRODUCTS

- A. **Paper Towel Dispenser:** Kimberly Clark, Series I, In-Sight, Smoke, G-HF108-90-25705, AKA 0099602.
 - 1. Surface Mounted.
- B. **Toilet Tissue Dispenser:** Kimberly Clark, Insight, Coreless Twin Jumbo Dispenser, Smoke, 0960810.
 - 1. Surface Mounted.
- C. **Soap Dispenser:** Deb, Cleanse Washroom 1000, Stock Code WRM1LDS.
 - 1. 1 Liter Capacity.
 - 2. Surface Mounted.
- D. **Hand Sanitizer Dispenser:** Deb, Instant FOAM 1000, 1FS1LDS.
 - 1. Surface Mounted.
- E. **Seat Cover Dispenser:** Hospitality Specialty Company, Half Fold Type, HG 1-2.
 - 1. Surface Mounted.

END OF SECTION

SECTION 10 44 00 - FIRE EXTINGUISHERS AND CABINETS

1.1 SUMMARY

- A. Provide all hand-carried fire extinguishers with fire extinguisher cabinets as required per NFPA and the local Fire Marshall.

1.2 WARRANTY

- A. Materials and Workmanship: Six (6) years from date of Substantial Completion.

1.3 PRODUCTS

- A. Fire Extinguisher types and sizes: Comply with NFPA and local Fire Marshall's requirements.
- B. Fire-Protection Cabinets:
 - 1. Type: Fire extinguisher.
 - 2. Cabinet Construction: Nonrated and rated as required for installation.
 - 3. Mounting: Recessed or semirecessed wherever possible.
 - 4. Style: If work is a renovation, fire extinguisher cabinets shall match existing cabinets in the area in style, glazing, and finish.
- C. Location and quantities: Comply with NFPA and local Fire Marshall's requirements.

END OF SECTION

SECTION 13 10 00 - DESIGN CRITERIA FOR MULTIMEDIA CLASSROOMS

1.1 PRIMARY MISSION

- A. The primary mission of every educational institution is to provide instruction. Since most conventional instruction takes place in a classroom, it is imperative to recognize its importance to the total learning environment experienced by the students. However, classrooms have historically suffered from a lack of attention, both in original design as well as construction. Students should have a classroom learning environment that allows them to see anything presented visually, to hear any audible presentation and to be physically comfortable. All of these factors are fundamental and equally important in designing an environment that is conducive to learning.
- B. The requirements for audiovisual presentations are undergoing a continuous change from an audio-visual supported environment to an electronic based media environment. This change in requirements is expected to continue into the future as the change in computer based information, digital communications and digital technology continues.
- C. Designing a multimedia based facility which accommodates information and presentation technologies to meet today's needs and future needs requires careful planning and organization. It requires the close collaboration of Architect, Mechanical Engineer, Electrical Engineer, Lighting Designer, Audio-Visual Specialist, Information Technologist and Instructor. Infrastructure design for "multimedia classrooms" must address requirements for A/C power, HVAC systems, cable distribution, ceiling heights, structural support, noise control, lighting, ergonomics and interior room acoustics. It is imperative that careful planning for technology become an integral part of the building's architectural design process in order to provide an infrastructure that will not only accommodate current technologies but one which can adapt to the rapid evolution of information and presentation technologies well into the future.
- D. The guidelines put forth in this document are not intended to be either static or stand-alone. They are not intended to establish rigid standards for the design, construction, or renovation of multimedia classrooms. They are general guidelines that will need to be adapted to specific applications and within specific projects early in the planning process. These guidelines are aimed at creating instructional spaces that are adequate for current requirements yet fully adaptable to the needs of the future.
- E. Case Western Reserve University's Multi-Media Information System (MMIS) is more than simply installing audio-visual equipment into the classroom. It is part of the University's approach to an "electronic learning environment" in which Instructors, as well as students, are given access to information resources which are available beyond the four walls of the traditional classroom. It can enhance the educational process by incorporating all senses into the learning experience. Architecture, acoustics, electrical and mechanical systems, as well as the media system itself, must all be optimized in order to achieve a quality learning environment. Temperature and humidity should be stable and comfortable. The room should be acoustically sound and free from distracting noise and outside disturbances. Lighting should be appropriate for each use and easily controllable. Electrical systems should be appropriately designed and rated for use with electronic media. The projected images should be large enough and bright enough for everyone in the room to see without experiencing fatigue. Special control systems are an important component of each facility and are designed to greatly reduce the

complexity of system operation. This allows the instructor to concentrate on his or her presentation instead of being distracted by a series of complex equipment control functions.

1.2 GENERAL CLASSROOM CHARACTERISTICS

- A. Classrooms should be concentrated on the lower floors of buildings. This provides the students, disabled students in particular, with better access and allows support services to be provided more conveniently.
- B. Classrooms should be located away from noise-generating activities taking place either outside or within the building. Classrooms shall be located away from loud machinery, vending machines, offices, labs and traffic areas as well as outside traffic noise.
- C. The size of the classroom should be designed to accommodate the programmed number of occupants as well as provide for additional support space. The support space must take into consideration both the set-up and use of audio-visual equipment, access for the disabled, an instructor workstation, circulation and empty floor space needed to keep the students from being seated too close to a chalkboard, projection screen, or video monitor.
- D. In order to accommodate an information display large enough to display images of adequate size, it must be placed high enough from the floor to provide unobstructed sight lines. The front wall and ceiling (including structural members) should be designed at a height and width, which is large enough to accommodate the proper installation of appropriately, sized and number of displays.
- E. There shall be no columns in any classroom. Columns placed within the room's interior space severely hamper room arrangement and student viewing of the instructor and visual aids.
- F. The front wall of the room behind the instructor area should have no protrusions (structural or otherwise) into the room so that chalkboard, markerboards, projection screens or information displays can be installed across the entire wall of the instructor area.
- G. There should be no decorative elements such as paintings or other artwork located within the classroom.
- H. The overall noise criterion of less than 30 is required. The maximum sound level shall not exceed 35dBA.

1.3 CLASSROOM SHAPE

- A. A rectangular shaped room is best.
- B. The ideal room dimension ratio is 1(H): 1 1/2(W): 2 1/2(L).
- C. The length of the room should not exceed its width by more than 50%.
- D. The instructor area and information displays should be located on the narrow wall of the room. Rooms wider than they are deep usually present unacceptable viewing angles for information displays and for information written on the chalkboard/markerboard.

1.4 CLASSROOM SURFACES AND FINISHES

- A. The front wall (i.e. the wall at the sending end of the classroom), should be hard surfaced (e.g., drywall, masonry or wood) with no special acoustical shaping or treatment.
- B. The front three-quarters of each sidewall should be constructed of hard (acoustically-non absorbent) materials (e.g. drywall, masonry or wood). These walls can be painted or vinyl-surfaced, but should not employ fabric covering or any other acoustically absorbent finish.
- C. Install acoustically absorbent finish on the rear one-fourth of the sidewalls in order to absorb useless reflections and to dampen standing waves, which reduces the room's "boominess".
- D. Install acoustically absorbent material on the rear wall.
- E. Ceilings should be of light color and of nonreflective material.
- F. Painted surfaces should be light in color (preferably light blue or beige for good video reproduction) and should be a durable finish to allow washing.
- G. Acoustically absorbent surfaces should be light in color, preferably light blue or beige, for good video reproduction.
- H. In general, black or white surfaces should be avoided.
- I. The classroom floors shall be carpeted with an anti-static, high traffic, commercial grade carpeting with no padding.
- J. The reflectance values of paints, vinyl coverings, laminates and other finish materials should be selected to enhance ambient illumination and the illumination at work surfaces. The following values are recommended:
 - 1. Ceilings: 70% - 90%
 - 2. Walls: 40% - 60%
 - 3. Floors: 30% - 50%
 - 4. Desktops: 35% - 50%
 - 5. Chalkboards: 20% - 30%

1.5 WALL CONSTRUCTION

- A. Walls shall be mechanically isolated from the building structure and shall be isolated at the top and bottom with a Neoprene seal or equivalent.
- B. Walls shall go from slab to slab in order to reduce noise paths into the room.
- C. Three layers of 5/8" drywall shall be used on all interior face of walls and two layers of 5/8" drywall shall be used on all exterior face of walls.
- D. Drywall seams should be staggered and each layer shall be taped and mudded individually.

1.6 WINDOWS

- A. All window treatments shall be opaque and capable of eliminating all outside light from reaching the information displays. Window treatment shall be installed with channels in order to provide a light-tight abutment to the window frame.
- B. A motorized window shading system, which can be integrated, with external audio-visual control systems shall be installed for each window.

1.7 DOORS

- A. Doors shall be located in the back of the classroom in order to minimize disruption.
- B. Doors shall be 2" thick sound-rated or at a minimum solid core to prevent noise from entering the room.
- C. Doors shall be equipped with acoustically rated compressive seals.
- D. All doors shall be a minimum of three feet wide and shall be equipped with a vision panel made of shatterproof glass and tinted to reduce light transmission. The area of the glass shall not exceed 100 square inches and shall be double pane with acoustically rated seals.
- E. Because ventilation louvers permit sound transmission, doors shall not contain louvers.

1.8 CEILINGS

- A. A minimum 9-foot ceiling height shall be utilized for rooms with less than 20 people. For rooms with a capacity between 21-49 people a minimum ceiling height of 10 feet shall be used.
- B. Soffits shall be avoided as they can cause unwanted acoustical reflections.
- C. The surface of the ceiling must be designed to accommodate the required acoustical properties of the room. The area of the ceiling to be acoustical tile is a function of ceiling height.
 - 1. A 9 foot ceiling height calls for 40% - 50% of the total ceiling area to have acoustic tile.
 - 2. A 10 foot ceiling height calls for 50% - 60% of the ceiling to have acoustic tile.
- D. The acoustic tile shall be arranged in the form of a U around the perimeter of the room, with the opening at the front and the remainder of the ceiling a hard material such as drywall or plaster.
- E. Ceiling tiles with a Noise Reduction Coefficient (NRC) of .55-.65 and a minimum Sound Transmission Coefficient (STC) of 40 shall be used.
- F. Access hatches must be installed in the ceiling wherever drywall or plaster is used to facilitate access to the entire ceiling cavity.

1.9 SEATING REQUIREMENTS

- A. For preliminary planning purposes, 20 square foot per student should be used. This will allow

for seating, circulation, media equipment, and space requirements to meet accessibility standards and adequate lecture space.

B. Classroom HVAC Requirements:

1. Classrooms shall be maintained in accordance with the general building specifications regarding temperature and humidity.
2. System components (fans, ductwork and diffusers) shall be selected to meet the sound criteria of NC 20 to NC 25
3. Projection booths, rear projection rooms and control rooms shall be equipped with separate HVAC systems or zoned independently of the classroom.

C. Classroom Lighting Requirements:

1. All classrooms must have a minimum of four lighting zones. These zones include:
 - a. Ceiling recessed VDT parabolic luminaries for the room's general student area.
 - b. One zone for the faculty workstation;
 - c. one zone for the demonstration and lecture area and
 - d. one zone for the chalkboard or markerboard.
2. Each zone shall be independently controllable via its own separate switch.
3. General guidelines for the selection of light fixtures should include the use of recessed lamps in sharp cutoff luminaries or shielded to provide controlled lighting with minimal light spill on information displays and to avoid shining light directly in the instructor's or student's eyes.
4. The lighting temperature of all lamps shall be specified at 3500°K.
5. Switching controls shall be located near the room entrances and on the front wall near the instructor's workstation.

D. Classroom Power Requirements:

1. Any audio-visual system requires clean, high quality ac power to operate correctly and reliably, with the lowest possible hum and noise. A conservative number of AC power circuits shall be dedicated exclusively to the audio-visual systems.
2. Electrical boxes must be staggered and shall not be placed "back to back" on any interior room surfaces.

1.10 LEVELS OF CLASSROOM TECHNOLOGY

A. The evolution of the classroom technology has resulted in the development of a three-level approach to system design and implementation. Each level is designed to add additional functionality to the overall system. They are based upon a foundation consisting of a well-designed classroom environment and campus network. The following table shows the components available to each level of classroom technology.

1. Level 1 :
 - a. Projection Screen

- b. Video Projector
- c. Projector Remote Control
- d. Laptop Computer Connection
- e. Auxiliary Audio and Video Connection
- f. Stereo Audio Playback
- g. CWRUnet Faceplate
- h. Telephone (optional)

2. Level 2 :

- a. Projection Screen
- b. Video Projector
- c. Projector Remote Control
- d. Laptop Computer Connection
- e. Auxiliary Audio and Video Connection
- f. Stereo Audio Playback
- g. CWRUnet Faceplate
- h. Telephone
- i. VCR/DVD Player
- j. Document Camera
- k. Computer with Lectern LCD Display
- l. Wireless Mouse
- m. Integrated AV Control System
- n. Teaching Station (optional)
- o. Remote AV System Support
- p. Touch Panel Control
- q. Instructor Speech Reinforcement (optional)
- r. Student Speech reinforcement (optional)
- s. White Board with Image Capture (optional)

3. Level 3 :

- a. Projection Screen
- b. Video Projector
- c. Projector Remote Control
- d. Laptop Computer Connection
- e. Auxiliary Audio and Video Connection
- f. Stereo Audio Playback
- g. CWRUnet Faceplate
- h. Telephone
- i. VCR/DVD Player
- j. Document Camera
- k. Computer with Lectern LCD Display
- l. Wireless Mouse
- m. Integrated AV Control System
- n. Teaching Station
- o. Remote AV System Support
- p. Touch Panel Control
- q. Video Conferencing Enabled
- r. Instructor Camera
- s. Instructor Microphone

- t. Student Camera
- u. Student Microphones
- v. Remote Site Display
- w. AV Recording Enabled (optional)
- x. Instructor Speech Reinforcement (optional)
- y. Student Speech reinforcement (optional)
- z. White Board with Image Capture (optional)

- B. The Level 1 system starts with a ceiling mounted video projection system that is chosen to best meet the requirements of the classroom environment. A projection screen provides an ideal viewing surface for data or video, displaying clear, bright images. A convenient interface plate provides connections for network, computer, video and audio sources. The system is controlled by a user-friendly remote control panel that allows users to turn the system on and off, select various input sources and adjust audio volume. Wall-mounted program speakers provide stereo sound for a complete multimedia experience. Each classroom also contains a telephone that allows faculty technical support should the need arise. The Level 1 classroom is designed to be deployed as a short-term solution and in rooms that seat less than 20 people.
- C. The Level 2 system includes all the components and features found in the Level 1 system along with the addition of greatly enhanced presentation capabilities. Every Level 2 classroom features a teaching station that is specially designed to house the room's technology, yet has a relatively small footprint (2' x 4') that is no larger than the desks that are currently located in each classroom. The teaching station features a height-adjustable surface, which allows the system to be operated from a standing or sitting position. The teaching station also features a retractable keyboard and mouse tray, along with a built-in LCD monitor, which serves as a confidence monitor that provides the ability to display the same image on both the built-in monitor and projection system, allowing instructors to maintain eye contact with their students. A document camera serves as a significant upgrade from the traditional overhead projector. Not only does it offer the ability to display overhead transparencies, but it can be used to image (and capture) pages from a book or periodical, hand written notes, pictures, photographs, x-rays and even three-dimensional objects. All these images can be saved as html pages that can be retrieved over the network. A rack-mounted combination VCR/DVD player allows the instructor to incorporate the highest quality video in the classroom. The system is controlled by a user-friendly remote control panel that contains all the features found in a Level 1 classroom along with simple transport controls of the VCR/DVD players. The control system also features an expanded set of browser-based controls that enable access to more advanced system control features, such as chapter and menu search of DVD titles. It also enables remote support of the classroom in that it allows technical support personnel to access classroom systems from a central location.
- D. The Level 3 system includes all the components and features found in the Level 2 system along with a unique set of features, which enables the classroom to function as a video conference facility. A Level 3 classroom can be used as an endpoint for video conferences.

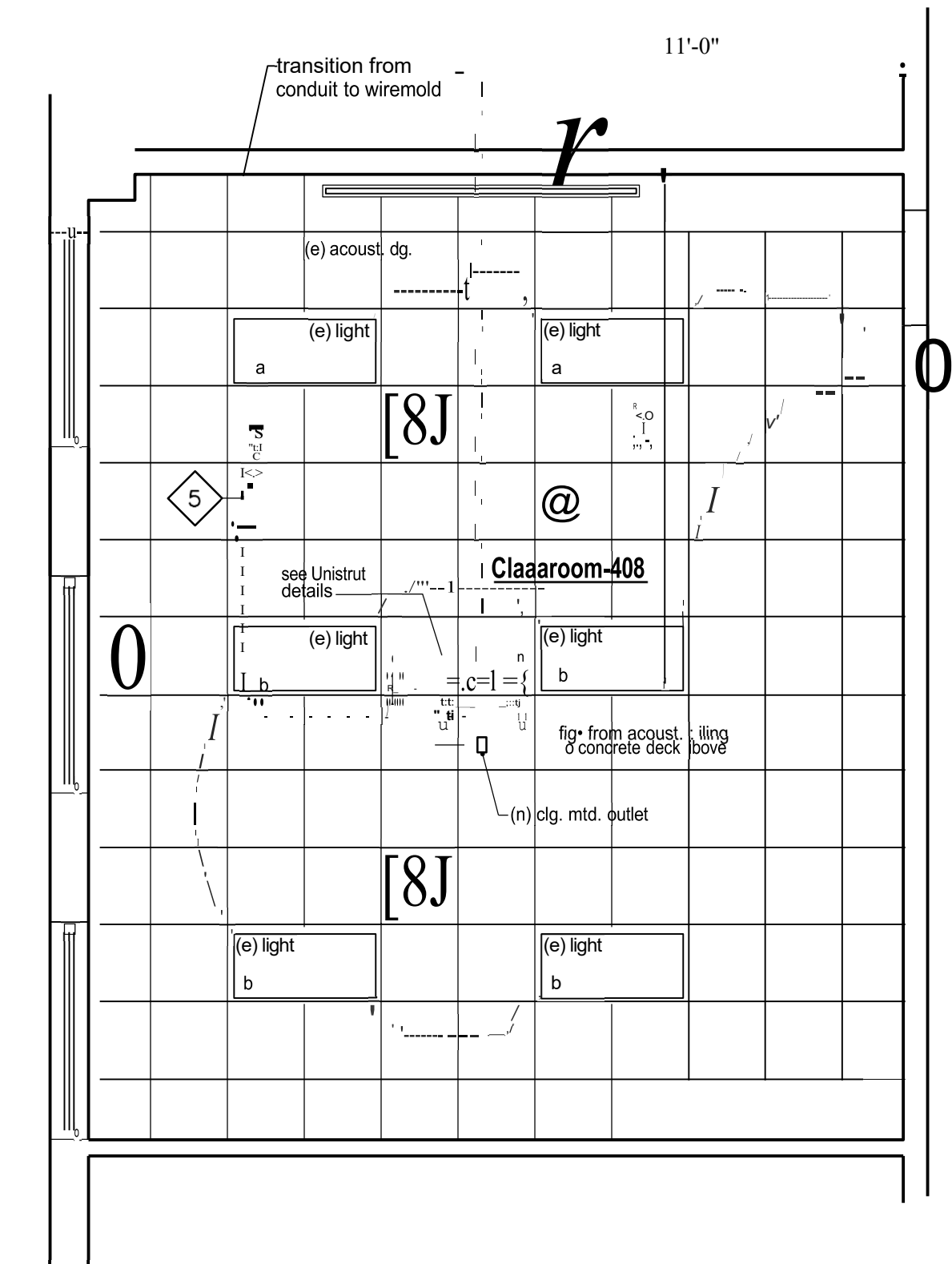
1.11 STANDARD A/V CLASSROOM LAYOUTS AND DETAILS

- A. Attachment 13 10 00.01: Sheet A1 shows the Floor Plan and Reflected Ceiling Plan of a typical A/V Room is approximately 21' x 25'.
- B. Attachment 13 10 00.02: Sheet A2 shows the Floor Plan and Reflected Ceiling Plan of a typical

A/V Room is approximately 22' x 22'.

- C. Attachment 13 10 00.03: Sheet A3 shows Unistrut Details for hanging screens and projectors.
- D. Attachment 13 10 00.04: Sheet A4 shows an Interior Elevation of each Room.

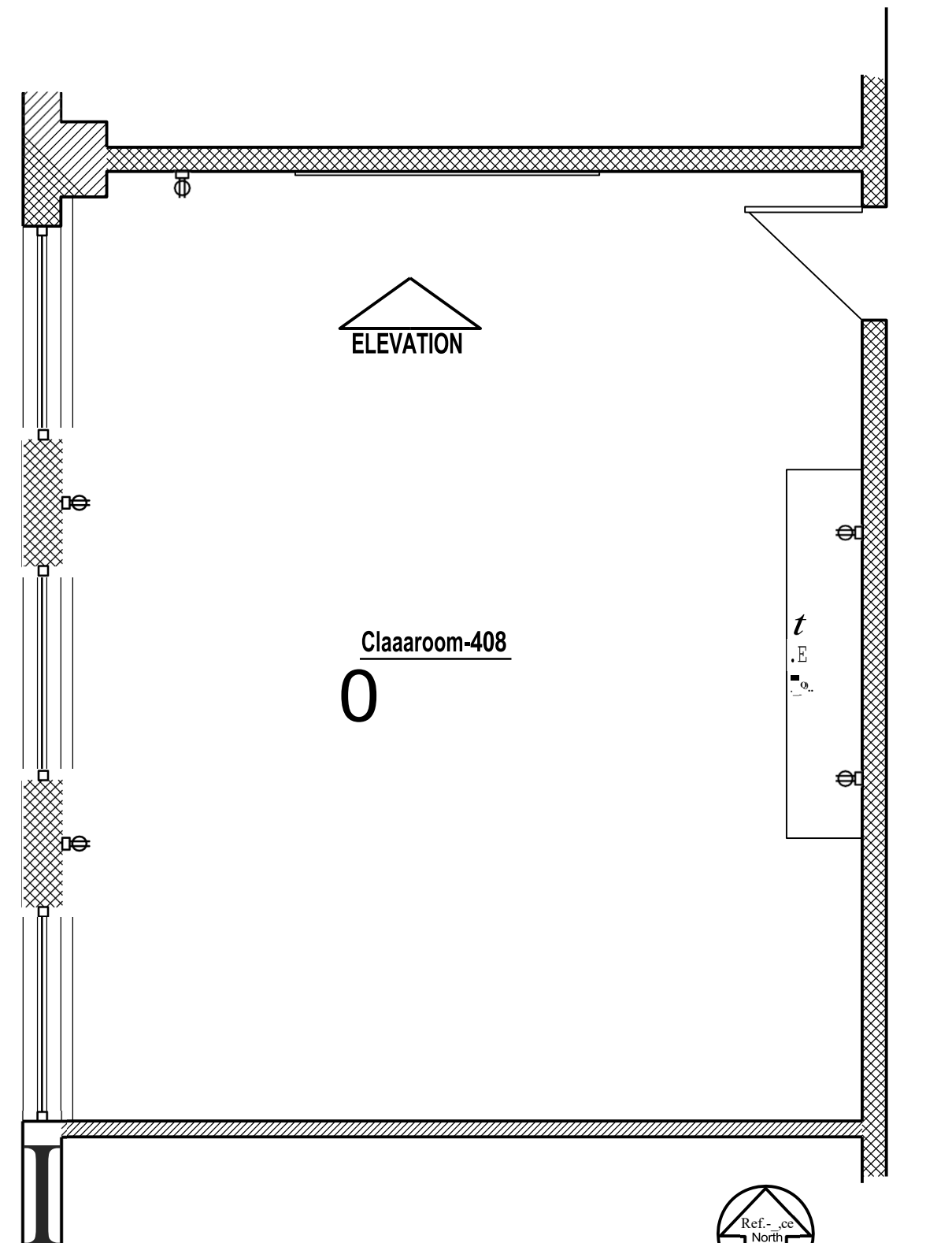
END OF SECTION



Ceiling Plan - Olin Rm. 408

1/4" = 1'-0"

2



Floor Plan - Olin Rm. 408

1/4" = 1'-0"

1

Drawing Notes:

- 0 Contractor to remove existing surface mounted single light switch and install new double light switch box. Rewire existing 6 lights as shown on ceiling plan.
- 0 Contractor to install Owner supplied motorized projector screen, Draper Premier, 6'h x B'w. Install screen approximately 4" off wall. See Dtl. 3 on Sheet A3. Modify acoustical cening as required to install screen and install a new opening in ceiling for screen lowering. Supply power as required and install Owner supplied switch. Wiremold by electrical contractor.
- 0 Install wiremold for new outlet boxes. 3 and 4 gang outlet boxes to be supplied by one wiremold
- 0 New speakers supplied and installed by Owner. Contractor to install bridge rings for Owner supplied speaker cables. Speaker cables to connect speakers to projector. Contractor to install speaker cables, Owner to install cable terminations.
- 0 Contractor to install 1-1/2" conduit from projector to above wiremolds. Contractor to install wiremold and gong outlet boxes. Contractor to install Owner supplied cables from projector to outlet boxes. Owner to install cable terminations.
- 0 Contractor to point all new exposed wiremold, conduits and outlet boxes to match existing adjacent walls. All patching and pointing to be included in their bid.

**CWRU
Olin Bldg. - Rm. 408
AV Installation**

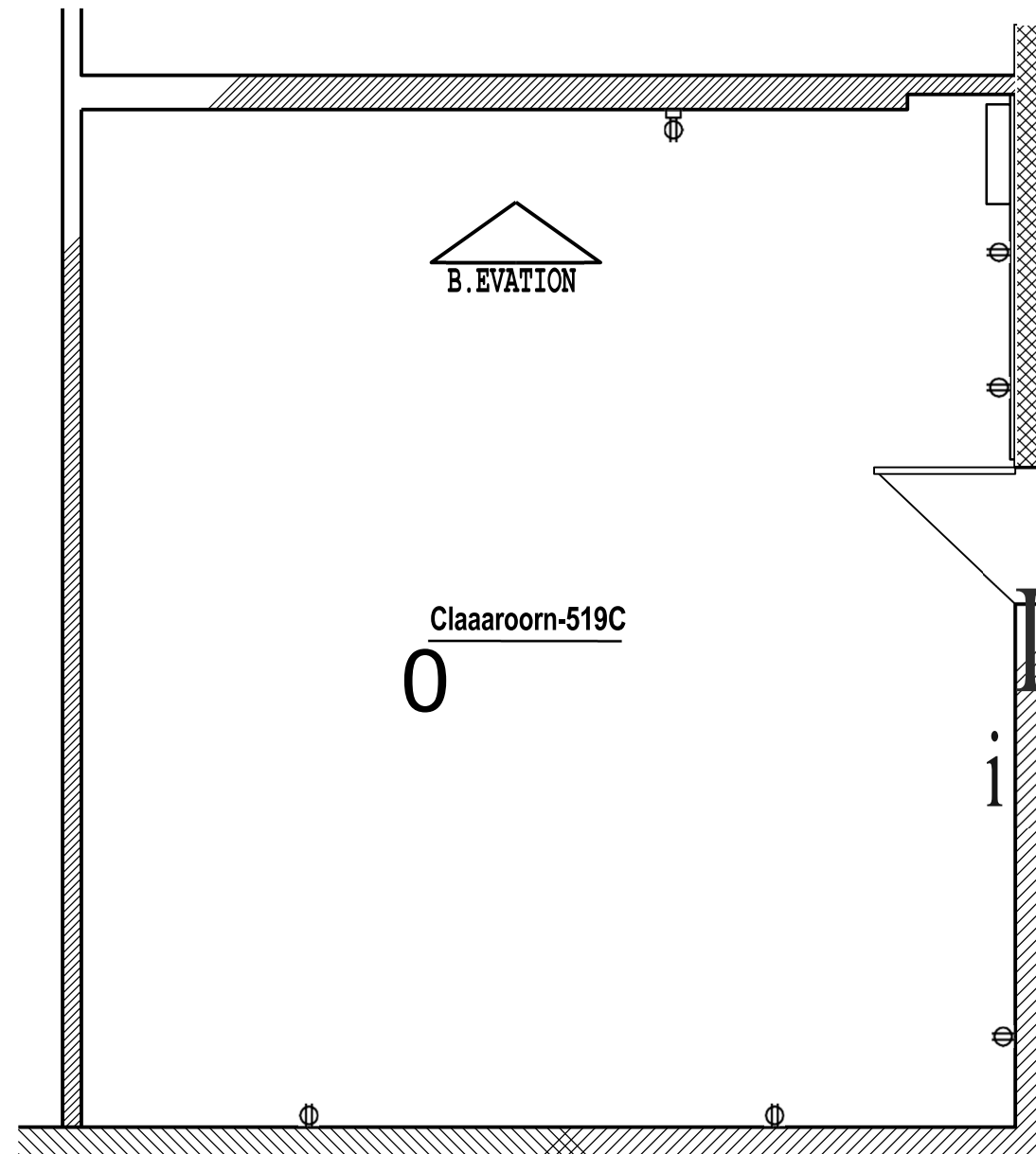
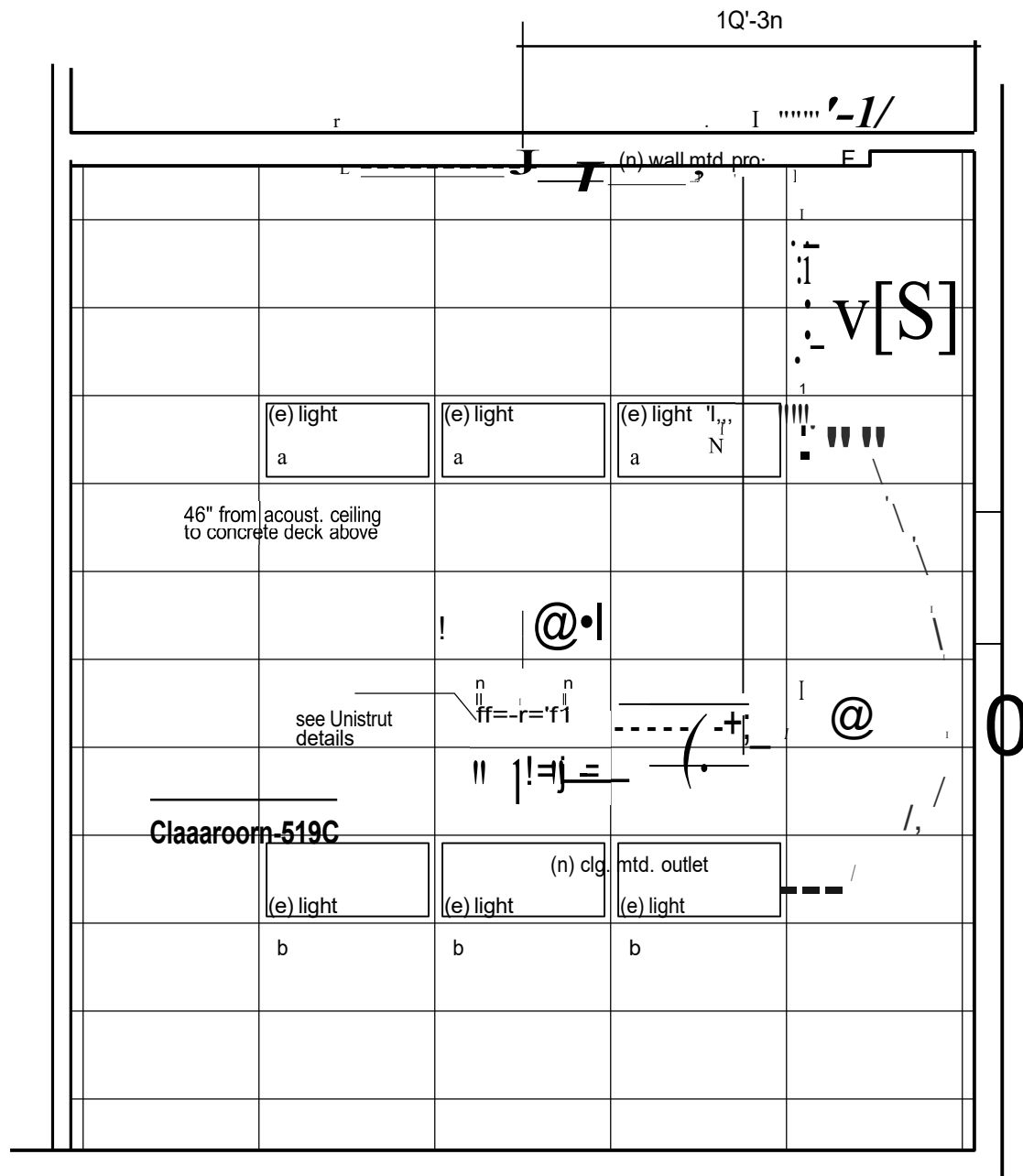
10600 Euclid Avenue
Cleveland, OH

0904

SMITH Architects
10 North Main Street, 114
Chagrin Falls, Ohio 44022
440.247.8650
Fax: 440.247.8370

Floor Plans

A1



Drawing Notes=

- 0 Contractor to remove existing surface mounted single light switch and install new double light switch box. Rewire existing 6 lights as shown on ceiling plan.
- 0 Install wiremold for new outlet boxes. 3 and 4 gong outlet boxes to be supplied by one wiremold.
- 0 New speakers supplied and installed by Owner. Contractor to install bridge rings for Owner supplied speaker cables. Speaker cables to connect speakers to projector. Contractor to install speaker cables, Owner to install cable terminations.
- 0 Contractor to install 1-1/2" conduit from projector to above wiremolds. Contractor to install wiremold and gong outlet boxes. Contractor to install Owner supplied cables from projector to outlet boxes. Owner to install cable terminations.
- 0 Contractor to point all new exposed wiremold, conduits and outlet boxes to match existing adjacent walls.
- 0 Contractor to install Owner supplied wall mounted manual projector screen, Draper lumo2 60" x 80", as close as possible to ceiling. Install blocking so that the screen is installed out from the wall post the wiremold.

**CWRU
Glennan Bldg. - Rm. 519C
A/V Installation**

10600 Euclid Avenue
Cleveland, OH

0904

SMITH Architects
10 North Main Street, 114
Chagrin Falls, Ohio 44022
440.247.8650
Fax: 440.247.8370

Floor Plans

Ceiling Plan - Glennan Rm. 519C

1/4" = 1'-0"

2

Floor Plan - Glennan Rm. 519C

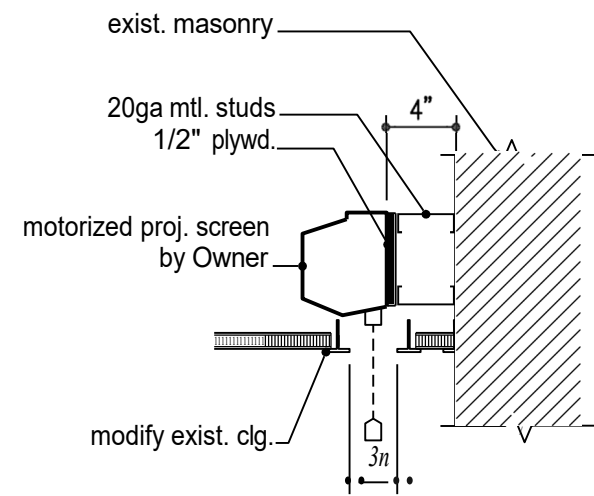
1/4" = 1'-0"



1

A2

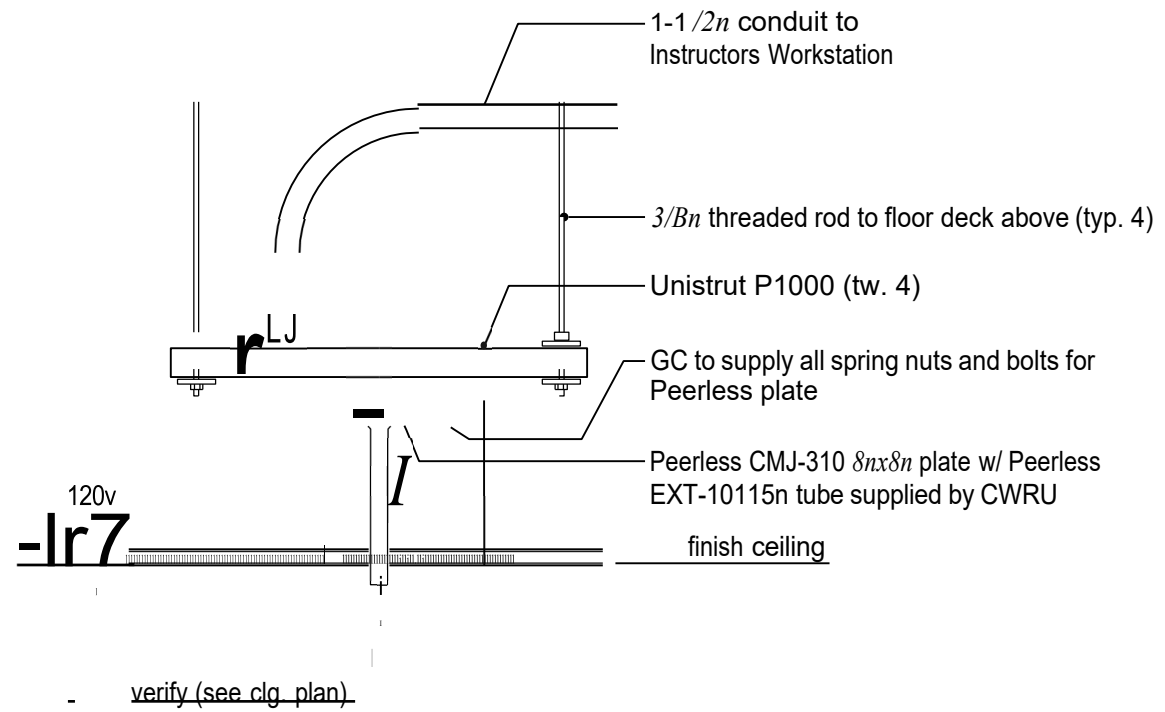
No.	Remarks	Date
	Bid Set	2/27/09



Olin Room 408 Proj. Screen Dtl.

1" = 1'-0"

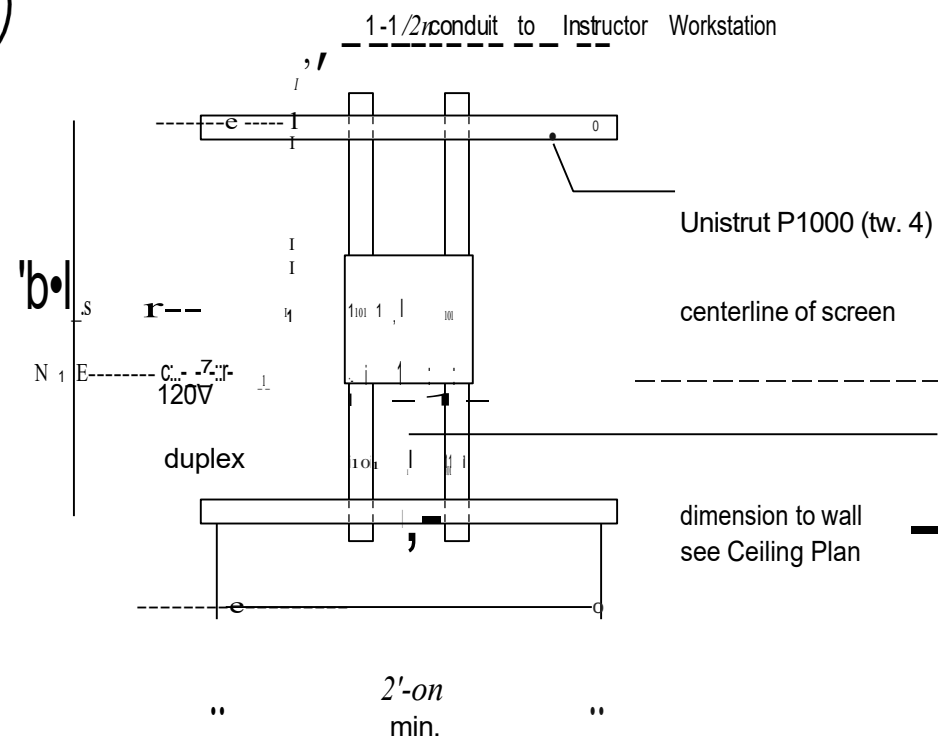
3



Project Unistrut Section

1" = 1'-0"

2



CWRU
Olin / Glennan Bldgs.

AV Installation

10600 Euclid Avenue
Cleveland, OH

0904

SMITH Architects

Project Unistrut Plan

1" = 1'-0"

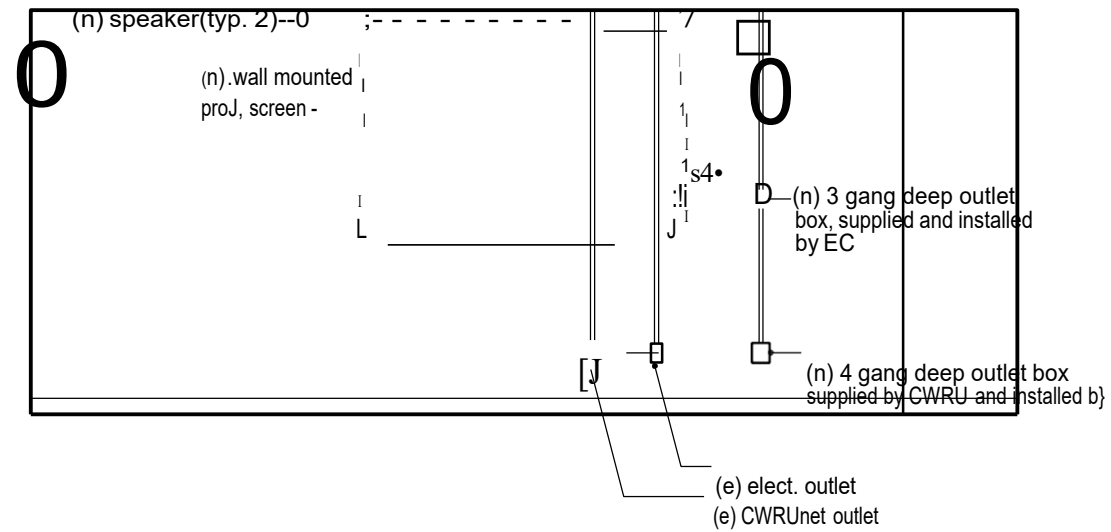
10 North Main Street, 114
Chagrin Falls, Ohio 44022
440.247.8650
Fax: 440.247.8370

Details

1

A3

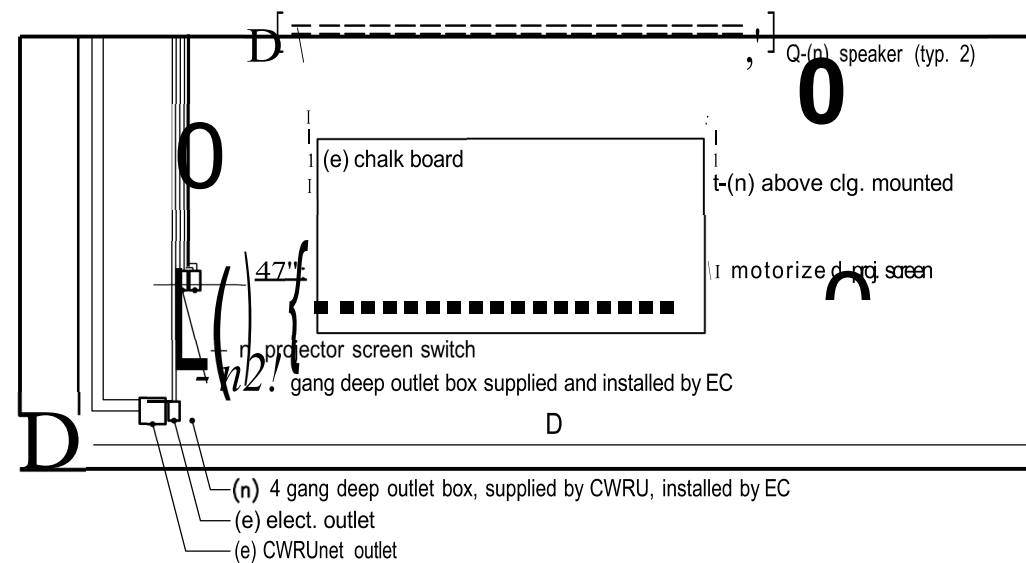
No.	Remarks	Date
	Bid Set	2/27/09



Glennan Room 519C Elevation

1/4" = 1'-0"

2



Olin Room 408 Elevation

1/4" = 1'-0"

1

CWRU
Olin / Glennan Bldgs.
AN Installation
10600 Euclid Avenue
Cleveland, OH

0904

SMITH Architects
10 North Main Street, #4
Chagrin Falls, Ohio 44022
440.247.8650
Fax: 440.247.8370

Elevations

A4

SECTION 14 20 00 - ELEVATORS, DUMBWAITERS, AND CHAIR LIFTS

1.1 GENERAL

- A. Basis-of-Design Product: Subject to compliance with requirements, provide a complete conveying system by one of the following:
 - 1. Kone Corporation (formerly Montgomery-Kone).
 - 2. Schindler USA & Canada.
 - 3. ThyssenKrupp Elevator.
 - 4. Otis Elevator.
- B. Conveying Systems shall use non-proprietary equipment, software, hardware, and maintenance tools to be acceptable, such that a Service Agreement may be entered into with other than the initial system manufacturer/installer.
- C. All installations shall be ADA compliant and shall be equipped with a factory installed ADA compliant automatic dialing telephone.
- D. Provide a one (1) year Warranty from the date of Substantial Completion of the Project.
 - 1. Early turnover of conveying equipment for the Contractor's use is acceptable, so long as the Contractor acquires and pays for all additional warranty extension time. The Owner shall continue to have a one (1) year warranty from the date of Substantial Completion of the Project.
- E. Upon completion of the Work, and as a condition of its acceptance, and at no additional cost to the Owner, deliver to the Owner requisite copies of the following:
 - 1. Executed copies of Warranty.
 - 2. Project Record Documents.
 - 3. Maintenance Manuals: Bound manual as well as electronic software for elevator equipment, with operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing for major and critical components, emergency instructions, and similar information.
 - 4. Provide to the Owner all special service tools and computer interface hardware, including operating software.
 - 5. Provide to the Owner complete as built wiring diagrams.
 - 6. Provide to the Case Western Reserve University elevator maintenance contractor:
 - a. One set of elevator as built shop drawings.
 - b. One set of elevator repair manuals.
 - c. Service tools.
 - d. Computer software for equipment maintenance.
 - e. Employee training.

1.2 QUALITY ASSURANCE

- A. Installer Qualifications: The Elevator Contractor shall have a minimum of five (5) years of successful experience in the type of work specified.
- B. Regulatory Requirements: All work shall comply with current governing local codes, laws, ordinances, and regulations.
- C. Standards: Except as modified by local codes, the work shall comply with the current edition of the following standards.
 - 1. ANSI A117.1: American National Standards Institute.
 - 2. ASME A17: American Society of Mechanical Engineers.
 - 3. ASTM: American Society for Testing Materials.
 - 4. AWS: American Welding Society.
 - 5. IEEE: Institute of Electronic and Electrical Engineers.
 - 6. NEII: National Elevator Industry Inc.
 - 7. NEC: National Electrical Code.
 - 8. NEMA: National Electrical Manufacturing Association.
 - 9. OSHA: Occupational Safety and Health Administration.
 - 10. UL: Underwriters Laboratories.
- D. Special attention shall be paid to ASME A17 requirements pertaining to the following:
 - 1. Pit Lighting.
 - 2. Shaft Ventilation.
 - 3. Fire Rated Doors.
 - 4. Electrical Panel Locations.

1.3 TESTS

- A. Upon substantial completion, test entire system in accordance with ASME A17.
- B. State of Ohio Elevator Inspection Violation Reference List is included in as Attachment 01.

1.4 HOISTWAY VENTILATION

- A. If Hoistway requires ventilation, it is recommended to use a cupola style such as Greenheck PEV-400 Penthouse Elevator Vent or approved equal. This assures protection of the Hoisway from rain water and melting snow.

1.5 PROPRIETARY TOOLS OR DIAGNOSTIC EQUIPMENT

- A. Any tools or equipment required for diagnostics, troubleshooting, or setting parameters that are not commercially available from other sources and required to provide proper maintenance and operation of the diagnostic equipment shall be provided to the Owner as a part of the work.
- B. A back-up copy of the final software shall be provided to the Owner for their use.

END OF SECTION

*Elevator Inspection Violation Reference List for
NEW Passenger, Freight and LULA Elevators*

Pre-Inspection Checklist

for New Installations of
Passenger, Freight and LULA Elevators

This form is to be completed and submitted to the Elevator Section Scheduling Coordinator at the time the request for an inspection is submitted. The checklist is required for all new installations of Passenger, Freight and LULA elevators.

See the ASME A17.1 2004S edition for the full text of the violations listed. In addition, see the referenced documents of NFPA #70 2082 for electrical code violations, the Ohio Building Code for fire rating and venting requirements, and NFPA 13 and 72 for sprinklers and firefighter emergency operations. See the following link for a list of common violations:

http://www.com.state.oh.us/dico/docs/elev_PreInspectionCheckList.pdf

Please Read Before Signing:

- A state of Ohio Field Inspector must inspect an elevator, and a temporary or permanent certificate of operation issued before an elevator may be used for any purpose.
- No person or company including a contractor, owner, tenant or Elevator Company may use the elevator to haul construction materials, furniture or persons not directly related to the installation and construction of the elevator unless permitted by a temporary certificate of operation issued by the Chief Elevator Inspector.
- An inspection will not be scheduled unless this form is included with your request to schedule an inspection.
- The unit will not be scheduled unless all potential violation items are completed prior to the inspection. The elevator inspection section does not perform “punch-list” type inspections or provide consulting services.

Provide State Elevator ID Number: _____

Name of Elevator Company: _____

Phone Number: _____ Fax Number: _____

Certified by: Print Name: _____ Signature: _____

Date: _____

Additional Notes and Remarks

Category	Code	Description	Discontinue Flag	Discontinue Date
N-	1	ACCESS/ROOF-HOISTWY ---Access to and from the roof and machine room shall be by the means of a stairway. When access is over a sloping roof or a roof with vertical obstructions, a walkway shall be provided. Access shall be safe and convenient. It is prohibited to allow access to a machine room to non-authorized personnel. Doors, which allow passage through a machine room to gain access to a roof area or other building equipment, shall be prohibited. See ASME A17.1 Item 2.7.3.	NO	
N-	2	NON-ELEVATOR RELATED ---All non-elevator-related piping and equipment shall be prohibited from entering or passing through the machine room per ASME A17.1 Item 2.8.1 and Item 2.8.2.	NO	
N-	3	ELECTRICAL DISCONNECT ---Electrical disconnects shall be lockable in the open position and properly located within sight of the elevator devices as outlined in NFPA 70 Rule 620-51. All disconnects shall be properly fused or utilize a non-self resetting circuit breaker. A lockable disconnect with overcurrent protection shall be located in the machine room serving the car lighting per NFPA 70 620-22 and 620-53. Advisory: The preferred location for electrical disconnects is near the jamb side of the machine room door in order to be readily accessible to qualified personnel.	NO	
N-	4	RECEPTACLES ---Receptacles in the machine room and machinery spaces shall have GFCI protection either by a GFCI-type receptacle or a GFCI-type circuit breaker per NFPA 70 Rule 620-85. Warning signs shall be posted when there is power from more than one source per NFPA 70 Rule 620-52-see also 620-91 & 620-51.	NO	
N-	5	ELECTRICAL CLEARANCE ---All electrical clearances shall be provided and maintained in front of the controller and disconnect at all times. Advisory: It is interpreted that machine room doors that swing into the electrical clearance area endanger worker safety and are prohibited and they shall meet the provisions of NFPA 70 Rule 620-5.	NO	
N-	6	MACHINE ROOM LIGHT ---Permanent electric light shall be provided in all machine rooms and machine spaces. The illumination shall be not less than 19ftc at the floor per ASME A17.1 sec. 2.7.9.	NO	
N-	7	ELECEQUIP/CONTR/MACH ---All electrical equipment, controllers, and machines shall be properly installed and grounded per NFPA 70 Rule 620-81; 82; 83 and ASME A17.1 Item 2.8.2.3.	NO	
N-	8	ELECTRICAL CONDUIT ---All electrical conduit shall be properly secured and routed in a workman like manner. See NFPA 70 Rule 620-21.	NO	
N-	9	ABC TYPE FIRE EXTING ---A properly tested and maintained ABC type fire extinguisher of adequate size shall be provided in the machine room per ASME A17.1 Item 8.6.1.6.5. The fire extinguisher in machine room is to be of sufficient size to allow workers within the room to exit safely in the case of a fire within the machine room occurs during their maintenance procedures. The extinguisher is not meant for usage for returning to the room to fight the fire. The extinguisher is to be located in an area of the room that will allow easy access to the extinguisher by workers. It is recommended that when	NO	

possible, the extinguisher be located near the jamb side of the elevator room entrance door.

Category	Code	Description	Discontinue Flag	Discontinue Date
N-	10	<p>CONDUCTORS</p> <p>---All conductors used in raceways and for hoistway door interlock wiring shall be flame-retardant per NFPA 70 Rule 620-11/Table 400.4.</p>	NO	
N-	11	<p>DOOR SELF-CLOSE/LOCK</p> <p>---The machine room door shall be self-closing and self-locking. The door shall always require a key to be opened from the outside, but can always be opened from the inside without a key per ASME A17.1 Item 2.7.3.4.1.</p>	NO	
N-	12	<p>CLEAR HEADROOM</p> <p>---The clear headroom in a machine room shall be not less than 7 feet. This shall be measured from any overhead obstruction per ASME A17.1 Item 2.7.4.1. LULA elevator headroom clearances shall be not less than 79" per ASME A17.1 Item 5.2.7.8</p>	NO	
N-	13	<p>MACHINE ROOM VENTED</p> <p>---Machine rooms shall be provided with natural or mechanical means to keep the ambient air temperature and humidity in the range specified by the elevator equipment manufacturer to ensure safe and normal operation of the elevator. The temperature and humidity range shall be permanently posted in the machine room per ASME A17.1 Item 2.7.5.2.</p>	NO	
N-	14	<p>COMMUNICATION</p> <p>--Where required, a permanent means of communication shall be provide between the elevator car and remote machine/control room per ASME A17.1 Item 2.7.8.4.</p>	NO	
N-	15	<p>SPRINKLERS</p> <p>---Sprinklers may serve a machine room via a branch line, when the machine room is located above the roof of the building, risers, return pipes, and branch lines for the machine room sprinkler(s) shall be permitted to be located in the hoistway between the top floor and the machine room, but they shall not pass through the machine room per ASME A17.1 Item 2.8.2.3.1.</p>	NO	
N-	16	<p>SHUNT TRIP OPERATION</p> <p>---Power shall be removed from the main line disconnect prior to the application of the sprinkler, commonly referred to as "shunt-trip operation." See ASME A17.1 Item 2.8.2 and NFPA 70 section 620; and NFPA 72 and 13.</p>	NO	
N-	17	<p>EXPOSED EQUIPMENT</p> <p>---Exposed equipment shall be guarded as required per ASME A17.1 Item 2.10.</p>	NO	
N-	18	<p>PIT LADDER</p> <p>---For pits greater than 35 inches in depth, a pit ladder shall be provided with a handrail at least 48 inches above the landing, the rungs are to have at least 4 ½ inches of toe clearance; and be not less than 16 inches in width (with 9 inches permitted under certain circumstances); and have a 12 inch separation between rungs. The ladder shall be non-combustible and within 39 inches from the egress door per ASME A17.1 Item 2.2.4.2.</p>	NO	
N-	19	<p>PIT REFUGE AREA</p>	NO	

---A pit refuge area of not less than 24 inches to 42 inches in height (depending on available width) is required when the car is on a fully compressed buffer per ASME A17.1 Item 2.4.1. LULA elevators shall conform to ASME A17.1 Item 5.2.1.4.

Category	Code	Description	Discontinue Flag	Discontinue Date
N-	20	PIT STOP SWITCH ---A pit stop switch shall be located within reach of this access floor, adjacent to the pit ladder and located about 18" above the landing in order to be accessible before stepping onto the pit ladder per ASME A17.1 Item 2.2.6.2..	NO	
N-	21	2ND PIT STOP SWITCH ---A second pit stop switch shall be provided when the pit exceeds 67" in depth and located approximately 47" from the pit floor per ASME A17.1 Rule 2.2.6.2.	NO	
N-	22	LIGHT FOR PIT ---A light for the pit shall be located so as to provide 10 fc lighting for the area. The switch shall be near the stop switch. The light shall be guarded per ASME A17.1 Section 2.2.5.	NO	
N-	23	REQUIRED PIT LIGHT ---The required pit lighting shall not be connected to the load side of the GFCI per NFPA 70 620-24.	NO	
N-	24	GFCI TYPE RECEPTACLE ---A GFCI type receptacle shall be provided in pits and on car tops per NFPA 70 Rule 620-85.	NO	
N-	25	SPRINKLER IN HOISTWY ---When a sprinkler is present in the hoistway or pit area, all electrical conduit shall be enclosed in NEMA-4 and wiring shall be identified for use in wet locations per ASME A17.1 Item 2.8.2.3.4.	NO	
N-	26	RECEPTACLES ---Receptacles for sump pumps shall conform to NFPA 70 620-85.	NO	
N-	27	DRAINS ---When fire fighter's service is present, drains shall be provided for all passenger, freight and LULA elevators. When a drain cannot be provided, a permanently installed sump pump shall be provided. The sump hole in the pit area shall be guarded with non-combustible material. All sump pumps are to discharge the fluid outside of the hoistway. See ASME A17.1 Item 2.2.2.4. The purpose of the sump pump is to prevent the accumulation of water in the pit area originating from the interior of the building due to fire fighting operations and to allow for the elevator to remain in service for operation under Phase II firefighter service. See ASME A17.1 Item 8.6.4.7.4 and published ASME A17.1 interpretations and the Ohio Plumbing Code. Oil sensing devices may be present on the sump pump, but electrical supply and auxiliary equipment must be located outside of the elevator hoistway.	NO	
N-	28	OFFSETS OR LEDGES ---All offsets or ledges within the hoistway greater than 4 inches shall be tapered to not less than 75 degrees per ASME A17.1 Item 2.1.6.2.	NO	
N-	29	SPRINKLER IN HOISTWY ---Sprinklers provided in the hoistway, (if required by the local jurisdiction), shall not interfere with the required clearances on top of the elevator car or the moving equipment within the hoistway per ASME A17.1 Section 2.8.2.	NO	
N-	30	BRANCH LINES ---Only branch lines shall be permitted to serve the hoistway, and the line may not serve more than one level per ASME A17.1 Item 2.8.2.1.2.	NO	

Category	Code	Description	Discontinue Flag	Discontinue Date
N-	31	<p>MAIN LINE DISCONNECT</p> <p>---Power shall be removed from the main line disconnect prior to the application of the sprinkler. The device shall be located within 2 feet of each sprinkler head. Smoke detectors shall not be used to activate shunt trip devices. See ASME A17.1 Item 2.8.2.3.2 and NFPA 72.</p>	NO	
N-	32	<p>SPRINKLER HEADS</p> <p>---Sprinkler heads located in the pit area shall not be located more than 2 feet above the pit floor per NFPA 13 Item 4.13.5. or ASME A 17.1 item 2.8.2.3.2 .Shunt trip devices are not required for pit sprinkler heads if the location of the sprinkler head is in conformance with the previous statement.</p>	NO	
N-	33	<p>CLEARANCES</p> <p>---Top and bottom car and counterweight runby and vertical clearances shall meet the requirements of ASME A17.1 Section 2.4 for traction/drum elevators and ASME A17.1 Section 3.4 for hydraulic elevators.</p>	NO	
N-	34	<p>OVERHEAD CLEARANCE</p> <p>---Overhead working clearances shall be provided in the upper end of the hoistway. When the elevator is at extreme travel, a minimum of 43 inch refuge area is required for traction/drum elevators when the counterweight is on a fully compressed buffer per ASME A17.1 Item 2.4.12.1, and a 43-inch refuge area is to be provided for hydraulic elevators (when on the stop ring) per ASME A17.1 Item 3.4.7.</p>	NO	
N-	35	<p>HORIZONTAL/REFUGE</p> <p>---In any area outside the refuge space where the vertical clearance between the top of the car enclosure and the overhead structure shall be clearly marked. The marking shall consist of alternating 4" diagonal red and white stripes. In addition, a sign with the words "Danger Low Clearance" shall be prominently posted on the crosshead and be visible from the entrance. The sign shall be permanently and readily legible per ASME A17.1 Item 2.4.12.2.</p>	NO	
N-	36	<p>MINIMUM/CROSSHEAD</p> <p>---A minimum of 24 inches shall be provided over the crosshead for counterweighted elevators. Beams are not to interfere with these clearances per ASME A17.1 Item 2.4.6.</p>	NO	
N-	37	<p>6" CLEARANCE/CARTOP</p> <p>---A minimum of 6 inches of clearance shall remain between the top of any auxiliary devices on the car-top and the overhead structure when the car is at extreme upward travel (strike point) per ASME A17.1 Item 2.4.11/2.4.6.2(c) for traction/drum elevators and ASME A17.1 Item 3.4.5 for hydraulic elevators. In addition, hydraulic elevator crossheads shall have a minimum of 12 inches of vertical clearance to the horizontal plane as described by the lowest point of the overhead structure.</p>	NO	
N-	38	<p>LULA/BOTTOM CLEARANC</p> <p>---Bottom car clearances for LULA elevators shall conform to ASME A17.1 Item 5.2.1.4 or meet the alternative bottom car clearances per ASME A17.1 Item 5.2.1.4.2.</p>	NO	
N-	39	<p>LULA/TOP CLEARANCE</p> <p>---Car top clearances for LULA elevators shall conform to ASME A17.1 Item 5.2.1.4.3. Alternative car top clearances per ASME A17.1 Item 5.2.1.4.4 shall be applied only to LULAs installed in existing buildings.</p>	NO	
N-	40	<p>HORIZONTAL CLEARANCE</p> <p>---Horizontal clearances shall meet ASME A17.1 Section 2.5 for both traction/drum and hydraulic elevators. LULA elevators shall conform to ASME A17.1 Item 5.2.1.5 for traction/drum units and Item 5.2.2.1 for hydraulic LULA units.</p>	NO	

N-	41	ESCAPE HATCH	NO
		---Car top escape hatches shall be provided for LULA elevators when manual operation is not provided as described in ASME A17.1 Item 5.2.1.28 per ASME A17.1 Item 5.2.1.14(b).	
N-	42	2-WAY/24-HR COMMUNIC	NO
		---Two-way 24-hour voice communication shall be provided from the elevator car to a location that can take action per ASME A17.1 Item 2.27.1.1.3 and previous ASME interpretations. Advisory: Refer to the "ADAAG" guidelines for additional requirements for "hands free" telephone operation.	
N-	43	SMOKE DETECTORS	NO
		---Fire-service initiating devices (smoke detectors) shall be properly located in the enclosed elevator lobbies and machine rooms. Initiating devices are required in the hoistway when a sprinkler head is located in the hoistway. See ASME A17.1 Section 2.27.3.2 & NFPA 72 for specific requirements for wiring methods and detector placement.	
N-	44	SMOKE ACTIVATION	NO
		---Smoke and not heat shall activate the fire-service initiating device unless approved by the jurisdiction having authority per NFPA 72; ASME A17.1 2.27.3.1.4 and ASME A17.1 published interpretations.	
N-	45	FIRE ALARM/VISUAL	NO
		---Either the fire alarm initiating device in the machine room or hoistway shall cause the visual signal in the car to illuminate intermittently per ASME A17.1 Item 2.27.3.2.6.	
N-	46	FIREFIGHTERSERV/LULA	NO
		---Firefighters service is not required for LULA elevators, but if provided, the installation shall meet the full provisions of ASME A17.1 Item 5.2.1.27.	
N-	47	HOISTWAY GLASS	NO
		---All glass used in construction of the hoistway enclosure shall be laminated. The laminated glass shall be marked with the proper ASME Z97.1 laminated glass etching on each and every panel per ASME A17.1 Item 2.1.1.2.2 (d)	
N-	48	RESTRICTED OPENDEVIC	NO
		---All hoistway/car door restricted opening devices shall be installed per ASME A17.1 Item 2.12.5.	
N-	49	MATERIALS/FLAME	NO
		---Materials used on floor and walls of an elevator car enclosure shall adhere to the flame spread and smoke density requirement of ASME A17.1 Item 2.14.2.1. The materials shall be certified and tested by the manufacturer for their end use configuration including adhesives.	
N-	50	GLASS IN CAB	NO
		---All glass used in the elevator cab shall meet the marking requirements of ASME A17.1 Item 2.14.1.8.	
N-	51	ILLUMINATION/LANDING	NO
		---Illumination at the landing sill shall be not less than 10 ftc per ASME A17.1 Item 2.11.10.2.	

N-	52	HOISTWAY DOOR GUIDES	NO
		---Hoistway door guides and safety retainers shall conform to ASME A17.1 Item 2.11.11.6	
N-	53	ROPE SOCKET/RET CLIP	NO
		---Wedge rope sockets and retaining clips shall be installed per ASME A17.1 Item 2.20.9.5.	
N-	54	ANTI-ROTATION DEVICE	NO
		---Anti-rotation devices shall be provided to prevent the rotation of the suspension ropes without restricting their movement horizontally or vertically per ASME A17.1 Item 2.20.9.8.	
N-	55	CONTROLLERS/UL/CSA	NO
		---All elevator controllers shall be "UL" or "CSA" labeled as to conforming to the requirements of ASME A17.5 per ASME A17.1 Item 2.26.4 or Item 3.26 for hydraulics and Item 5.2.2 for LULA Elevators.	
N-	56	DOOR INTERLOCKS	NO
		---All hoistway door interlocks shall be labeled as to conforming with the testing requirements of ASME A17.1 Item 8.3.3 per ASME A17.1 Item 2.12.4.3 or Item 3.12 for hydraulics, or item 5.3.1.7 for LULA elevators.	
N-	57	CODE DATA PLATES	NO
		---Code data plates shall be installed per ASME A17.1 Item 8.9.	
N-	58	FIRE SERVICE INSTRUC	NO
		---Fire service instructions shall be installed per ASME A17.1 Item 2.27.7	
N-	59	ID NUMBERING	NO
		---Emergency identification numbering shall be provided when more than one elevator is in a hoistway or machine room. The following items shall be numbered: the driving machine; the mainline disconnect switch; the crosshead; and the car operating panel per ASME A17.1 Item 2.29.1.	
N-	60	HOISTWAY NUMBERS	NO
		---Hoistway door floor numbers visible from within the hoistway shall be provided per ASME A17.1 Item 2.29.2, or Item 3.1 for hydraulic elevators and Item 5.2.1.1 for LULA elevators.	
N-	61	ROPE DATA TAGS	NO
		---Rope data tags shall be installed per ASME A17.1 Rules 2.20.2.1 on the crosshead and 2.20.2.2 on the wire rope fastenings, and Item 3.20 for roped hydraulics and Item 5.2.1.20 for LULA elevators.	
N-	62	PRESSURES POSTING	NO
		---Full-load working pressures for hydraulic elevators shall be permanently posted per ASME A17.1 Item 3.24.1.1, and Item 5.2.2.12 for LULA elevators.	
N-	63	PUMP RELIEF VALVES	NO
		---Pump relief valves shall be sealed after being set to the correct pressure per ASME A17.1 Item 3.19.4.2.1(c)	

N-	64	CAR CAPACITY PLATE	NO
		---In-car capacity plate shall be installed per ASME A17.1 Item 2.16.3, or Item 3.16.3 and Item 5.2.1.16.2 for LULA elevators.	
N-	65	FREIGHT LOADING SIGN	NO
		---Freight elevators shall be provided with a sign specifying the type of loading for which the elevator is designed per ASME A17.1 Item 2.16.5.	
N-	66	NO PASSENGERS SIGN	NO
		---Freight elevators not permitted to carry passengers shall have a sign reading: "This is not a passenger elevator. No persons other than the operator and freight handlers are permitted to ride on this elevator" per ASME A17.1 Item 2.16.5.	
N-	67	MAINLINE DISCONNECT	NO
		---For hydraulic elevators, a sign shall be placed on the mainline disconnect reading "Keep switch closed except during maintenance, repair and inspection" per ASME A17.1 Item 3.26.3.1.	
N-	68	CROSSHEAD DATA TAGS	NO
		---Crosshead data tags shall be installed per ASME A17.1 Item 2.16.3.1 or 5.2.1.16.2.	
N-	69	GOVERNOR ROPE TAGS	NO
		---Governor rope data tags shall be installed per ASME A17.1 Item 2.18.5.3.	
N-	70	TRIPPING SPEEDS TAGS	NO
		---The tags indicating the governor tripping speeds shall be installed per ASME A17.1 Item 2.18.9.	
N-	71	CLEARANCE SIGNS	NO
		---For LULA elevators, signs shall be posted in the pit or overhead whenever there is insufficient bottom car clearance or insufficient car top clearance per ASME A17.1 Item 5.2.1.4.2 and Item 5.2.1.4.4.	
N-	72	FIREFIGHTER SERVICE	NO
		---Firefighter Service shall function properly per ASME A17.1 Item 2.27.3.	
N-	73	TOP OF CAR RAILING	NO
		---A standard railing conforming to 2.10.2 shall be provided on the outside perimeter of the car top on all sides where the perpendicular distance between the edges of the car top and the adjacent hoistway enclosure exceeds 12" Horizontal clearance per ASME A17.1 Item 2.14.1.7.1	
N-	74	PIT ACCESS DOOR	NO
		---Pit access doors shall be provided when pit floor is more than 120" and conform to the requirements of Item 2.2.4 per ASME A17.1.	
N-	75	MAINTENANCE CLEARANCE	NO
		---A clear path and a clearance of not less than 18" shall be provided in the directions required for maintenance access per ASME A17.1 Item 2.7.2.2.	

N-	76	BUILDING WITHOUT FIRE ALARMS SYSTEMS	NO
		--In facilities without a building fire alarm system, these smoke detectors shall be connected to a dedicated fire alarm system control unit that shall be designated as "elevator recall control and supervisory panel".The "elevator recall control and supervisory panel" shall receive input and monitor the smoke detectors within the dedicated fire alarm system per NFPA 72 - 2002 section 6.15.3.	
N-	77	CONTROL CIRCUIT FOR SHUNT TRIPS	NO
		---Control circuits to shutdown elevator power shall be monitored for presence of operating voltage. Loss of voltage to the control circuit for the disconnecting means shall cause a supervisory signal to be indicated at the control unit and required remote annunciators per NFPA 72 section 6.15.4.4 and NFPA 70 section 620.	
N-	86	Hoistway Access Switch	NO
		--Hoistway access switches shall be provided and function accordingly. Per A17.1 Sec.2.12.7	
N-	87	Closing Data Plate	NO
		--A data plate shall be attached to the power door operator or crosshead containing minimum closing times. Per A17.1 Sec.2.13.4.2.4	
N-	88	Machine Room Source	NO
		--A separate branch circuit shall supply the machine room or control room/machine space or control space lighting/receptacle(s). Per NFPA 70 620.23	
N-	89	Machine Room Lighting/GFCI	NO
		--Machine rooms shall be properly lighted so the electrical control devices and machinery are well illuminated. The light switch shall be located in the machine room and shall be placed near the machine room door jamb per ASME A17.1 Sec. 2.7.5.1. The required lighting shall not be connected to the load side of a GFCI per NFPA 70 620-23.	
N-	93	Top car Inspection	NO
		--Operating devices for inspection operation shall be provided on the top of car and labled accordingly. Per A17.1 Sec. 2.26.1.4	
N-	95	Em. Exit Elec. Contact	NO
		--All exit covers shall be provided with a electrical device, positively opened, cannot close accidentally, manually reset, and protected against mechanical damage. Per A17.1 Sec. 2.14.1.5	
N-	96	Top Car Light/Recept.	NO
		--Each elevator shall be provided with an electric light and outlet on top of the car. Per A17.1 Sec. 2.14.7.1.4	

Category	Code	Description	Discontinue Flag	Discontinue Date
N1	30	Light source --A separate branch circuit shall supply the car lights, receptacle(s), auxiliary lighting power source and ventilation on each elevator car. Per NFPA 70 620.22	NO	
N1	31	Headroom in Car --The minimum clear headroom of 80 inches above the car floor shall be provided. Per A17.1 Sec. 2.14.2.4	NO	
N1	35	Displays --Visual displays shall have edges beveled or rounded and shall not project greater than 1.5 inches. Per A17.1 Sec. 2.14.1.9.1.(d)	NO	
N1	36	In Car Venting --Natural ventilation in the car shall be guarded to prevent straight-through passage. Per A17.1 Sec. 2.14.2.3.1	NO	
N1	37	Symbols --Symbols shall be as specified in Table 2.26.12.1 or required wording. Per A17.1 Sec. 2.26.12	NO	
N1	38	Stop --An emergency stop switch or in car stop switch where required shall function accordingly. Per A17.1 Sec. 2.14.1.4.4/2.14.1.4.5	NO	
N1	39	In Car Lights --The minimum illumination shall not be less than 5ftc for passenger/2.5 ftc for freight and shall not be less than 2 lamps. Per A17.1 Sec. 2.14.7	NO	
N1	40	Guard Lights --Light bulb and tubes within the car shall be equipped with guards. Per A17.1 Sec.2.14.7.4	NO	
N1	41	Emergency Lights --Each elevator shall be provided with auxiliary lighting of .2 ftc. Per A17.1 Sec. 2.14.7.	NO	
N1	42	ALARM ON AN EMERGENCY STOP SWITCH --When an emergency stop switch is provided an audible signal device shall be provided. Per A17.1 Sec. 2.27.1.2	NO	
N1	43	Emergency Alarm --The audible signal device shall function for at least 1 hr. Per A17.1 Sec.2.27.1.1.5	NO	
N1	45	Reopening device --Reopening devices for power operated car doors and gates shall function accordingly. Per A17.1 Sec. 2.13.5	NO	
N1	46	Door Force --The force necessary to prevent closing of hoistway door from rest shall not exceed 30lbf. Per A17.1 Sec.2.13.4.2.3	NO	
N1	66	Phase I Label --Phase I switch shall be labeled "Fire Recall" with position marked "Reset", "Off", and "On". Per A17.1 Sec. 2.27.3.1.1b	NO	

Category	Code	Description	Discontinue Flag	Discontinue Date
N1	67	Phase I Illuminate --All "Fire Recall" switches shall be provided with an illuminated visual signal to indicate when Phase I emergency recall operation is in effect. Per A17.1 Sec. 2.27.3.1.5	NO	
N1	68	Visual Signal --The visual signal shall remain activated until the car is restored to automatic operation. Per A17.1 Sec. 2.27.3.1.6(h)	NO	
N1	69	Phase II Panel Layout --All buttons and switches shall be readily accessible, located not more than 72 inches above the floor and shall be arranged as shown in Fig.2.27.3.3.7 Per A17.1 Sec.2.27.3.3.7	NO	
N1	70	Fed From Sign --The disconnecting means shall be provided with a sign to identify the location of the supply side over current protective device. Per NFPA 70 620.54/ 620.53/620.51(D)	NO	
N1	71	Parts of Controller Sign --Warning sign for multiple disconnecting means shall be clearly legible and shall read; "Warning parts of the controller are not de-energized by this switch." Per NFPA 70 620.52(B)	NO	
N1	72	Drive Sheave Data tag --Drive sheaves and drums shall be permanently and legibly marked to state the minimum sheave and drum diameter. Per A17.1 Sec. 2.24.2.4	NO	
N1	73	Drive Machine Brake Marking Plate --The brake setting and method of measurement shall be permanently and legibly marked on the drive machine. Per A17.1 Sec. 2.24.8.5	NO	
N1	74	Ascending car --Ascending car over speed protection shall be provided and function accordingly A17.1 Sec. 2.19	NO	
N1	75	Unintentional Movement --Protection shall be provided with a device to prevent unintended car movement away from the landing and shall function accordingly. A17.1 Sec.2.19.2	NO	
N1	76	Emergency Brake --When required for protection against ascending car over speed. An emergency brake shall be provided and function accordingly. A17.1 Sec. 2.19.3	NO	
N1	77	Emergency Brake/Rope Gripper Marking Pla --The Emergency Brake/ Rope Gripper shall be provided with a marking plate. Per A17.1 Sec.2.19.3.3	NO	
N1	78	Checking Liquid Level --Tanks shall be provided with means for checking liquid level. Per /A17.1 Sec. 3.24.3.3 (Dip Stick or magnet)	NO	

Category	Code	Description	Discontinue Flag	Discontinue Date
N1	79	Pressure Switch --When cylinders are installed with the top of the cylinder above the top of the storage tank. A pressure switch shall be provided. Per A17.1 Sec.3.26.8	NO	
N1	80	Low Oil Protection --A means shall be provided to render the elevator on normal operation inoperative if for any reason the liquid level in the tank falls below the permissible minimum. Per A17.1 Sec. 3.26.9	NO	
N1	81	Battery Lowering --Where the auxiliary power supply provided solely for the purpose of lowering the car shall conform according to A17.1 Sec. 3.26.10	NO	
N1	82	Emergency Power/Standby --Where an emergency or standby power system is provided to operate an elevator in the event of normal power failure shall conform to Sec. 2.27. Per A17.1 Sec. 2.27.2	NO	
N1	83	Pit Source --A separate branch circuit shall supply the hoistway pit lighting and receptacle(s). Per NFPA 620.24 (A)	NO	
N1	84	Sump Cover --Sumps and sump pumps in pits where provided, shall be covered. The cover shall be secured and level with the pit floor. Per A17.1 Sec. 2.2.2.6	NO	
N1	85	Buffer Plates --Buffer shall be provided with marking plates per A17.1 Sec.2.22.3.3/ 2.22.4.11	NO	
N1	86	Max Runby Sign --Shall provide a data plate with "MAXIMUM DESIGN COUNTERWEIGHT RUNBY" Per A17.1 Sec. 2.4.5	NO	
N1	87	Platform Guard --The entrance of the platform of passenger and freight elevators shall be provided with a smooth metal guard securely braced Per A17.1 Sec. 2.15.9	NO	
N1	88	Safety Bulkhead --Clearance shall be provided at the bottom of the cylinder that the bottom of the plunger will not strike the safety bulkhead of the cylinder when the car is resting on its fully compressed buffer. Per A17.1 Sec. 3.18.3.3	NO	
N1	89	5 Gallon Collection --A means shall be provided to collect for removal any oil leakage from the cylinder head seals or packing gland. Per A17.1 Sec. 3.18.3.7	NO	
N1	90	Buried Cylinder --Cylinders buried in ground shall be protected from corrosion due to galvanic or electrolytic action, saltwater or other underground conditions. Per A17.1 Sec. 3.18.3.8	NO	
N1	91	Hyd. Pipe Identification --A marking shall be applied to accessible piping that is located outside the elevator machine room or hoistway "Elevator Hydraulic Line". Per A17.1 Sec. 3.19.2.5	NO	

Category	Code	Description	Discontinue Flag	Discontinue Date
N1	92	Over speed Valve --Over speed valve shall be installed and mounted and sealed accordingly to A17.1 Sec. 3.19.4.7.3	NO	

SECTION 21 10 00 – FIRE SUPPRESSION SYSTEMS – GENERAL

1.1 SUMMARY

- A. Provide for the design of a complete, automatic, building Fire Suppression System, as appropriate and in compliance with all current and applicable codes.
- B. Provide for the design of a water, dry, wet chemical, dry chemical, foam, carbon dioxide, or other type of building Fire Suppression System that is appropriate for the building or area Use Group.
- C. Provide for the design of the interconnection of the Fire Suppression System(s) with the Smoke and Fire Detection System(s) as well as the Access Control System(s)

1.2 QUALITY ASSURANCE

- A. Fire Suppression Systems shall be designed in accordance with the current versions of the following:
 - 1. Ohio Building Code (OBC), Chapter 9.
 - 2. National Fire Protection Association (NFPA), appropriate Chapter for system.
 - 3. Factory Mutual (FM).
 - 4. Underwriters Laboratories (UL).
 - 5. Local Fire Marshall.
 - 6. CWRU Department of Environmental Health and Safety (EHS).

- B. Orange Plastic Piping shall not be used for Fire Suppression Systems.

1.3 SUBMITTALS

- A. Fire Suppression System Shop Drawings shall be designed, prepared, and sealed by a Certified Fire Suppression System Designer.
- B. Fire Suppression System Shop Drawings shall be submitted to CWRU Department of Environmental Health and Safety for review. CWRU review shall be for coordination and compliance with their requirements. This review shall not be for compliance with the OBC, NFPA, FM, UL or any other applicable codes. Such compliance shall be the sole responsibility of the Certified Fire Suppression System Designer.
- C. Sealed Fire Suppression System Shop Drawings shall be adequate to be submitted to local authorities to obtain all Fire Suppression System Permits.

1.4 SPECIAL CONDITION

- A. Provide a small red dot on lay-in ceiling grid to indicate the location of all above ceiling flow valves.

1.5 CLOSEOUT

A. Provide the following to Owner.

1. Warranty Documents.
2. As-Built Documents.
3. Staff Training on operation and maintenance of all systems.
4. Operation and Maintenance Manuals.

END OF SECTION

SECTION 22 10 00 – PLUMBING SYSTEMS – GENERAL

1.1 PLUMBING GENERAL

- A. Design systems so that all components requiring access are easy to reach for maintenance. These components include, but are not limited to valves and clean-outs. Provide appropriate size access doors for servicing of all devices. Use only screwdriver operated access latching. Keyed locks on doors are not permitted. Access doors shall be clearly marked on drawings. To the greatest extent possible, design systems so required access points do not occur in spaces intended for high design impact.
- B. Domestic interior water piping shall be type "L" copper only.
- C. Use only ADA approved lavatory and kitchen faucets only, no self-closing fixtures are permitted.
- D. Use only poly propylene pipe for de-ionized water piping. Joints may be either fused or mechanical.
- E. All eyewash stations and emergency showers shall utilize tepid water per current ANSI/ISEA Z358.1 standard. Provide with mixing valve such that water can be maintained at 70 degrees F.
- F. All Electric Water Coolers shall be equipped with water bottle fillers.
- G. All valves less than 2-1/2 inch shall be ball valve type unless not appropriate for the application.
- H. All Laboratory drain piping shall be acid resistant, regardless of the use of the laboratory.
- I. All Laboratory service fixtures (air, gas, vacuum etc.) shall be ball valve type only.
- J. Waterless Urinals are not permitted.
- K. High Purity Water Systems shall be coordinated with Owner to determine current service provider.

1.2 IDENTIFICATION OF PIPING SYSTEMS

- A. The Owner has instituted a common system to assist in the identification of the contents of piping systems. This system conforms to the current ANSI standard A13.1.
- B. Positive identification of the contents of a piping system shall be by lettered legend giving the name of the contents in full or abbreviated form. In addition, arrows shall be used to indicate direction of flow of those contents.
- C. Legends shall be brief, informative, pointed and simple for greatest effectiveness. Legends shall be applied close to valves or flanges and adjacent to changes in direction, branches and where pipes pass through walls and floors, also at intervals on straight pipe runs sufficient for identification usually not more than 25 feet.

- D. Attention shall be given to visibility of the pipe markings. Where pipe lines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal center line of the pipe to facilitate a more direct line of sight.
- E. Valve charts shall be posted in all Equipment Rooms. Tags shall identify each valve identifying what content they control and to what specific piece of equipment that content is supplied.
- F. Piping Identification Legends with designated colors shall be as follows:
 - 1. Piping with contents that are inherently hazardous:
 - a. Flammable or explosive materials: Yellow field with Black letters.
 - b. Chemically active or toxic materials: Yellow field with Black letters.
 - c. Materials with extreme temperature or pressures: Yellow field with Black letters.
 - 2. Piping with contents that are inherently low hazard:
 - a. Liquid or liquid admixture: Green field with White letters.
 - b. Gas or gaseous admixture: Blue field with White letters.
 - 3. Piping with contents that are fire quenching materials:
 - a. Water, foam, CO₂, etc.: Red field with White letters.

G. Size of Legend Letters

- 1. For pipes with Outside Diameters of 3/4 inch to 1-1/2 inch:
 - a. Length of color 8 inches, height of letters 1/2 inch.
- 2. For pipes with Outside Diameters of 1-1/2 inch to 2-1/2 inch:
 - a. Length of color 8 inches, height of letters 3/4 inch.
- 3. For pipes with Outside Diameter of 2-1/2 inch to 6 inch:
 - a. Length of color 12 inches, height of letters 1-1/4 inch.
- 4. For pipes with Outside Diameter of 6 inch to 10 inch:
 - a. Length of color 24 inches, height of letters 2-1/2 inch.
- 5. For pipes with Outside Diameter greater than 10 inches:
 - a. Length of color 32 inches, height of letters 3-1/2 inch.

1.3 PREFERRED PLUMBING FIXTURES AND EQUIPMENT MANUFACTURERS

A. Acid Waste Lines:

- 1. Enfield.

2. Orian.

B. Backflow Preventers:

1. Febco.
2. Watts.
3. Wilkens Zurn.

C. Valves:

1. Apollo.
2. Hammond.
3. Milwaukee.
4. Victaulic.
5. Watts.

D. High Purity Water Piping:

1. Enfield.
2. Orian.

E. Domestic Hot Water heaters:

1. A. O. Smith.
2. PVI.
3. Rudd.

F. Eyewash Stations/Emergency Showers (per ANSI.ISEA Z358.1):

1. Guardian.
2. Haws.

G. Faucets:

1. Kitchen Sinks:

- a. American Standard.
- b. Chicago.
- c. Moen.

2. Lavatories:

- a. American Standard.
- b. Chicago.
- c. Moen.
- d. Sloan.
- e. Zurn.

3. Service Sinks:

- a. Chicago 445-897SRCX KCP with integral check valve to prevent crossover.

- 4. Laboratories:
 - a. Chicago.

- H. Flushometers:
 - 1. Zurn 6000 series.

- I. Shower Mixing Valves:
 - 1. Moen, Moentrol with integral stops.

- J. Sinks, Lavatories, and Water Closets:
 - 1. American Standard.
 - 2. Zurn.

- K. Urinals:
 - 1. Zurn, 1 pint/flush units.

- L. Pumps (Domestic Hot Water pumps shall be brass or bronze):
 - 1. Bell & Gossett.
 - 2. Armstrong.
 - 3. Peerless.

END OF SECTION

SECTION 23 10 00 - HVAC SYSTEMS - GENERAL

1.1 HVAC SYSTEMS GENERAL

- A. All pneumatic controls shall be marked Hot Deck, Cold Deck, Mixed Air, etc. See Identification of Piping Systems paragraph below.
- B. Design systems so that all components requiring access are easy to reach for maintenance. These components include, but are not limited to, shut off, balancing and control valves, dampers, filters and terminal boxes. Provide access doors (with a minimum width of 18 inches) in ductwork for servicing of all devices. Use only screwdriver operated access latching. Keyed locks on doors are not permitted, including doors at fire dampers. Access doors shall be clearly marked on drawings. To the greatest extent possible, design systems so required access points do not occur in spaces intended for high design impact.
- C. All pneumatic controls, relays, end point switches, etc. shall have 1-1/2 inch gauges installed to read the output/input signals.
- D. All steam line valves shall be gate valves.
- E. All air compressor line valves shall be ball valves.
- F. All pneumatic line valves shall be ball valves unless not appropriate for the application.
- G. All valves less than 2-1/2 inch shall be ball valve type unless not appropriate for the application.
- H. All gauges shall be liquid filled except on steam and condensate return lines.
- I. Roof top equipment shall be dampened to eliminate perceptible vibrations.
- J. Clearances, follow manufacturers recommendations, however, a minimum of 3 feet around areas requiring maintenance shall be provided for.
- K. Assume a 20 year life cycle with 12% spare capacity for system component selection.
- L. All Laboratory drain piping shall be acid resistant, regardless of the use of the laboratory.
- M. All mechanical equipment shall be designed to be accessible for service without rigging or equipment.

1.2 IDENTIFICATION OF PIPING SYSTEMS

- A. The Owner has instituted a common system to assist in the identification of the contents of piping systems. This system conforms to the current ANSI standard A13.1.
- B. Positive identification of the contents of a piping system shall be by lettered legend giving the name of the contents in full or abbreviated form. In addition, arrows shall be used to indicate direction of flow of those contents.

- C. Legends shall be brief, informative, pointed and simple for greatest effectiveness. Legends shall be applied close to valves or flanges and adjacent to changes in direction, branches and where pipes pass through walls and floors, also at intervals on straight pipe runs sufficient for identification usually not more than 25 feet.
- D. Attention shall be given to visibility of the pipe markings. Where pipe lines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal center line of the pipe to facilitate a more direct line of sight.
- E. Valve charts shall be posted in all Equipment Rooms. Tags shall identify each valve identifying what content they control and to what specific piece of equipment that content is supplied.
- F. Piping Identification Legends with designated colors shall be as follows:
 - 1. Piping with contents that are inherently hazardous:
 - a. Flammable or explosive materials: Yellow field with Black letters.
 - b. Chemically active or toxic materials: Yellow field with Black letters.
 - c. Materials with extreme temperature or pressures: Yellow field with Black letters.
 - 2. Piping with contents that are inherently low hazard:
 - a. Liquid or liquid admixture: Green field with White letters.
 - b. Gas or gaseous admixture: Blue field with White letters.
 - 3. Piping with contents that are fire quenching materials:
 - a. Water, foam, CO₂, etc.: Red field with White letters.
- G. Size of Legend Letters
 - 1. For pipes with Outside Diameters of 3/4 inch to 1-1/2 inch:
 - a. Length of color 8 inches, height of letters 1/2 inch.
 - 2. For pipes with Outside Diameters of 1-1/2 inch to 2-1/2 inch:
 - a. Length of color 8 inches, height of letters 3/4 inch.
 - 3. For pipes with Outside Diameter of 2-1/2 inch to 6 inch:
 - a. Length of color 12 inches, height of letters 1-1/4 inch.
 - 4. For pipes with Outside Diameter of 6 inch to 10 inch:
 - a. Length of color 24 inches, height of letters 2-1/2 inch.
 - 5. For pipes with Outside Diameter greater than 10 inches:
 - a. Length of color 32 inches, height of letters 3-1/2 inch.

1.3 PREFERRED HVAC EQUIPMENT AND EQUIPMENT MANUFACTURERS

- A. Air Compressors for building system, 1 hp or greater. No oil-less compressors shall be used except for compressors generating air for human consumption.
 - 1. Quincy.
 - 2. Ingersol Rand
- B. Air Compressors less than 1 hp, follow manufacturer's recommendations.
- C. Air Dryer Systems:
 - 1. Hankison.
 - 2. Airco.
- D. Back Flow Preventers:
 - 1. Febco.
 - 2. Wilkens Zurn
 - 3. Watts.
- E. Valves:
 - 1. Apollo.
 - 2. Hammond.
 - 3. Watts.
 - 4. Milwaukee.
 - 5. Victaulic.
- F. Heat Exchangers (Bundles):
 - 1. Bell & Gossett.
 - 2. Taco.
- G. Air Compressor Inlet Air Filters:
 - 1. Coalescent or Particulate Dryer type only.
- H. Air Compressor Inline Filters:
 - 1. Coalescent or Particulate Dryer type only.
- I. Steam Pressure Regulators:
 - 1. Spence (no exceptions).
- J. Pumps (Domestic Hot Water pumps shall be brass or bronze):
 - 1. Bell & Gossett.
 - 2. Armstrong.
 - 3. Peerless.
 - 4. Taco.

K. Steam Traps:

1. Spirax/Sarco

L. Strainer:

1. Wye type with blow-down valve.

END OF SECTION

SECTION 23 50 00 - HVAC CHEMICAL CLEANING AND WATER TREATMENT

1.1 CHEMICAL CLEANING AND WATER TREATMENT - GENERAL

- A. Contractor shall engage the services of the Water Treatment Contractor that currently services Case Western Reserve University to provide a complete fluid treatment service, designed to minimize corrosion and scale formation in the piping systems. Coordinate with Owner to determine current water treatment service provider.
- B. All necessary cleaning chemicals, treatment chemicals, control equipment and services shall be provided by the Water Treatment Contractor. The specifications shall include a one (1) year Service Agreement for each system that shall cover the supply of chemical treatment and service. The fluid treatment supplier shall receive written notice from the Contractor prior to temporary or permanent start-up of any system requiring chemical treatment system. Makeup water piping shall conform to the Board of Health and all City, State, and Federal Code requirements.
- C. The fluid treatment supplier shall forward within 90 days from job acceptance, the following for approval to the Owner:
 - 1. System installation drawings and diagrams.
 - 2. Product information sheets on each component, device, pump, controller, valve, etc., being supplied in the system.
 - 3. Cleveland City Water supplies all systems.
 - 4. Product information sheets and Material Safety Data Sheets on all chemical products being supplied for each system, including cleaning chemicals.
 - 5. Recommended feed rates on each chemical product.
 - 6. Recommended operating conditions for each system, including cycles of concentration, chemical test limits and limits of water treatment system set points.

1.2 CHEMICAL CLEANING

- A. The new and any existing piping systems shall be thoroughly flushed out of cutting oils and other loose extraneous materials. This shall include piping installed now or capped for future use. The cleaning chemicals shall be added by the Contractor. The chemical supplier shall instruct the Contractor as to proper feed rates, shall check that the cleaning solution is actually in each system, shall instruct the Contractor as to when to flush the systems and shall check each system following flushing to insure all cleaning materials have been removed from each system. The Contractor shall block open all modulating valves, zone valves and all other system restrictions. If building pumps are not available, the Contractor shall provide portable pumps to circulate water for cleaning purposes.
- B. Chemicals used for the cleaning of systems shall comply with the recommendations of the manufacturers of the major components in the system.
- C. A certificate of cleaning shall be provided by the cleaning chemical supplier to the Owner, as well as a list and MSDS Sheets for all chemicals being used in the cleaning process.

- D. The cleaning chemical supplier shall supervise the cleaning.
- E. Provide chemical cleaning as each phase of the project is accepted. In addition, provide a complete full system cleaning at the completion of the final phase. The total system shall be cleaned before activation (primary and secondary).

1.3 HOT WATER AND GLYCOL SYSTEMS

- A. The systems shall each have a 5-gallon capacity Shot Feeder installed. The system shall be thoroughly flushed and cleaned.
- B. The feeders shall have:
 - 1. Inlet opening (3/4" NPT).
 - 2. Outlet opening (3/4" NPT).
 - 3. Bottom drain with drain valve to be piped to a floor drain.
 - 4. Mounting bracket.
 - 5. Top opening for chemical addition (2" minimum).
 - 6. Pressure test as required.
 - 7. Install feeders in a two valve bypass arrangement around the most convenient circulating pump. 3/4" NPT feeder lead-in line shall be taken from the circulating line on the discharge side of the pump. 3/4" NPT feeder outlet line shall run to the circulating line on the suction side of the pump.
- C. Antifreeze shall be non-toxic polypropylene only.

1.4 WATER TREATMENT COMPANY NOTIFICATION

- A. Contractor shall notify the Water Treatment Company in writing prior to the operation of any Water System so that they can be initially charged with proper system chemicals.

1.5 CONSULTING ANALYSIS SERVICE

- A. Provide installation, cleaning, start-up supervision, and training of Maintenance Personnel.
- B. Provide written instructions, dosage rates, control limits, and a complete supply of test kits, reagents and test materials.
- C. After Project is Substantially Complete, provide a minimum of 4 quarterly Consulting Analysis Service Visits with written reports and recommendations submitted. Provide a 1-year supply of all chemicals from date of initial start-up.

END OF SECTION

SECTION 23 73 00 - HVAC AIR HANDLING UNITS

1.1 AIR HANDLING UNITS GENERAL

- A. All motors over 10 HP shall be variable frequency drives.
- B. All chilled water coils shall have minimum of 1/2 inch ball valves on drains and vents.
- C. All headers shall be brass or copper.
- D. All motors shall be high efficiency with adjustable base. VFD driven motors shall also be inverter rated.
- E. Duct sizing: All distribution feeding more than five terminals shall have 15% expansion capability.
- F. All fan sizes shall provide for 15% free space for future expansion.
- G. All mechanical duct shafts shall provide for 25% free space for future expansion.
- H. Where possible, Owner preferred HVAC system for non-research/laboratory facilities is a VAV air handling system with a VFD on both the supply and return air fans and VAV terminal boxes with reheat coils as necessary on the respective zones. Continual renovation work of these facilities lends a VAV type system most adaptable to change.
- I. Satellite equipment rooms, telecommunications rooms, electrical equipment rooms and other high heat gain environments shall only have cooling terminals, no reheat coils, and they shall operate independently of the building cooling system.
- J. Owner acknowledges that it is not economical to provide thermostat control in each space, however, to accommodate the diversity of occupants found on campus system design should attempt to provide no more than three spaces controlled off of one thermostat in office areas.
- K. In addition to code requirements, HVAC Systems shall be connected to emergency power if they serve SER Rooms.
- L. Design professional shall assure, via field investigations, air balancing reports, reviews and interviews, that there is sufficient availability of required capacities of existing systems to satisfy the demands of the project specifications without affecting other areas serviced by the existing system and shall document and verify with Owner.
- M. The passage of any piping through SER, electrical or telecommunications rooms, except for the Fire Suppression lines, is prohibited.
- N. For duct cleaning purposes, provide access panels at every 50 feet of straight duct and both upstream and downstream of each elbow and reheat coil.
- O. Spring isolation shall be provided on fans/blower assemblies
- P. Service lights shall be provided in each compartment of the air handling units. Coordinate with Electrical Sections.

- Q. All fan rotation directions shall be clearly marked.
- R. Assume a 20 year life cycle with enough spare capacity to compensate for system degradation over those 20 years.
- S. All air cooled condensers shall be set on curbs built into the roof. The bottom of the units shall be not less than 24 inches off the roof.
- T. Provide access at all dampers, manual or automatic. Access shall be large enough to complete any foreseeable work. All equipment not on legs shall be on housekeeping pads.
- U. All condensate pans shall be stainless steel. Drains shall be copper with an exterior cleanout, and with a "P" trap installed at Floor Drain.
- V. All systems shall have pre-filters and final filters with magnahelic gauges.
- W. Building Cooling Systems shall not be used to satisfy Process Cooling requirements.
- X. Access doors to pressurized spaces shall open inward.
- Y. Access doors to spaces in vacuum shall open outward.

1.2 ACCEPTABLE AIR HANDLER EQUIPMENT MANUFACTURERS

- A. Air Handling Units:
 - 1. Trane.
 - 2. York.
 - 3. Carrier.
 - 4. McQuay.
 - 5. Air Enterprise.
- B. Computer/Server Rooms (and other heat generating rooms):
 - 1. Liebert.
- C. Chillers:
 - 1. Trane.
 - 2. Carrier.
 - 3. York.
- D. Steam Piping, Supply: Schedule 40, black seamless.
- E. Steam Piping, Return: Schedule 80, black seamless.
- F. Steam Traps:
 - 1. Sarco.

END OF SECTION

SECTION 25 10 00 - BUILDING AUTOMATION SYSTEM

1.1 CURRENT EQUIPMENT

- A. Currently the Campus has the following three building automation systems.
 - 1. Invensis (Schneider Electric)
 - 2. Johnson Metasys.
 - 3. Trane Tracer Summit.
- B. Coordinate with the Owner to determine which system is appropriate for each design.
- C. All Hood Control Systems shall be compatible and integrate with the building's control system with full technical support from the vendor.

END OF SECTION

SECTION 26 10 00 - ELECTRICAL SYSTEMS - GENERAL

1.1 ELECTRICAL – GENERAL

- A. All electrical work shall be in accordance with the current editions of NEC, UL, NEMA, and all other state, and local codes and ordinances.
- B. Electrical Rooms:
 - 1. Shall contain no non-electrical piping.
 - 2. Shall have a minimum clear height of 12'- 0".
 - 3. Shall have egress and equipment access openings large enough to accommodate equipment service or replacement.
- C. All electrical conduits shall be a minimum of 3/4" on new installations. Existing relocation of conduit may be 1/2" if original installation is 1/2".
- D. All communication conduits shall be in accordance with Division 27 section for Technology.
- E. All security systems conduits shall be a minimum of 1" unless specifically noted otherwise in Security Sections.
- F. All devices shall be 20 amps fully rated and shall be specification grade with plastic device cover plates.
- G. All exit lights shall be LED diffuse face type. Use battery mounted inside fixture housing only where required.
- H. All conduit runs from floor to 8' A.F.F. in garages, warehouses and mechanical rooms shall be rigid galvanized steel. It may be EMT elsewhere. Riser penetrations shall have a 4" high curbing.
- I. All branch circuit panels shall be bolt-on circuit breaker type, 10,000 A.I.C. breakers. New panels shall have minimum of 20% spare capacity.
- J. All fuses 600 AMP and lower shall be Class RK 1, low peak time delay. 601 AMP and larger shall be Class L low peak.
- K. All safety switches shall be heavy duty with provisions for Class RK 1 fuses.
- L. For systems 600 volt and lower, all wire shall be stranded copper, 600 volt, 90 degrees C. THHN or THWN insulation. Minimum wire size shall be No.12 AWG.
- M. For system above 600 volt, all wire shall be copper, at rated voltage or higher, with ground shield and waterproof insulation.
- N. All transfer switches shall be 3 pole for single-phase systems and 4 pole for three phase systems.
- O. Provide double duplex (quad) receptacles adjacent to all CWRUnet faceplates in office areas.

- P. Designs shall require affixing flash protection warning labels in all electrical panels.
- Q. All receptacles on an emergency circuit shall be red in color with red device cover plates.
- R. Panel Labeling engraved phenolic plates and shall be as follows:
 - 1. XX-A-BBBC where:
 - a. XX = either RP for 208/120V; LP for 480/277V; or PP for 480V distribution
 - b. A = Floor;
 - c. BBB = Room Number;
 - d. C = Letter sequence. Hallway panels get nearest room number.
 - 2. Example: The 1st 208/120 Panel located on the 3rd Floor at Room 301 shall be labeled as RP-3-301A.
- S. Wiremold shall be #3000 when applicable. Alternates may be considered as required.
- T. All grounds shall be separate green ground wire. Conduit shall not be used for ground return.
- U. All building emergency generators shall be natural gas where possible.
- V. All equipment, where applicable, shall carry Energy Star Rating (transformers, lighting, motors, etc.).
- W. For projects that retrofit an existing building, consultants shall specify panel manufacturers prevalent to the Building (if the building presently utilizes Square D panels all new Panels shall be Square D).
- X. Provide two level lighting in stairwells. Low level always on and high level activated by a motion detector.
- Y. All recessed lighting shall have at least 6 inch clearance for service and maintenance.
- Z. All public areas shall use LED lighting where possible.

1.2 ACCEPTABLE EQUIPMENT AND DEVICE MANUFACTURERS

- A. Electrical devices:
 - 1. Minimum 20 amps, fully rated.
- B. Electronic ballasts:
 - 1. Multi-Volt Capacity.
- C. Emergency Lighting Units (battery packs):
 - 1. Only use when project has no emergency generator.
 - 2. Battery Packs shall last not less than 90 minutes when in use.

- D. Exit Lights:
 - 1. Shall be LED only.
 - 2. Shall be red background unless match existing, nearby units
- E. Panels, Branch Circuits:
 - 1. Square D.
 - 2. General Electric.
 - 3. Cutler/Hammer-Westinghouse.
- F. Panels, Distribution:
 - 1. Square D.
 - 2. General Electric.
 - 3. Cutler/Hammer-Westinghouse.
- G. Lighting Controls:
 - 1. Douglas Lighting Controls.
 - 2. General Electric Lighting Controls.
 - 3. Watt Stopper.
- H. Safety Switches:
 - 1. Square D.
 - 2. General Electric.
 - 3. Cutler/Hammer-Westinghouse.
- I. Transfer Switches (All critical service areas shall have bypass capability):
 - 1. Russ Electric.
 - 2. Zenith.
 - 3. Asco.
- J. Clock System (Clocks shall be located in all corridors, classrooms, and teaching labs and shall be satellite synchronized):
 - 1. Primex.

1.3 ELECTRICAL SERVICE AND DISTRIBUTION

- A. All new switchgear shall utilize Square D Powerlogic Metering and Monitoring Systems, and shall be connected to the existing campus Powerlogic System. All current transformers shall include shorting block installation. New switchgear shall be fitted out completely, blank spaces shall be allowed.
- B. All high voltage service through the metering and primary gear shall be subject to utility (The Medical Center Co.) approval in addition to CWRU's approval.
- C. The installation shall comply with The Medical Center Co. specifications issued in Division 33.

1.4 LUMINAIRES AND ACCESSORIES

- A. All fluorescent lighting fixtures shall contain electronic ballast that deliver 98% or greater power factor and have less than 10% harmonic distortion with sound rating of "A."
- B. Incandescent and halogen lamps are not permitted. Use compact fluorescent lamps or LED lamps in all fixtures that would typically use incandescent lamps.
- C. Architect and/or Lighting Consultant shall conform to either I.E.S., IEEE or to the CWRU Required Design Lighting Levels listed herein. This pertains to maximum, as well as minimum levels. Lighting calculations shall be submitted to CWRU with 90% Design Development review drawings.
- D. Outdoor perimeter and walkway lighting source shall be HPS or LED.
- E. All fluorescent lamps shall be SP 35 color specification and shall be T-8. Preferably low mercury lamps. New construction installations may utilize T-5 lamps.
- F. Motion sensors and/or Emergency Management System for lighting control shall be used in hallways, offices, classrooms and restrooms. Departments shall approve use of lighting control in classrooms. Provide a minimum of one night-light in each restroom.

END OF SECTION

SECTION 28 13 00 - ACCESS CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. The conditions of the General Contractor (General, Supplementary and other Conditions) and the General Requirements are made part of this section. The complete installation shall conform to the requirements set forth by the National Electrical Code, all State and Local Building Codes as required by the "Authority Having Jurisdiction" and the requirements of the owner.
- B. Case requires at a minimum that all exterior doors be equipped with card access or electronic door position monitoring.
- C. All equipment and materials provided shall be new and unused and of the most current model or revision. All components of this system shall be installed in a workmanlike manner, following security industry "best practices" and in strict adherence to the manufacturer's specifications and applicable codes. Wire and conduit shall be installed consistent with the following Case building standards.
 - 1. Attachment 28 13 00.01 – Door and Door Frame Details.
 - 2. Attachment 28 13 00.02 – Typical ACS Layout.
 - 3. Attachment 28 13 00.03 – Installation Standards.
- D. The Security System Vendor shall be responsible for all costs associated with the installation of this equipment.

1.2 RELATED DOCUMENTS

- A. Divisions 00 and 01 contain additional provisions that apply to this Section and shall be reviewed thoroughly.

1.3 WORK INCLUDES

- A. Furnish and install all equipment, accessories and materials in accordance with these specifications and drawings to provide a complete and operating Access Control System.
- B. The scope of work for the Electrical Contractor shall include, but not be limited to providing the following:
 - 1. Raceway systems required for complete rough-in.
 - 2. Communication field wiring outside the SER (Satellite Equipment Room).
 - 3. 120 volt emergency power, grounding, wire management raceways and fire resistant backboards located in the SER.
- C. The scope of work for the Security System Subcontractor shall include, but not be limited to providing the following:
 - 1. Local control panels within the SER.

2. Card readers.
3. Exit motion sensors.
4. Magnetic door locks.
5. Door monitor contacts.
6. Request-to-exit devices.
7. Sounders and key-switches.
8. Panic buttons
9. Termination of all field wiring including the card readers.
10. Termination of communication field wiring within the SER.
11. Testing and programming of local system.
12. Reprogramming of existing host computer.
13. Interface with ADA door operators where applicable.

- D. Any material and/or equipment necessary for the proper operation of the access control system not specified or described herein shall be deemed part of this specification.

1.4 ACCEPTABLE MANUFACTURERS

Access Control System (ACS) shall be manufactured by Lenel Systems International, Inc.

Acceptable representatives:

1. Zenith Systems, 5055B Corbin Drive, Bedford Heights, Ohio 44128. Phone: 216-518-3813. Contact: Marty Jeric: mjeric@zenithsystemsllc.com
2. Convergent, 7792 Capital Blvd. Macedonia, Oh 44056 Contact: TJ Ammond: tj.ammond@convergent.com 330-748-8409
3. Presidio Corp. 4960 Blazer Parkway. Dublin Oh 43017. Contact Joey Maniaci jmaniaci@netechcorp.com. 740-725-4227
4. Siemens Industry 5350 Transportation Blvd. Garfield Hts Oh 44125 Contact Richard Boepple 216-816-5132 richard.boepple@siemens.com

- B. All access control hardware and software shall be of a single manufacturer including controller panels, and input and output terminal modules.
- C. All published specifications of the system manufacturer shall be considered as being a part of this specification, even though they have not been written in complete detail.
- D. The base bid shall be based on the products specified. Any substituted product and/or system shall not be accepted without prior approval from the Owner within 10 days of bid date.

1.5 RELATED WORK SPECIFIED ELSEWHERE

- A. Electrical General Provisions
- B. Basic Materials and Methods
- C. Fire-Stopping

- D. Door, door frame and door hardware shall be coordinated with Architect and Owner. All doors that are monitored or provided with access control devices shall be provided with mechanical panic hardware that has the ability to be manually locked in the event of failure by the Access Control System.

1.6 SUBMITTALS

- A. Submittals shall include installation and wiring diagrams and instructions for installation, operation and maintenance, to be suitable for inclusion in the Maintenance Manuals.
- B. Submittals shall include a complete Bill of Material, identifying each component, counts, manufacturer, model number, and unit price, extended price per unit, materials and labor. Case Western Reserve University will review and must approve all submittals and the Bill of Material before equipment is ordered. Costs for shipping, handling, etc. shall be clearly defined as a separate line item.
- C. Submittals shall include descriptive literature for all system components, size and type of recommended conduit and wiring, and sequence of system operation.
- D. Submittals shall include testing and commissioning procedures for the specified system, including report forms that will be provided in a final commissioning report.
- E. Provide final commission report specified in 1.5 D.
- F. Submittals shall include battery calculations.

PART 2 - PRODUCTS

2.1 GENERAL PROVISIONS

- A. Wiring tag requirements: all wiring throughout this project will be tagged using a numerical numbering system and be recorded in an Excel spreadsheet listing cable number, location, wire type, and function. A legend of wiring numbering scheme will accompany this spreadsheet. This document will be provided in both hard copy and electronically as an Excel spreadsheet.
- B. All low voltage control, data, and other cables will be terminated using terminal strips, with crimp type lugs, no "b style crimp connectors" or wire nuts will be allowed.

2.2 SYSTEM DESCRIPTION

- A. The system shall allow for access to the facility by use of card readers at the locations indicated on the Drawings.
- B. The system shall allow for monitoring of doors indicated on the Drawings.
- C. The system shall provide for computer based configuration so as to allow the greatest control of access both during configuration and ongoing operation.
- D. All Access Control System local control panels shall be located within the SER.

2.3 OPERATION REQUIREMENTS

- A. The Access Control System (ACS) shall be capable of integrating multiple building functions including access control, alarm management and intrusion detection.
- B. The system shall be listed by Underwriters Laboratories for UL 294 Access Control Systems and shall carry the UL labels as required.
- C. Control circuits shall be low-voltage Class 2 type only.
- D. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, card readers, sensors, etc.
- E. The system shall incorporate the necessary hardware, software, and firmware to collect, transmit, and process alarm, tamper and trouble conditions, access requests, and advisories in accordance with the security procedures of the facility. The system shall control the flow of authorized personnel traffic through the secured areas of the facility.
- F. The user interface at the host computer (server) and at the operator workstation terminal computers shall be existing to remain.
- G. ACS shall interface with the building fire alarm system as supplied by others. This interface is to interconnect to the electromagnetic locking hardware power supplies to remove power from all electromagnetic locking hardware in the event of a fire alarm. This permits free egress from the facility on the event of a fire alarm.
- H. ACS shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel to provide opening of door when card reader is utilized.
- I. Installed ACS must interconnect with the request to exit devices and emergency exit devices as may be required by local code provided by the locking hardware supplier.
- J. Installed ACS must be capable of interconnection to the owner provided dedicated Ethernet LAN/WAN network for connection to remote building Main and/or Terminal Controllers.
- K. Where more than two door leaves are within a bank of exit doors, only two shall be provided with access control as specified herein. The balance of the door leaves shall be provided with magnetic door locks and door monitor switches only.

2.4 APPLICATION SOFTWARE REPROGRAMMING

- A. The existing application software in the host computer shall be reprogrammed to accommodate the local subsystem installed under this Contract.
- B. The software reprogramming shall be Owner defined and shall include, but not be limited to the following:
 - 1. Event Viewer, Event Archiving.
 - 2. Time Zones.
 - 3. Holidays.
 - 4. Door Access Group Privilege Levels.
 - 5. Assigning Access Group Levels.

6. Door and Reader Configuration.
7. Request-to-Exit.
8. Input and Output Configuration.
9. Device Configuration.
10. Operator Interface, Alarm Handling and Overrides.
11. Facility Maps & Graphics.
12. Card Holder Database Configuration.
13. Personal Identification Numbers.
14. Duress Code.
15. Operator Privilege Levels.
16. Reports, Personnel Report, Event Archived History Reports.
17. Operator On-line Help.
18. Query Status of System Components.
19. Filter and Use of Filters.
20. Backup and Restoration.
21. On-line Maintenance.

2.5 HARDWARE REQUIREMENTS

A. Intelligent System Controller: [See Attachment 28 13 00.04 – LNL-4420 Cut Sheet.](#)

1. The LNL-4420 Intelligent System Controller (ISC) by Lenel is designed for advanced access control applications. As the access control engine for the OnGuard system, the ISC provides power and functionality. The ISC can communicate to the host computer in a single- or dual-path configuration of Ethernet, dial-up or direct connect RS-485 communication. Multiple combinations of Input Control Modules, Output Control Modules and Card Reader Interface Modules (up to 64 devices) can be configured.
 - a. On-board high-speed Ethernet 10/100Base-T upstream port provides up to 8 times higher throughput than serial-to-Ethernet converters. DHCP and fixed IP addressing supported.
 - b. DNS device naming through DHCP extended commands
 - c. Host dual path communication enabled - on-board Ethernet TCP/IP, direct wire (RS-485, 2-wiremultidrop capable), or dial-up communications
 - d. 15 MB of available on-board, non-volatile flash memory
 - e. Battery-backed, non-volatile storage of 50,000 events
 - f. Firmware stored in flash memory, background download of firmware updates supported
 - g. 12 or 24 VDC input power
 - h. Supports up to 16 different formats (8 card formats and 8 asset formats)
 - i. Biometric template storage support for Schlage Recognition Systems®, Bioscrypt®, and Identix®
 - j. Enhanced anti-passback capabilities
 - k. Up to 32,000 access level permissions
 - l. 255 holidays with grouping
 - m. 255 timezones, each with 6 intervals
 - n. Elevator control support for up to 128 floors
 - o. Alarm masking
 - p. Individual extended held open and strike times (ADA required)
 - q. Up to 9-digit user PIN codes
 - r. Status LEDs for heartbeat & battery status, upstream and downstream communication, and memory write status

- s. Two dedicated inputs for tamper and power failure status
- t. Advanced Encryption Standard (AES) 128-bit algorithm for communications
 - 1) The ISC on-board memory shall be 15 MB.
 - 2) Each ISC shall be provided with built-in hardware to support hard-wired communications between ISC(s) of up to 4000 feet.
 - (a) The ISC shall communicate upstream at 38.4 kbps via RS-232/RS-485 multi-dropped configurations, modem dial-up communications, Ethernet TCP/IP or Token Ring type networks.
 - (b) Each ISC shall have four downstream 2-wire RS-485 channels or two 4-wire RS-485 channels.
 - (c) Communications between the ISC and the Host Server shall be via Ethernet TCP/IP at 10Mbps.
 - 3) A single ISC shall serve up to 64 readers or 32 devices. Each control module (#LNL-1100 or #LNL-1320) shall use one device address.
 - 4) Provide a minimum of #18 AWG wiring for the power supply.

B. Input Control Module: **See Attachment 28 13 00.05 – LNL-1100 Cut Sheet.**

1. Lenel #LNL-1100 Input Control Module (ICM) shall provide high-speed acknowledgement of critical alarm points in monitored areas with operational characteristics as follows:
 - a. AC input: 12 VAC+/- 15%, 350mA RMS; DC input: 12VDC+/- 15%, 500mA.
 - b. 3-volt lithium battery back-up, type BR2325.
 - c. Operating temperature range: 0° to 70° C.
 - d. Operating humidity range: 0% to 95%, non-condensing.
 - e. Grade B, A, and AA Line Supervision.
 - f. Elevator Control; support for 64 floors.
 - g. Status LED's for heartbeat and host communications.
 - h. UL 294 listed and labeled.
2. The ICM shall have 16 configurable input control points and 2 output control relays. It shall support normally open, normally closed, supervised and non-supervised circuits. The input circuits shall be scanned using an analog to digital converter. The digitized input status signal shall be software monitored and controlled, so that each input point can be programmed as a supervised or non-supervised alarm point. The output relays shall be configured for fail-safe or fail-secure operation.
 - a. Alarm Inputs: Two non-supervised inputs (normally closed contacts) for cabinet tamper and power fault monitoring. are. The inputs shall be shorted if they are not used.
 - b. Alarm Outputs: Two Form-C relay contacts, 5A 30VDC or 125VAC, resistive.
 - c. For Supervised Inputs, end-of-line (EOL) resistors shall be 1000 ohm, 1% tolerance.
See Attachment 28 13 00.06 – EOL Resistor Diagram.
3. The ICM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each ICM module shall be individually addressed for increased reporting capabilities from software applications.

4. Provide a minimum of #18 AWG wiring for the power supply.
- B. Dual Reader Interface: [See Attachment 28 13 00.07 – LNL-1320 Dual Reader Cut Sheet.](#)
1. Lenel #LNL-1320 Dual Reader Interface (DRI) shall provide support for up to 64 access control card readers, keypads, or readers with keypads that use standard Wiegand Data1/Data0 or Clock/Data communications with operational characteristics as follows:
 - a. AC input: 12 VAC+/- 15%, 600mA RMS; DC input: 12VDC+/- 15%, 450mA.
 - b. 3-volt lithium battery back-up, type BR2325.
 - c. Operating temperature range: 0° to 70° C.
 - d. Operating humidity range: 0% to 95%, non-condensing.
 - e. Status LED's for heartbeat and host communications.
 - f. UL 294 listed and labeled.
 2. Lock, unlock, and facility code offline access modes shall be supported on all readers connected to the DRI. Each DRI shall support up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.
 3. DRI shall interface with electric doors utilized for ADA access. This interface is to interconnect to the electric door contact in its respective control panel from a contact closure on the DRI.
 4. As many as 32 DRI modules shall be capable of being multi-dropped up to 4,000 feet away from the ISC. The ICM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each DRI module shall be individually addressed for increased reporting capabilities from software applications.
 5. The DRI shall include eight inputs that support normally open, normally closed, supervised, and non-supervised circuits. In addition, six output relays support fail-safe or fail-secure operation. [See Attachment 28 13 00.08 – Typical 1320 Wiring.](#)
 - a. Alarm Inputs: Two non-supervised inputs (normally closed contacts) for cabinet tamper and power fault monitoring. Eight supervised inputs to be used for Request-to-Exit and door status. Two programmable auxiliary inputs. The inputs shall be shorted if they are not used.
 - b. Alarm Outputs: Six Form-C relay contacts, 5A 30VDC or 125VAC, resistive.
 6. Provide a minimum of #18 AWG wiring for the power supply.
 7. Contact protection circuits shall be used to prevent premature contact failure. Arrangement shall be per the manufacturer's recommendation.
- C. Output Control Module: [See Attachment 28 13 00.09 – LNL-1200 Cut Sheet.](#)
1. Lenel #LNL-1200 Output Control Module (OCM) shall provide high-speed device control via relay operation with operational characteristics as follows:
 - a. a. AC input: 12 VAC+/- 15%, 350mA RMS; DC input: 12VDC+/- 15%, 500mA.
 - b. 3-volt lithium battery back-up, type BR2325.
 - c. Operating temperature range: 0° to 70° C.
 - d. Operating humidity range: 0% to 95%, non-condensing.
 - e. Grade B, A, and AA Line Supervision.

- f. Elevator Control; support for 64 floors.
 - g. Status LED's for heartbeat and host communications.
 - h. UL 294 listed and labeled.
- 2. The OCM shall have 16 programmable Form-C 5 A, 30 VDC contacts for load switching that can be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.
 - 3. The OCM shall communicate directly with ICS either by 2-wire or 4-wire RS-485 communication. Provide Belden #9841 or equivalent for RS-485 (2-wire) communication and Belden #9842 or equivalent for RS-485 (4-wire) communication. Each ICM module shall be individually addressed for increased reporting capabilities from software applications.
 - 4. Provide a minimum of #18 AWG wiring for the power supply.
- D. Fire Door Release:
- 1. Power distribution to mag locks shall be via an Altronix MOM-5 PDM.
 - 2. The Altronix MOM-5 shall also serve as the interface to the fire panel and is to be wired according to **Attachment 28 13 00.10 – Fire Panel Interface**.
- E. Power Supplies:
- 1. Power Supply shall be Altronix ULX series and shall be rated 12 VDC with required output continuous supply current; 120 VAC input. Power Supply shall be UL listed.
 - 2. The sum of the total device current requirements shall not exceed 80% of the power supplies continuous current output rating.
 - 3. Provide enclosure with lock to house open frame transformer, power supply and UPS and UPS batteries.
 - 4. Batteries shall be rechargeable sealed lead-acid type rated @ 12 VDC.
 - 5. Provide sufficient batteries to back-up system for:
 - 16 hours at academic and administration buildings.
 - 24 hours at residence buildings.
 - 6. Provide separate Power Supply at each SER installation for:
 - a. Local control panels and modules.
 - b. Field devices.
- F. Enclosures:
- 1. System logic boards shall be mounted in a LNL – CTX-6. **See Attachment 28 13 00.11 – LNL-CTX6.**

2.6 CARDS AND CARD READERS

- A. Cards shall be furnished and programmed by the Owner.
- B. Proximity Card Access Readers: **See Attachment 28 13 00.12 – Allegion aptiQ Cut Sheet.**
 - 1. Provide Allegion aptiQ Card Access Reader.
 - 2. All readers shall be configured with the reader electronics mounted separately, on the “secure” side of the door such that only the reader head is mounted in the reader housing on

- the “entry” side of the door.
3. The reader shall communicate with the ISC through the #LNL-1320 DRI and shall interpret the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal back to the ISC via RS-485 communication.
 4. The reader shall be located no more than 500 feet away from the DRI.

2.7 REQUEST-TO-EXIT DEVICE - PRIMARY

- A. Provide an exit motion sensor which employs passive infrared technology to initiate door release. The device shall have an adjustable detector face to allow for precise pattern configuration and adjustment.
- B. The exit motion sensor shall operate at 12 VDC and shall have a SPDT relay for shunting alarm or access control wiring.
- C. Provide Bosch DS160. [See Attachment 28 13 00.15 – DS160, Request to Exit Detectors.](#)

2.8 REQUEST-TO-EXIT DEVICE - SECONDARY

- A. Provide a hand operated request to exit device. Device type shall be specified by door by the Case security coordinator.
- B. Activating the device shall release a magnetic door lock and send a request to exit signal through a relay output. The release of a magnetic door lock shall be facilitated by breaking 12 VDC power within the security junction box as shown on the Drawings. The relay shall be DPDT, rated 1 amp at 24VDC.
- C. Alarm Controls #PS2-111. [See Attachment 28 13 00.14 – RTE Push Button Alarm Controls.](#)

2.9 MAGNETIC DOOR LOCK

- A. Provide 12 VDC electromagnetic door locks with 1600 lbs. of holding force.
- B. Locks shall not exceed 0.67 amps of current draw with residual magnetism within one second of 4 LBF, and inductive kick-back not to exceed 53 volts peak.
- C. Where required, locks shall include filler plates, angle brackets or glass door brackets as required for door and frame assembly as recommended by manufacturer. Coordinate installation with General Contractor and Architect.
- D. Provide Locknetics #390 Series. [See Attachment 28 13 00.16 – Locknetics 390 Mag Lock.](#)

2.10 DOOR MONITOR SWITCH

- A. Provide ¾ inch diameter recessed door switch set for door monitoring.
- B. Door switch shall be of solid construction with 12 inch #22 AWG leads.
- C. Color shall be white or mahogany as selected by the Architect or Owner. Coordinate installation with General Contractor and Architect.

- D. Provide Sentrol 1078. [See Attachment 28 13 00.17 – Recessed Door Contacts.](#)

2.11 PIEZO SOUNDER

- A. Provide electronic piezo sounder at doors as indicated on Drawings.
- B. Sounder shall be 3 to 28 VDC and provide sound power output of 93dBA at 1 meter.
- C. Sounder shall be installed within a flush two-gang outlet box along with key switch to silence sounder. Provide #304 stainless steel coverplate and mount each device in ½ inch diameter knockout.
- D. Provide AMSCO #PAL-328N with Black Finish. [See Attachment 28 13 00.18 – PAL-328 Piezo Sounder.](#)

2.12 SILENCE KEY SWITCH

- A. Provide key switch to silence piezo sounder. [See Attachment 28 13 00.19 – Piezo and Key Switch Wiring.](#)
- B. Switch shall be keyed for A126 key. Coordinate exact key requirements with Case security coordinator.
- C. Switch shall be installed within a flush two-gang outlet box along with sounder; see requirements above.
- D. Provide C & K #Y-141-7U-2C2-WCNQ. [See Attachment 28 13 00.20 – Key Switch.](#)

2.13 PANIC BUTTON

- A. Provide panic button complete with keyed reset feature where indicated on the plans.
- B. Switch shall be installed within a flush one-gang outlet box. Switch shall be provided with a stainless steel backplate.
- C. Switch shall be provided with blue operator and “EMERGENCY” lettering.
- D. Provide STI #SS2400E. [See Attachment 28 13 00.21 – Panic Buttons.](#)

2.14 ELECTRICAL MATERIALS

- A. Conduits and boxes shall be concealed and flush mounted. Interconnecting conduit and necessary pullboxes shall be run throughout the building in accordance with the NEC.
- B. Conduits shall be 3/4" trade size, minimum, unless otherwise noted on the Drawings or within these Specifications. Where sizes are not shown, conduits shall be as required to accommodate the number and type of conductors in accordance with the National Electrical Code wiring tables, but shall not be smaller than 3/4".
- C. Panel Backboards:
 - 1. Where indicated on the Drawings, mount equipment within the SER Room on a panel

backboard. Backboards shall be 4 feet wide x 8 feet high x 3/4 inches thick AC plywood, painted with two (2) coats of fire retardant gray paint on both sides prior to installation.

2. Backboard shall be mounted six inches above the finished floor with outlet boxes mounted at 18 inches above finished floor.

2.15 WIRE AND CABLE

- A. Control wire for security device interconnections shall be multi-conductor cables, shielded stranded copper type with PVC jacket, UL type CMR. Provide West Penn or equal by Belden with sizes and color-coding as indicated below.
 1. To Card Reader: 8-conductor #22 AWG w/shield
 2. To Door Junction Box for field devices: 12-conductor #22 AWG
 3. To Magnetic Lock: 4-conductor #18 AWG
See Attachment 28 13 00.22 – Wiring Color Codes.
 4. Between Fire Alarm Panel and ACS Panel: 4-conductor #18 AWG
Red/Black – Alarm Indication
Green/White – Trouble Indication

PART 3 - EXECUTION

3.1 ELECTRICAL MATERIALS AND METHODS

- A. Wire and Cable:
 1. Leave 8 inches free wire at all outlet boxes for wiring device connection.
 2. Contractor shall provide ten (10) feet of extra ACS control cable at the ACS panel within the SER.
 3. ACS control cable shall not be run with other system wiring in a common raceway. ACS control cable shall be continuous from the field devices to the panel without splices except within the door security junction box indicated on the Drawings.
 4. Tag each end of all control and communication wiring with "Brady Tags" or equal.
- B. Power and Grounding:
 1. Provide a dedicated 120 volt, 20 amp circuits for the system as shown on the Drawings.
 2. Connect all network system power supplies and equipment cabinets to the Technology system ground bus (located in the SER) utilizing a #12 AWG solid grounding conductor.

3.2 TRAINING AND INSTRUCTION

- A. Provide three (3) complete printed operational manuals in a format as provided by the equipment manufacturer. Instructions shall be simplified to permit operation of the system by non-technical personnel.

3.3 MOUNTING HEIGHTS

- A. The equipment height shall be as noted on the Drawings. Care must be taken to ensure that mounting heights set forth by the Americans with Disability Act (ADA) for said items are met.

3.4 COMMISSIONING

- A. After all Work is completed, and prior to requesting the commissioning report specified in 1.5 D, here after known as the Acceptance Test, Contractor shall conduct a final inspection, and pre-test all equipment and system features required for project. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test.
- B. Contractor shall submit a request for the Acceptance Test in writing to the Owner's Project Manager, no less than fourteen days prior to the requested test date. The request for Acceptance Test shall be accompanied by a certification from Contractor that all work is complete and has been pre-tested, and that all corrections have been made.
- C. During Acceptance Test, Contractor shall demonstrate all equipment and system features to the security systems coordinator. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the coordinator.
- D. Any portions of the work found to be deficient or not in compliance with the Drawings and Specifications will be rejected. The security systems coordinator will prepare a list of any such deficiencies observed during the Acceptance Test. Contractor shall promptly correct all deficiencies. Upon correction of deficiencies, Contractor shall submit a request in writing to Owner's Project Manager for another Acceptance Test.

3.5 WARRANTY

- A. The Contractor shall guarantee this system in its entirety to be free from mechanical and electrical defects for a period of one (1) year from the date of the completed and owner approved acceptance test.
- B. The Equipment Supplier shall make available to the Owner a maintenance contract proposal.
- C. The Contractor's guarantee shall cover all costs associated with the troubleshooting, repair, and replacement of defective work, including costs of labor, transportation, lodging, materials, and equipment.
- D. The Guarantee shall not cover any damage to material or equipment caused by accident, misuse, or unauthorized modification or repair by the Owner.

3.6 SERVICE CONTRACT PROPOSAL

- A. The bidder shall include an optional service contract proposal at the time of bid. The proposal shall include:
 - 1. Respond to emergency service requests on-site, if required.
 - 2. Replace or repair defective components as required.
 - 3. Manufacturer's recommended preventive maintenance.
 - 4. Second year and five year maintenance contract with the price shown for each year and all payment terms and conditions.
 - 5. The service contract shall be optional and the Owner shall have the right to accept or reject the contract, and accept only the warranty service as described above, at no additional cost.

END OF SECTION



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

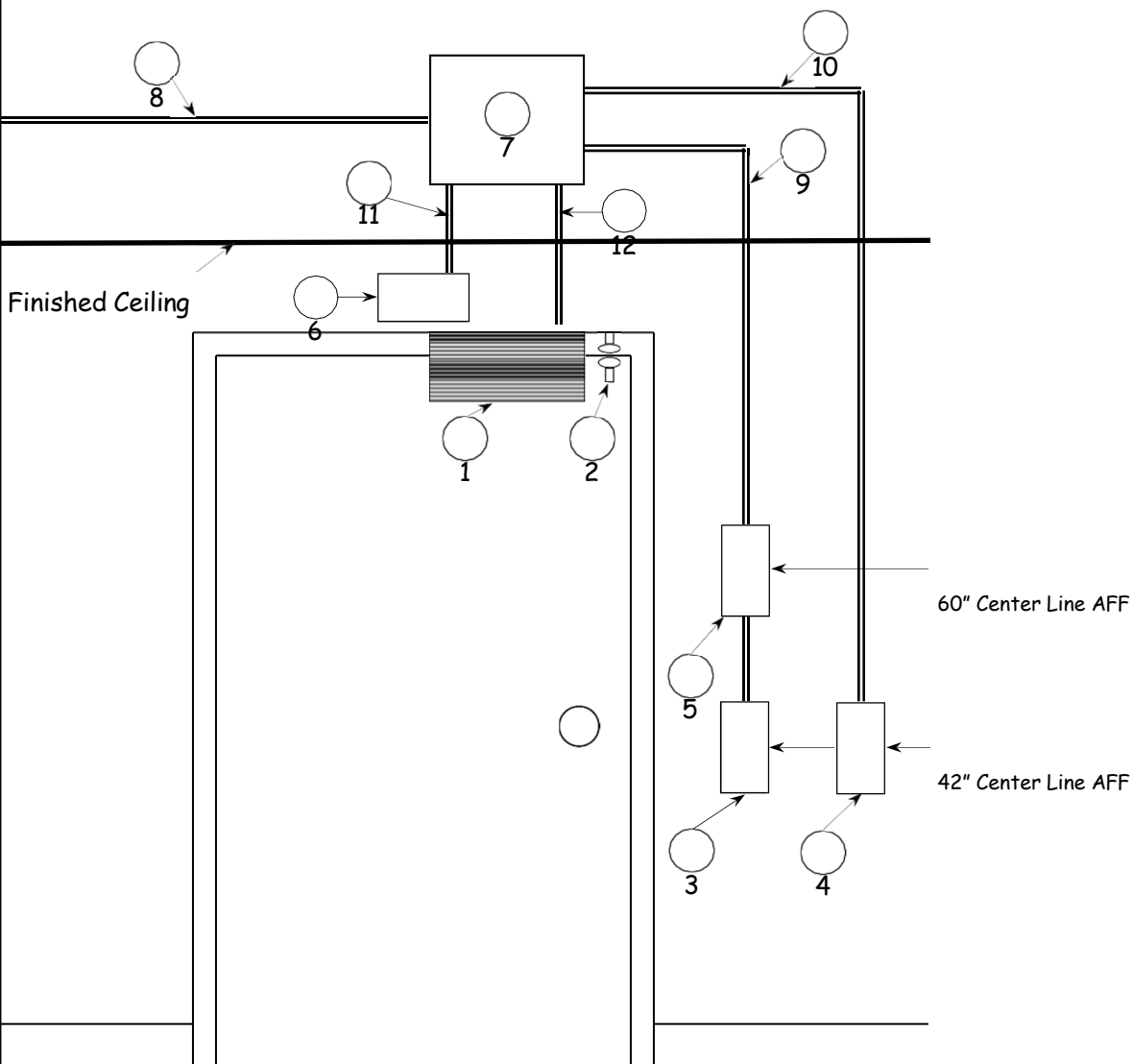
Typical Access Control Single Door Detail

Drawn

CFV

Date:

5/18/04



- 1 Magnetic Lock
- 2 Door Position Contacts
- 3 Single Gang Box — For RQE Push Button (Secure Side Of Door)
- 4 Single Gang Box — For Card Reader (Public Side Of Door)
- 5 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 6 Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- 7 8" X 8" X 4" Security Junction Box
- 8 1" Conduit To SER Room Filled With 1 ea — 12/C #22, 4/C #18. And 8/C #22 Shielded Pulled Through To Item 4.
- 9 3/4" Conduit Filled With 2/C #22 To Item 5 And 4/C #22 To Item 3
- 10 3/4" Conduit Filled With 8/C #22 Pulled Through Item 7.
- 11 1/2" Conduit Filled With 4/C #22.
- 12 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 1 ea. 2/C #18 and 2/C #22.



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

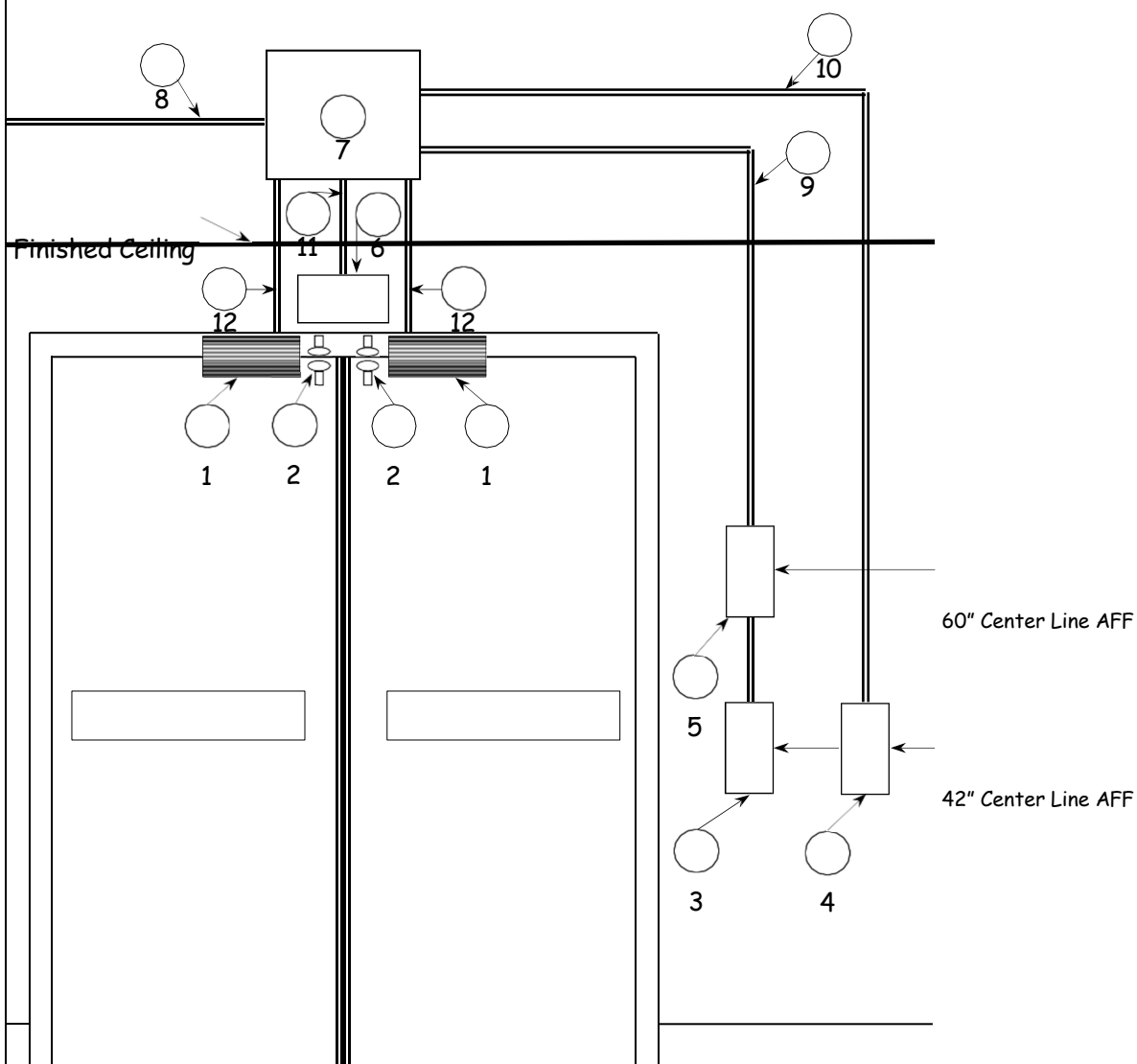
Typical Access Control Double Door Detail

Drawn By:

CFV

Date:

5/18/04



- 1 Magnetic Locks
- 2 Door Position Contacts
- 3 Single Gang Box — For RQE Push Button (Secure Side Of Door)
- 4 Single Gang Box — For Card Reader (Public Side Of Door)
- 5 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 6 Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- 7 8" X 8" X 4" Security Junction Box
- 8 1" Conduit To SER Room Filled With 1 ea — 12/C #22, 4/C #18. And 8/C #22 Shielded Pulled Through To Item 4.
- 9 3/4" Conduit Filled With 2/C #22 To Item 5 And 4/C #22 To Item 3
- 10 3/4" Conduit Filled With 8/C #22 Pulled Through Item 7.
- 11 1/2" Conduit Filled With 4/C #22.
- 12 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 1 ea. 2/C #18 and 2/C #22.



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

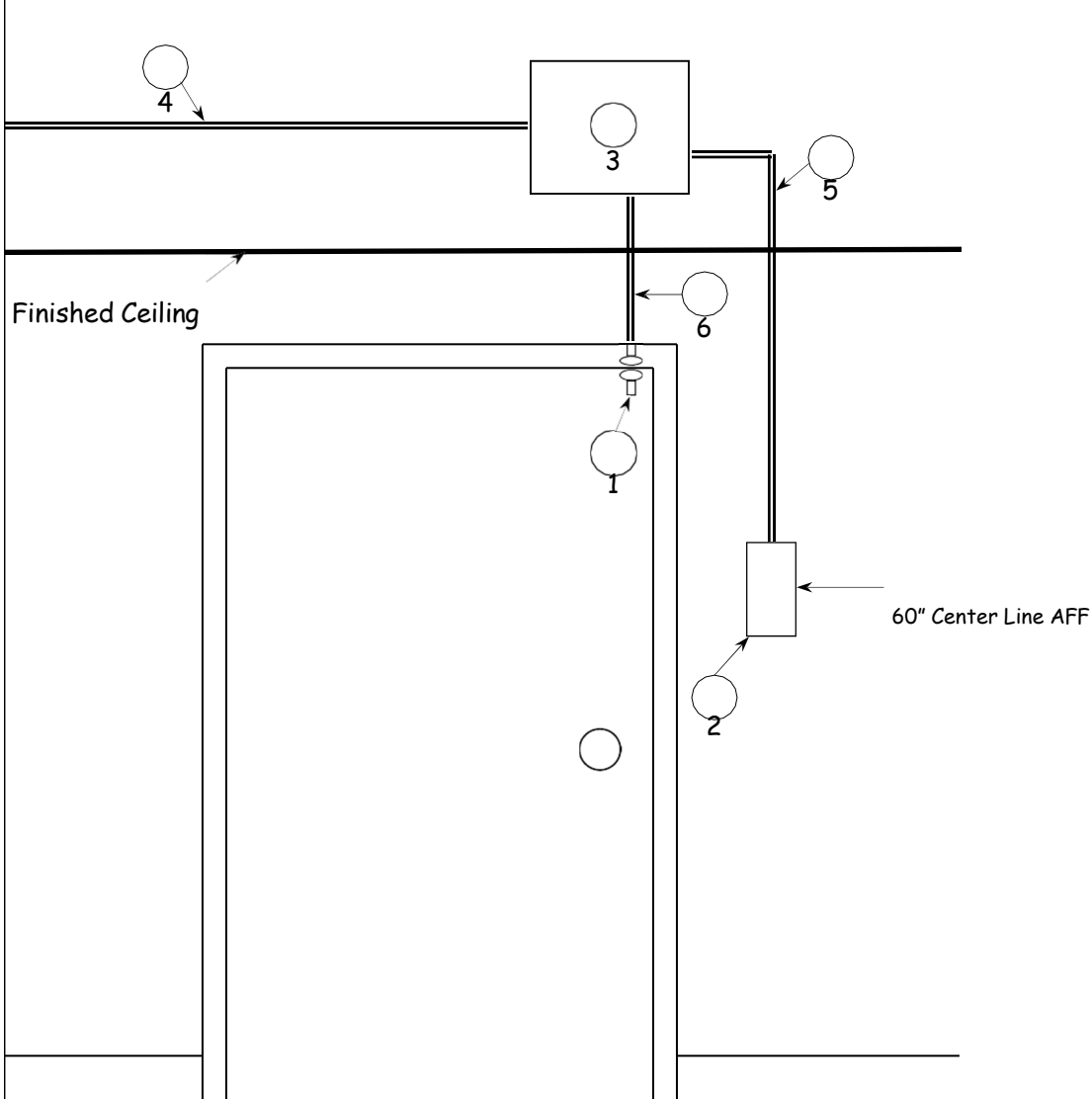
Typical Monitored Door Detail

Drawn

CFV

Date:

5/18/04



1 Door Position Contacts



2 Single Gang Box — For Piezo & Key Switch
(Secure Side Of Door)



3 4" X 4" X 4" Security Junction Box



4 3/4" Conduit To SER Room Filled With — 12/C #22.



5 1/2" Conduit Filled With 2/C #22.



6 1/2" Conduit Filled With 2/C #22.



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

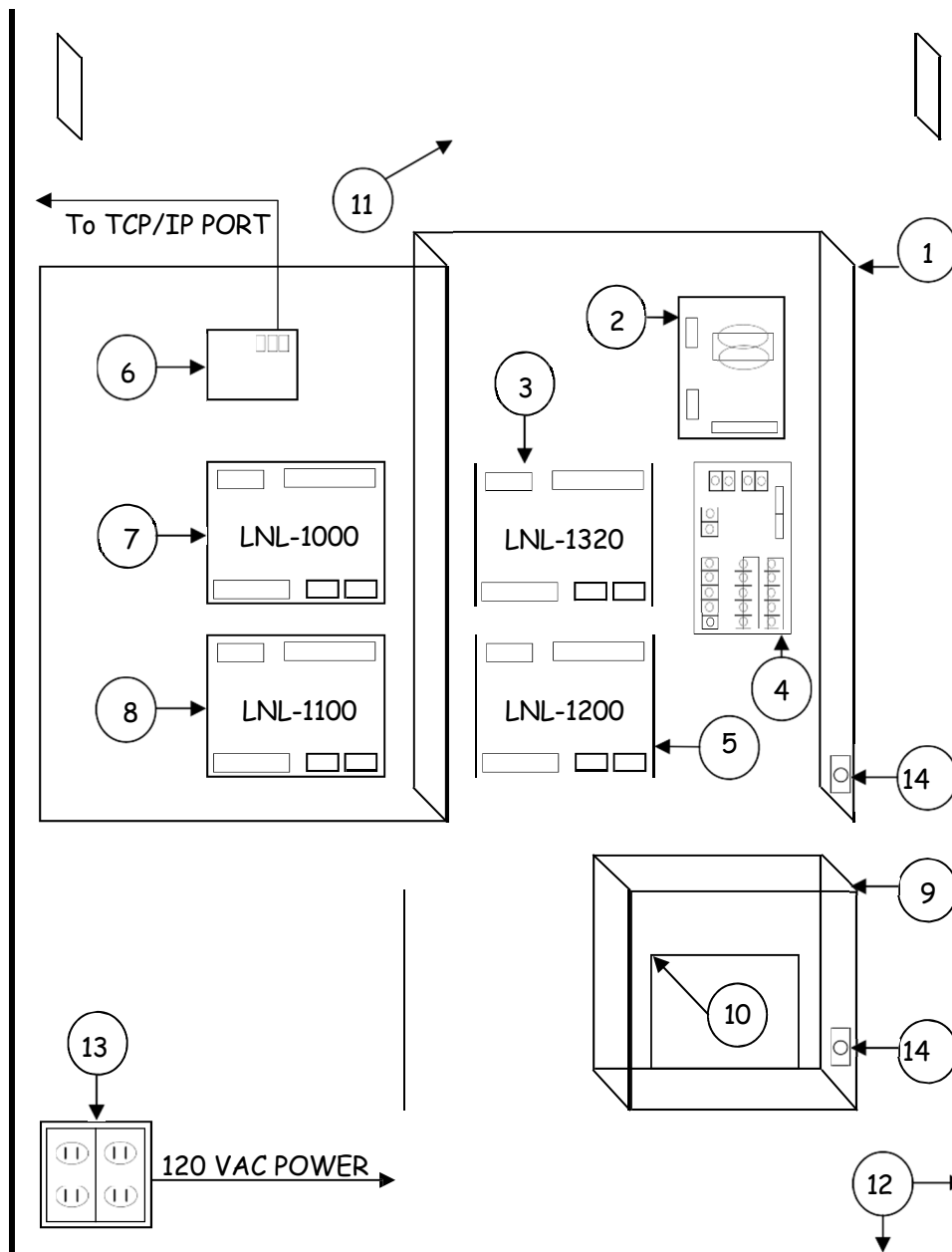
Typical Access Control System Panel Detail

Drawn By:

CFV

Date:

5/18/04



- 1 Lenel LNL-CTX6 Enclosure
- 2 Altronix ULX Series Power Supply
- 3 Lenel LNL-1320 Dual Reader Interface
- 4 Altronix MOM-5 Power Dist. & Fire Door Release
- 5 Lenel LNL-1200 16 Output Control Module
- 6 Lantronix MSS-100 Ethlan Interface
- 7 Lenel LNL-1000 Intelligent System Controller
- 8 Lenel LNL-1100 16 Input Control Module
- 9 Mier BW-310 Battery Enclosure
- 10 Backup Battery
- 11 4 X 4 Panduit Wire Management Duct
- 12 4' X 8' Fire Rated Plywood Backboard
- 13 Double Duplex Receptacle
- 14 Cabinet Tamper Switch

Access Control System Installation Standards

A. Raceways

1. Securely mount to permanent structure per NEC requirements. Conditions will determine type of raceway to be used (i.e., EMT, rigid, watertight, wiremold).
2. Securely fasten all connectors.

B. Wiring

1. Use the standard cable types for all projects. Substituting a different cable must be approved by CASE prior to use.
2. Use proper gauge wire for each application. Consider power requirements and distance. Wire should be sized for 80% of its capacity.
3. No exposed wiring within 4 feet of the floor surface.
4. Consider electrical interference when routing cable. No cabling is to be run within 12 inches of high voltage wiring. No cabling is to be run parallel to high voltage wiring.
5. Non conduit wiring must be properly secured to structure per NEC guidelines. Never lay cables across the top of the ceiling.
6. Maintain fire wall and floor penetration ratings using proper sealant per NEC requirements.
7. Cables shall be run between devices without splices. If a splice is required, each wire is to be soldered and the splice will be covered with heat shrink tubing.
8. There shall be no taped splices.
9. All splices are to be done in a junction box or appropriate enclosure. The use of terminal blocks is required in larger enclosures.
10. All wires shall be labeled at both ends and at all splice points using permanent, machine generated tags.
11. Spade connectors shall be used on all wires being placed under a screw terminal that is not rated for stranded wire.

C. End of Line Supervision

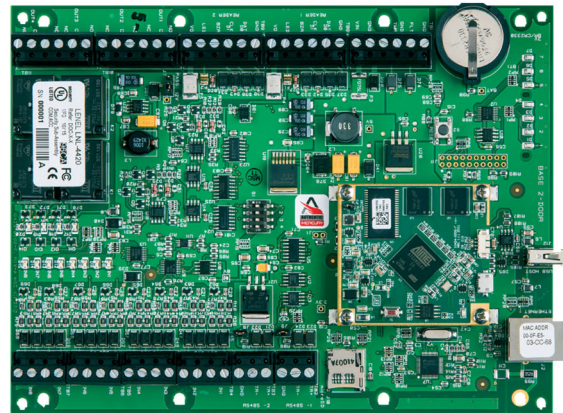
When line supervision is required, devices must be installed at the "*End of The Line*". 1K ohm +/- 1% resistors shall be used.

D. General

1. All areas must be cleaned at the end of each day.
2. At a minimum, work areas are to be left broom clean.
3. Secure all materials and equipment at the end of each day. CASE shall not be responsible for lost or stolen items.
4. Understand and comply with job site safety requirements. Safety shoes, hard hats, eye and ear protection shall be worn as required.

LNL-4420

Advanced Dual Reader Controller



Overview

The LNL-4420 is an Advanced Dual Reader Controller by Lenel that provides a single-board solution for interfacing up to 64 doors, plus auxiliary inputs and outputs, to an OnGuard® system.

The LNL-4420 controller enables Ethernet connection directly from an entry location to the OnGuard server. The controller is scalable for most access control applications. In addition, other I/O and reader interface modules can be added on the controller's two downstream ports, further expanding its capabilities. In the event of communication loss, the LNL-4420 controller can maintain most of its local functionality until the server connection is restored.

The LNL-4420 controller can act as an interface to building automation systems via the ASHRAE BACnet™ protocol. Through the OnGuard software, up to 63 total BACnet points can be defined. These can be a mix of physical inputs connected to the board and virtual outputs. Virtual outputs can be set and read from a connected BACnet client, allowing two-way state exchange with a variety of building control systems. This information can be used by both OnGuard and the external system for status reporting, and as inputs to control logic.

Utilizing its 32-bit processor and a multiple-application operating system, the LNL-4420 controller can communicate upstream to the host computer through its Ethernet port. The LNL-4420 controller can store up to 500,000 cardholders in non-volatile flash memory, and supports selective download for larger cardholder databases. The two downstream RS-485 two-wire ports can be used to connect up to 64 devices (64 doors) in many combinations of LNL-1100, LNL-1200, LNL-1300, LNL-1320, LNL-500B, LNL-500W, Schlage PIM-400 wireless interface, or Assa Abloy Apero® wireless devices.

Each LNL-4420 controller supports up to eight different card formats. The LNL-4420 controller also includes eight inputs — four designated for door interface support and four for general-purpose inputs.

Features & Functionality

Controller Functionality

- BACnet protocol support via up to 63 total inputs and virtual outputs
- Support for DHCP and fixed IP addressing
- DNS device naming through DHCP extended commands
- 16 MB of available on-board, non-volatile flash memory for badge data, plus dedicated storage for future apps and extensions
- Battery-backed, non-volatile storage of 50,000 events
- Firmware stored in flash memory, background download of firmware updates supported
- Support for up to 16 different formats (8 card formats and 8 asset formats)
- Biometric template storage support for Bioscrypt® and ANSI/INCITS 378 templates
- Advanced anti-passback capabilities
- Up to 32,000 access level permissions
- Elevator control support for up to 128 floors
- Individual extended held open and strike times (ADA required)
- A dedicated input for cabinet tamper and power failure status
- Advanced Encryption Standard (AES) 128-bit algorithm for communications

Reader Interface Functionality

- Support for Data1/Data0, Clock/Data, Unsupervised F2F and OSDP-compatible RS-485 readers and keypads, including OSDP Secure Channel (SC) encrypted communications

Extended Functionality

- Optional onboard HID® FIPS-201 Embedded Authentication

LNL-4420

Specifications

Power Supply

Primary Power	12 or 24 VDC \pm 10%. 500 mA maximum (reader current not included)
Memory and Clock Backup Battery	3 V lithium, type BR2325, BR2330, CR2330

Communication Ports

Host Communications	Ethernet Port, 10/100Base-TX
SIO Downstream Ports	Two each, 2-wire RS-485, 9600 to 38.4 Kbps async

Inputs

Tamper and Power Fail Monitors	Unsupervised, dedicated
Door position, REX	4, each programmable as normally open or normally closed, supervised or unsupervised circuits
AUX	4, each programmable as normally open or normally closed, supervised or unsupervised circuits

Outputs

Relay Outputs	Four Form-C 5A@30 VDC, resistive, relay outputs: two for strike, two for auxiliary outputs
---------------	--

Reader Interface

Reader Power (Jumper Selectable)	DC output: 12 VDC, +/- 10% regulated, current limited to 150mA for each reader
	12 to 24 VDC, +/- 10% (input voltage pass through) current limited to 150 mA for each reader
Data Inputs	TTL: Wiegand Data1/Data0, Magnetic Clock/Data, Unsupervised F2F single-wire protocol (Note: Supervised F2F supported on connected door controllers but not for the two onboard ports)
	RS-485: 9600 baud, Bioscrypt RS-485 or OSDP (Open Supervised Device Protocol); OSDP Secure Channel, Transparent Mode and biometric templates supported
Building Automation Interface	Supports ASHRAE BACnet™ protocol

Environmental

Operating Temperature	32° to 158° F (0° to +70° C)
Storage Temperature	-67° to +185° F (-55° to +85° C)
Humidity	0 to 95% Relative Humidity, Non-Condensing (RHNC)

Mechanical

Dimensions	6.0" x 8.0" x 1.0" (152mm x 203mm x 25mm)
Weight	10.65 oz. (302g) nominal

Ordering Information

Part No.	Description
LNL-4420	Advanced Dual Reader Controller



lenel.com/access-hardware

(866) 788-5095

Specifications subject to change without notice.

© 2016 United Technologies Corporation. All rights reserved. All trademarks are the property of their respective owners. Lenel is a part of UTC Climate, Controls & Security, a unit of United Technologies Corporation.

2016/10 (LI-2020)



LNL-1100



Lenel Input Control Module

Overview

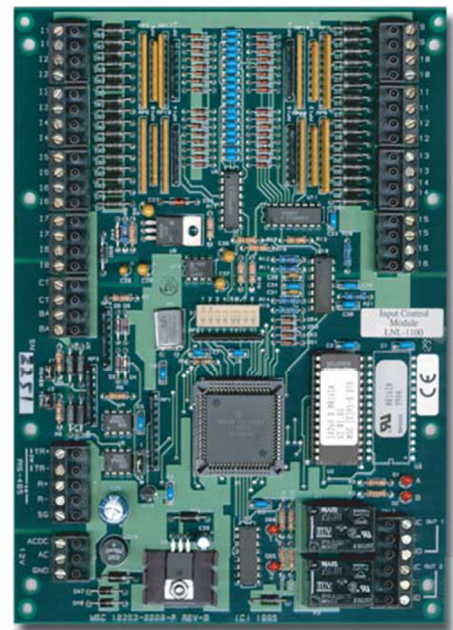
The Lenel Input Control Module (ICM) provides the access control system with high-speed acknowledgement of critical alarm points in monitored areas. The ICM communicates directly with the Intelligent System Controller (ISC) either by 2-wire or 4-wire RS-485 communication. The ICM has 16 configurable input control points and 2 output control relays. It supports normally open, normally closed, supervised and non-supervised circuits.

The input circuits are scanned using an analog to digital converter. The digitized input status signal is software monitored and controlled, so that each input point can be programmed as a supervised or non-supervised alarm point.

The output relays can also be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.

Features and Functionality

- Grade B, A, and AA Line Supervision
- 12 VAC or 12 VDC input power
- 16 programmable supervised or non-supervised contacts
- Two Form-C 5 A, 30 VDC contacts for load switching
- Two dedicated inputs for tamper and power failure status
- Onboard termination jumpers
- DIP switch selectable addressing
- Elevator control, support for 64 floors
- Status LED for host communication and heartbeat
- Variable Resistor Values for Line Supervision
- Downloadable Firmware
- UL 294 listed and CE approved
-



LENEL[®]
Always OnGuard™

Total Security Knowledge Management Solutions.

Mechanical and Architectural Characteristics and Wiring

Requirements

The acceptable power supply is either 12 VDC or 12 VAC. Locate the power source as close as possible to the LNL-1100. Use a minimum of 18 AWG (one twisted pair) wiring for the power supply.

Communications

Communication with the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multi-drop communication on a single ISC port, up to 4000 feet per port. Use twisted pair(s) with a minimum of 24 AWG and a shield for communication. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

Recommended cabling for RS-485 (2-wire) communication is Belden 9841 or equivalent.

Recommended cabling for RS-485 (4-wire) communication is Belden 9842 or equivalent.

Recommended plenum cabling for RS-485 communication is Belden 88102 or equivalent.

Sixteen software configurable alarm inputs can be used for alarm device monitoring. Each of these inputs can, via the Lenel OnGuard Access Control software, be configured as either N/O (normally open) or N/C (normally closed) in combination with either supervised or non-supervised wiring.

For supervised inputs, end-of-line (EOL) resistors are included with each LNL-1100 (1000 ohm, 1% tolerance).

Alarm Inputs

Two non-supervised inputs are for cabinet tamper and power fault monitoring. Normally, the contacts are closed. The inputs must be shorted if they are not used.

Alarm Outputs

Two Form-C relay contacts, 5 A 30 VDC or 125 VAC, resistive.

Options

Power Supplies and Enclosures

LNL-AL400ULX Lenel UL Listed 4 A, 110 VAC Power Supply - 12 VDC or 24 VDC 4 A output (switch selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional) (UL Approved)

LNL-AL600ULX-4CB6 Lenel UL Listed Power Supply - 12 VDC or 24 VDC 6 A output (switch selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional), UL Approved

ABT-12 Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

* The ICM is for use in low voltage, power limited, class 2 circuit only.

Primary Power (DC or AC):

DC input: 12 VDC \pm 15%. 350 mA
AC input: 12 VAC \pm 15%. 350 mA RMS

Environmental:

Temperature: Operating: 0° to +70° C (32° to 158° F)
Storage: -55° to +85° C (-67° to 185° F)

Humidity: 0 to 95% RHNC

Mechanical:

Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)

Weight: 10 oz. (290 g) nominal

Approvals:

UL 294 and UL 1076 Listed

LENEL®

Always OnGuard™

Lenel Systems International, Inc.

1212 Pittsford-Victor Road Pittsford NY 14534 USA

[tel] +1.585.248.9720 [fax] +1.585.248.9185 [web] www.lenel.com





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

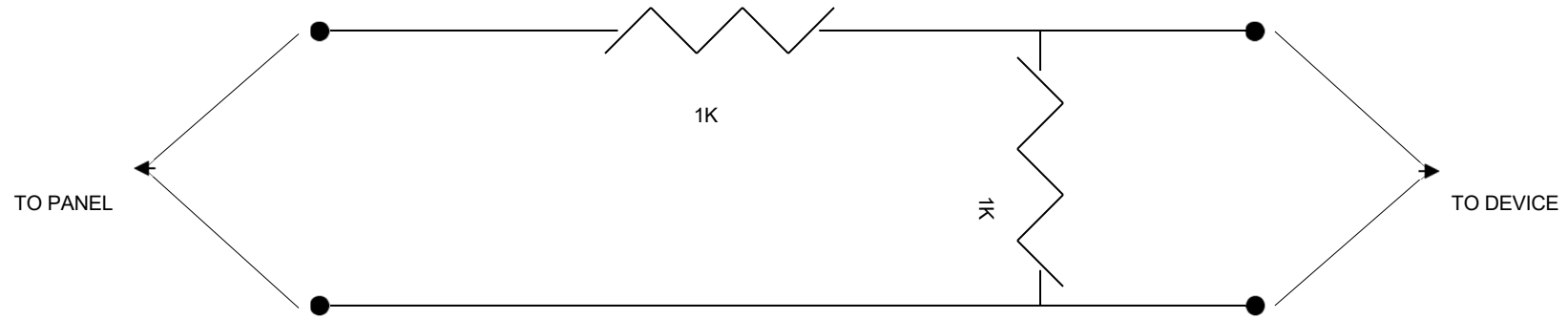
Level E.O.L. Resistors

Drawn

CFV

Date:

4/27/04



LNL-1320

Lenel Dual Reader Interface Module

Overview

Lenel Systems International offers a Dual Reader Interface (DRI) module for business access control solutions. Most access control card readers, keypads, or readers with keypads that use standard Wiegand Data1/Data0 or Clock/Data communications are supported. Lock, unlock, and facility code offline access modes are supported on all readers connected to the DRI. Each DRI supports up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

The DRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 DRI modules can be multi-dropped using RS-485 2-wire or 4-wire communication up to 4000 feet per port away from the ISC. Each DRI module is individually addressed for increased reporting capabilities with Lenel OnGuard Access Control software applications. The DRI includes eight inputs that support normally open, normally closed, supervised, and non-supervised circuits. In addition, six output relays support fail-safe or fail-secure operation.

Features and Functionality

- 12 VAC or 12 VDC power supply
- Reader communications (Clock/Data or Wiegand Data1/Data0) - more than 150 different readers approved for use
- Downloadable firmware
- Six Form-C 5 A at 30 VDC relay outputs
- Up to 16 different formats (8 card and 8 asset)
- Issue code support for Magnetic and Wiegand formats
- Door contact supervision (Open/Closed)
- REX push-button monitor
- Strike Control output
- Bi-color status LED support and 2-wire LED support
- Beeper control
- Dedicated tamper and power failure circuits
- Support for offline reader access mode
- Onboard jumpers for termination
- Onboard jumpers for 5 VDC or 12 VDC reader support
- DIP switch selectable addressing
- UL 294 listed and CE approved



Lenel Systems International, Inc.

Total Security Knowledge Management Solutions.

Mechanical and Architectural Characteristics and Wiring

Requirements

The hardware is configured using several jumpers and a set of eight DIP switches. The acceptable power supply is either 12 VDC or 12 VAC. Locate the power source as close as possible to the LNL-1320. Use a minimum of 18 AWG (one twisted pair) wiring for the power supply.

Communications

Communication to the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multi-drop communication on a single ISC port up to 4000 feet each. Use twisted pair(s) with a minimum of 24 AWG and a shield for the communications. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

Recommended cabling for RS-485 (2-wire) communications is Belden 9841 or equivalent.

Recommended cabling for RS-485 (4-wire) communications is Belden 9842 or equivalent.

Recommended plenum cabling for RS-485 communications is Belden 88102 or equivalent.

Alarm Inputs

Eight supervised inputs are normally used for REX (Request to EXit), door status, and two programmable auxiliary inputs. Two non-supervised inputs are for cabinet tamper and power failure monitoring. Normally, the door contact is closed and REX is open. The inputs must be shorted if they are not used.

Alarm Outputs

Six Form-C relay contacts, one 5 A at 30 VDC, resistive, normally used for door contacts or four auxiliary output relays.

Note

To minimize premature failure of the contact and to increase system reliability, contact protection circuits **MUST BE USED**. The protection circuits must be located as close to the load as possible (within 12 inches, or 30 cm), as circuit effectiveness decreases at greater distances.

Options

Power Supplies and Enclosures

LNL-AL400ULX	Lenel UL Listed 4 A, 110 VAC Power Supply - 12 VDC or 24 VDC 4 A output (switch selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional) (UL Approved)
LNL-AL600ULX-4CB6	Lenel UL Listed Power Supply - 12 VDC or 24 VDC 6 A output (switch selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional), UL Approved
ABT-12	Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

* The DRI is for use in low voltage, power limited, class 2 circuit only.

Primary Power (DC or AC):

DC input:	12 VDC \pm 15%. 450 mA
AC input:	12 VAC \pm 15% 600 mA RMS
Reader Output Voltage:	5 VDC or 12 VDC

Environmental:

Temperature:	Operating: 0° to +70° C (32° to 158° F) Storage: -55° to +85° C (-67° to 185° F)
--------------	---

Humidity:	0 to 95% RHNC
-----------	---------------

Mechanical:

Dimension:	6 x 8 x 1 in. (152 x 203 x 25 mm)
------------	-----------------------------------

Weight:	10 oz. (290 g) nominal
---------	------------------------

Approvals:

UL 294 & UL 1076 Listed



Lenel Systems International, Inc.

Lenel Systems International, Inc.

1212 Pittsford-Victor Road Pittsford NY 14534 USA

[tel] +1.585.248.9720 [fax] +1.585.248.9185 [web] www.lenel.com





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

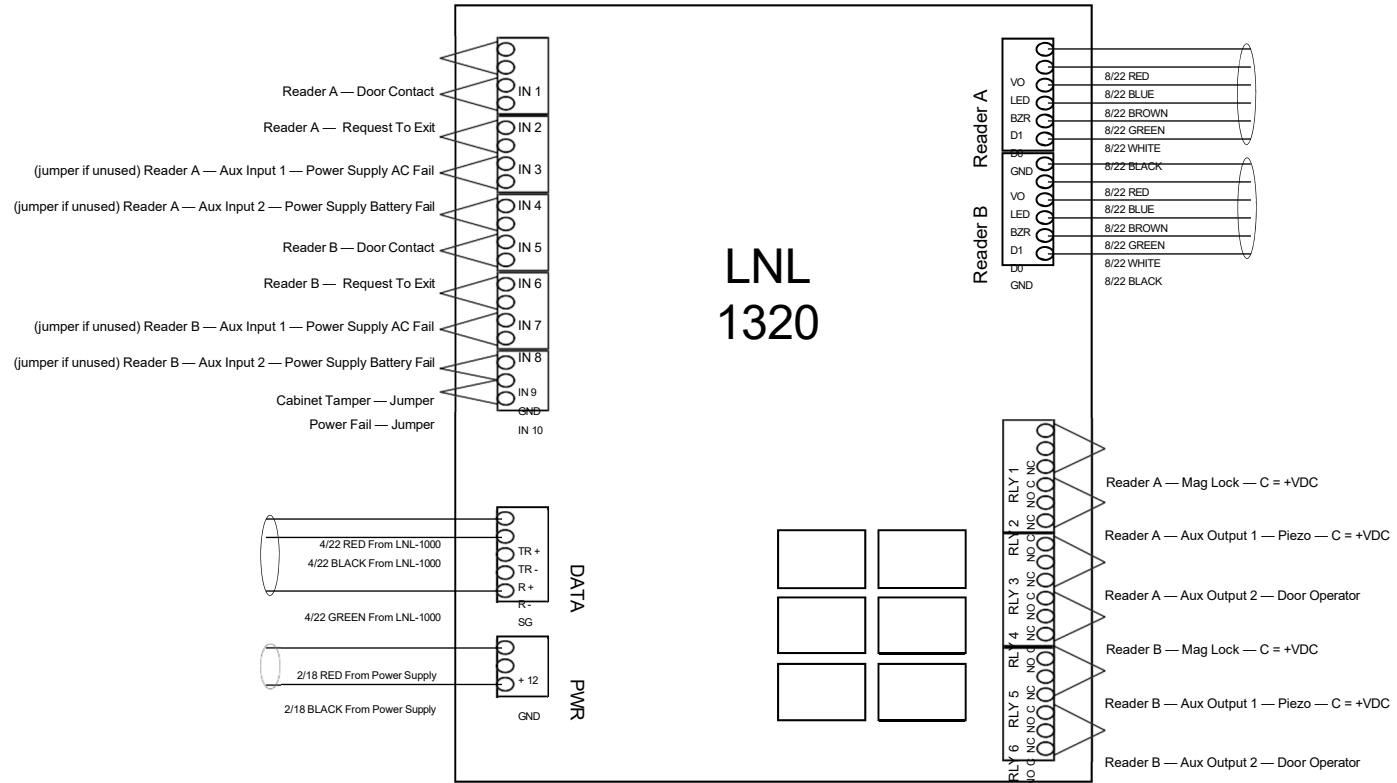
Lenel 1320 Dual Reader Interface
Standard Wiring

Drawn By:

CFV

Date:

4/15/04





LNL-1200

Lenel Output Control Module

Overview

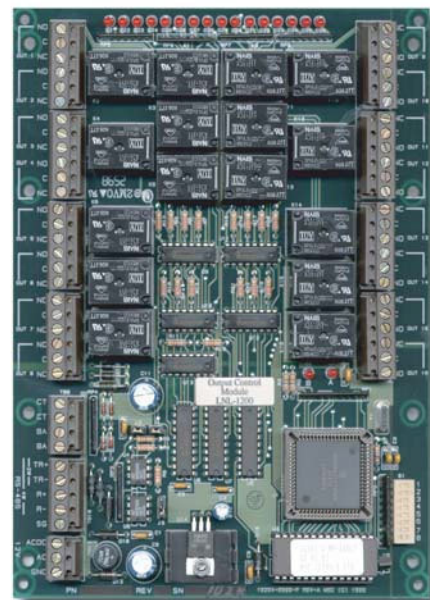
The Lenel Output Control Module (OCM) communicates directly with the Intelligent System Controller (ISC) either by 2-wire RS-485 or 4-wire RS-485 communication. Each OCM is an individually addressed device, and counts as a single device on all Intelligent System Controllers.

The OCM, like other Lenel hardware products, can be operated by either 12 VAC or 12 VDC power. Each OCM includes dedicated tamper and power failure input contacts.

The OCM has 16 programmable output relays that can be configured for fail-safe or fail-secure operation. Each relay supports "On," "Off," and "Pulse" Lenel OnGuard software commands.

Features and Functionality

- 16 Form-C 5 A, 30 VDC contacts for load switching
- 12 VAC or 12 VDC input power
- Two dedicated digital inputs for tamper and power failure status
- RS-485 communications, multi-dropped (2-wire or 4-wire RS-485)
- Up to 16 OCMs per Intelligent System Controller
- Onboard termination jumpers
- DIP switch selectable addressing
- Status LEDs for communication to the host, heartbeat and relay status
- Elevator control, support for 64 floors
- UL 294 listed and CE approved



LENEL®

Always OnGuard™

Mechanical and Architectural Characteristics and Wiring

Requirements

The acceptable power supply is either 12 VDC or 12 VAC. Locate the power source as close as possible to the LNL-1200. Use a minimum of 18 AWG (one twisted pair) wiring for the power supply.

Communications

Communication with the Intelligent System Controller is via a 2-wire or 4-wire RS-485 interface. The interface allows multi-drop communication on a single ISC port, up to 4000 feet per port. Use twisted pair(s) with a minimum of 24 AWG and a shield for communication. The 2-wire or 4-wire communications with end-of-line termination are jumper-selectable.

Recommended cabling for RS-485 (2-wire) communication is Belden 9841 or equivalent.
Recommended cabling for RS-485 (4-wire) communication is Belden 9842 or equivalent.
Recommended plenum cabling for RS-485 communication is Belden 88102 or equivalent.

Alarm Inputs

Two non-supervised inputs are for cabinet tamper and power fault monitoring. Normally, the contacts are closed. The inputs must be shorted if they are not used.

Alarm Outputs

Two Form-C relay contacts, 5 A 30 VDC or 125 VAC, resistive.

Note

To minimize premature failure of the contact and to increase system reliability, contact protection circuits **MUST BE USED**. The protection circuits must be located as close to the load as possible (within 12 inches, or 30 cm), as circuit effectiveness decreases at greater distances.

Options

Power Supplies and Enclosures

LNL-AL400ULX	Lenel UL Listed 4 A, 110 VAC Power Supply - 12 VDC or 24 VDC 4 A output (switch selectable), 120 VAC input, continuous supply current with enclosure (12 x 16 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional) (UL Approved)
LNL-AL600ULX-4CB6	Lenel UL Listed Power Supply - 12 VDC or 24 VDC 6 A output (switch selectable), 120 VAC (1.6 amps) input, continuous supply current with enclosure (18 x 24 x 4.5 in.), lock and open frame transformer, tamper switch, UPS capable (Battery Optional), UL Approved
ABT-12	Battery Kit - 12 VDC, 12 AH battery (PS-12120)

Specifications

* The OCM is for use in low voltage, power limited, class 2 circuit only.

Primary Power (DC or AC):

DC input: 12 VDC \pm 15%. 500 mA
AC input: 12 VAC \pm 15%. 600 mA RMS

Environmental:

Temperature: Operating: 0° to +70° C (32° to 158° F)
Storage: -55° to +85° C (-67° to 185° F)

Humidity: 0 to 95% RHNC

Mechanical:

Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)

Weight: 16 oz. (454 g) nominal

Approvals:

UL 294 & UL 1076 Listed

LENEL®

Always OnGuard™

Lenel Systems International, Inc.
1212 Pittsford-Victor Road Pittsford NY 14534 USA
[tel] +1.585.248.9720 [fax] +1.585.248.9185 [web] www.lenel.com





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

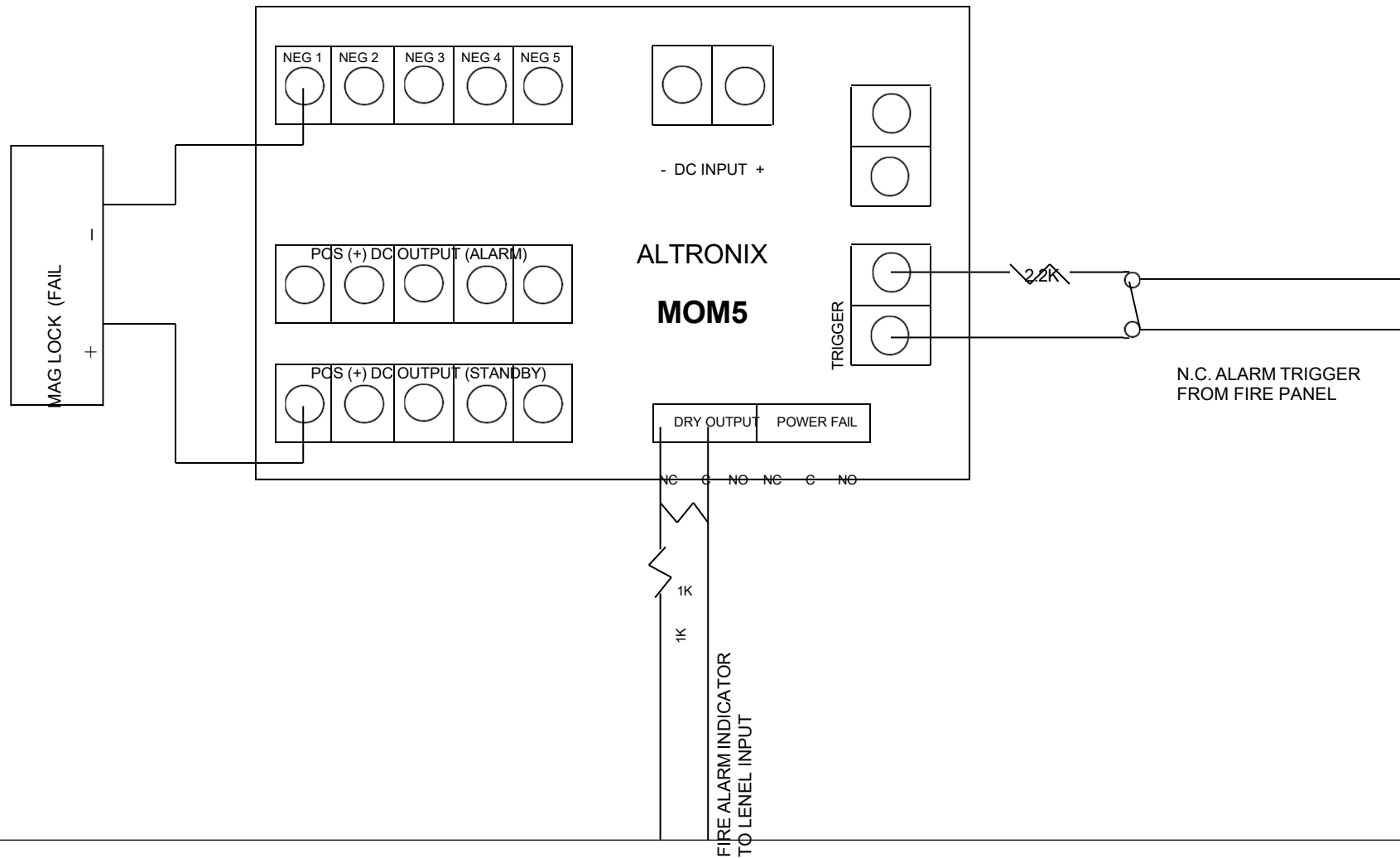
Lenel system interface to fire alarm panel with N.C.
dry trigger contacts

Drawn By:

CFV

Date:

4/7/04





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

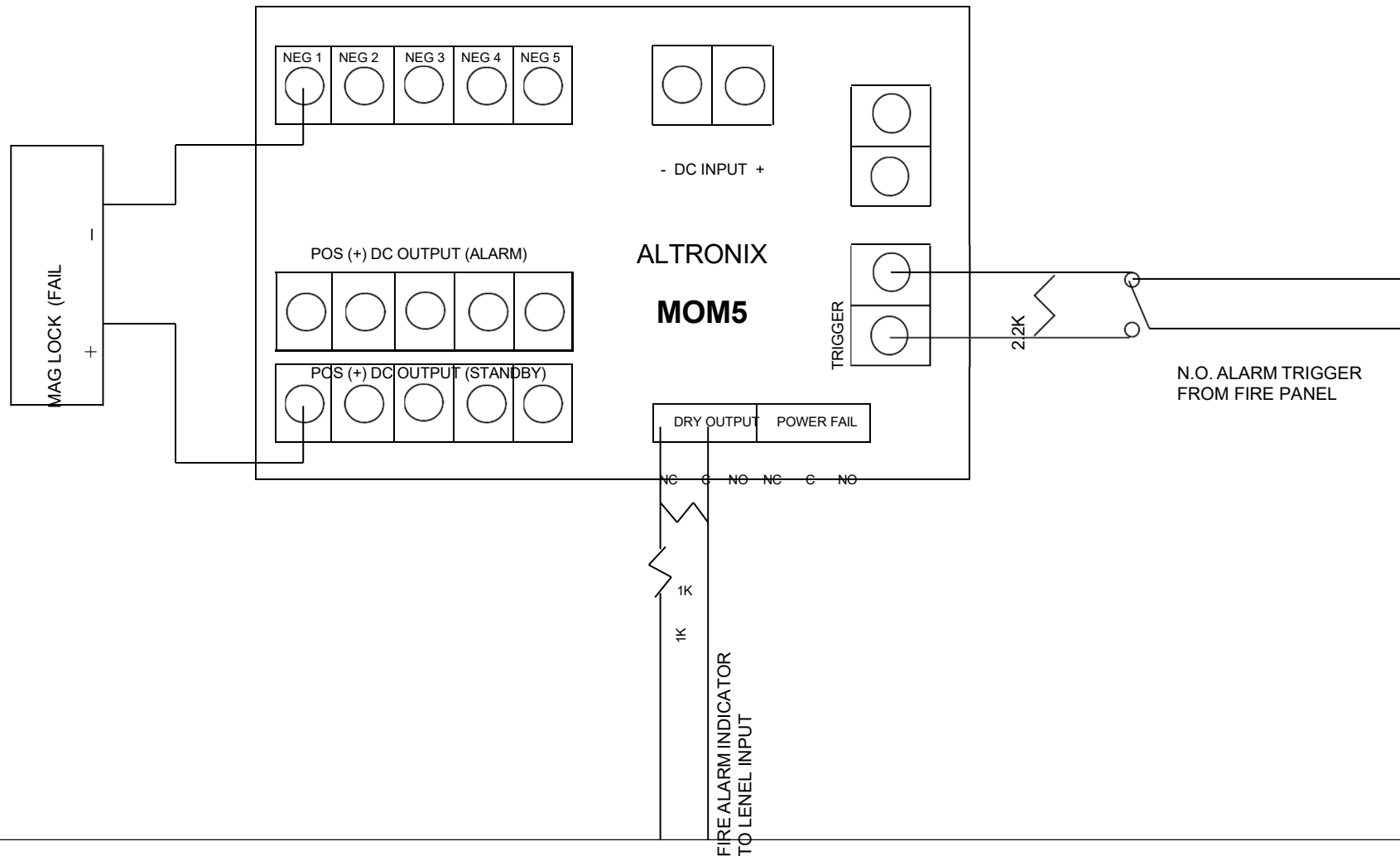
Lenel system interface to fire alarm panel with N.O. dry trigger contacts

Drawn By:

CFV

Date:

4/7/04



LNL-CTX-6

Lenel Systems International, Inc.

1212 Pittsford-Victor Road Pittsford NY 14534 USA

[tel] +1.585.248.9720 [fax] +1.585.248.9185 [web] www.lenel.com

rev. 0603



Includes

LNL-CTX-6 enclosure (Gray with Lenel logo)

Tamper switch

Lenel Lock with two keys

Forty-eight stand-offs and Forty-eight screws

Installation Instructions

UL294 and UL1076 approvals

Can accommodate up to 6 Lenel Access Control

Ordering Information

Part Number

LNL-CTX-6

Description

Cabinet only, with Lock [24" H x 18" W x 4.5" D]



Multi-technology readers



Overview

Schlage® multi-technology readers are designed to simplify your access control solutions. Transition your system from proximity to smart card technology at your own pace without having to change out readers as new technologies are available. Schlage readers handle all applicable ISO standards (14443A, 14443B, 15693), are FIPS 201 compliant and are versatile enough to read 125 kHz proximity and 13.56 MHz contactless smart cards in a single unit. Schlage multi-technology readers interface with Schlage smart credentials (MIFARE Classic®, MIFARE Plus® and MIFARE® DESFire® EV1) and can read the card serial numbers (CSN) of a variety of smart cards from other manufacturers, making your next upgrade in technology simple and seamless. Additionally, Schlage readers are already NFC compatible and able to communicate with NFC-enabled phones whenever you're ready to take that step.

Schlage multi-technology readers use an open architecture platform designed to work with industry standards and common access control system interfaces. Multiple Schlage reader form factors are designed to fit a variety of placement needs, with an attractive modern design which will complement any facility's architecture and décor. Schlage readers are very easy to install with the quick-connect design and a standard wiring color scheme that most technicians are already accustomed to. But if you do have questions, you'll never worry about lack of service or assistance. As always, our knowledgeable sales and support staff is ready to assist you with any design or technology questions you may have.

Note: Magnetic stripe multi-technology readers also available.

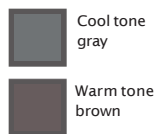
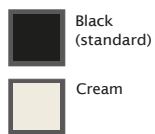
Features and benefits

- Accommodates interior, exterior, metal, and non-metal installation environments
- Recognizes most proximity credentials, and Schlage smart credentials (MIFARE Classic, MIFARE Plus and MIFARE DESFire EV1)
- FIPS 201 compliant
- NFC compatible, reads Schlage and aptiQ® mobile credentials
- Quick-connect design for easy installation
- Simple wiring – color scheme is identical to most readers in the market
- Easy-to-install mounting bracket
- Tri-state LED (red, green, amber) visual indicator and audio feedback representing status and activity information, easily discernible for the audibly or visually impaired
- Wiegand output for simple interface with most access control panels
- Multiple reader cover color options
- Limited lifetime warranty
- Multi-technology readers may also be ordered with RS-485 capability



Model*	PR10	SM10	MT11	MT15	MTK15
Reader type	Proximity – mini-mullion†	Smart – mini-mullion†	Multi-technology – mullion	Multi-technology – single gang	Multi-technology with keypad – single gang
Frequency	125 kHz	13.56 MHz	■	13.56 MHz and 125 kHz	■
FIPS 201 compliant	No	■	■	Yes	■
Standard default PIV output	N/A	■	■	75 bit PIV**	■
Standards	N/A	■	■	ISO 14443A, 14443B, 15693	■
Certifications	FCC Certification · IC Certification · UL 294 Listed · RED Directive (15 EU Countries) · CE Mark · IP65				
Voltage range	■ 5-16 VDC ■				
Power supply	■ Linear DC ■				
Current requirement (at 12 VDC and 25 C; mAmps)	Avg. 65 mA Peak 110 mA	Avg. 95 mA Peak 195 mA	MT11 Avg. 100 mA Peak 170 mA	MT11-485 Avg. 115 mA Peak 145 mA	MT15 & MT15-485 Avg. 120 mA Peak 200 mA
Read range	Proximity: Up to 3" (7.5 cm)	MIFARE Classic: Up to 4" (10 cm) MIFARE Plus: Up to 1.5" (3.8 cm) DESFire EV1: Up to 2" (5.1 cm)	■	Proximity: Up to 5" (12.7 cm) MIFARE Classic: Up to 4" (10 cm) MIFARE Plus: Up to 1" (2.5 cm) MIFARE DESFire EV1: Up to 2" (5.1 cm) PIV credential: Up to 2.5" (6.5 cm)	■
Cable specification	■ 18 AWG, 5 conductor stranded/shielded ■				
System interfaces	Wiegand	Wiegand / Clock & Data	■ Wiegand / Clock & Data / RS-485*** (OSDP) ■		
Cabling distance	■ Wiegand output: 500 ft. (152 m) ■				
Physical dimensions (H x W x D)	4.26" x 1.72" x 0.81" 10.8 cm x 4.4 cm x 2.1 cm	4.26" x 1.72" x 0.81" 10.8 cm x 4.4 cm x 2.1 cm	5.91" x 1.72" x 0.81" 15 cm x 4.4 cm x 2.1 cm	5.1" x 3.25" x 0.76" 12.9 cm x 8.3 cm x 1.9 cm	5.1" x 3.25" x 0.76" 12.9 cm x 8.3 cm x 1.9 cm
Operating temperatures	■ -40° to 158°F (-40° to 70°C) ■				
Weight	4.1 oz	3.9 oz	5.7 oz	9.1 oz	9.3 oz
Material	■ PBT Polymer ■				
Technologies supported in default mode					
Schlage Proximity	■	■	■	■	■
XceedID® Proximity	■	■	■	■	■
HID® Proximity	■	■	■	■	■
GE/CASI ProxLite®	■	■	■	■	■
AWID® Proximity	■	■	■	■	■
LenelProx®	■	■	■	■	■
Schlage/aptiQ mobile	■	■	■	■	■
Schlage/aptiQ/XceedID smart cards using MIFARE Classic	■	■	■	■	■
Schlage smart cards using MIFARE Plus	■	■	■	■	■
Schlage/aptiQ smart cards using MIFARE DESFire EV1	■	■	■	■	■
DESFire® CSN	■	■	■	■	■
HID iCLASS® CSN	■	■	■	■	■
Inside Contactless PicoTag® CSN	■	■	■	■	■
ST Microelectronics® CSN	■	■	■	■	■
Texas Instruments Tag-It® CSN	■	■	■	■	■
Phillips I-Code® CSN	■	■	■	■	■

Color options†



* Some features and benefits listed on the front may not be applicable to the smart-only and proximity-only readers.
 ** Other output options available through configuration.
 *** RS-485 model numbers include "-485" after the original model number. For example, MT11-485 is the RS-485 version of the multi-technology mini-mullion reader. Multi-drop, Open Standard Device Protocol (OSDP).
 † Lead time may apply for non-standard colors

About Allegion

Allegion (NYSE: ALLE) is a global pioneer in safety and security, with leading brands like CISA®, Interflex®, LCN®, Schlage®, SimonsVoss® and Von Duprin®. Focusing on security around the door and adjacent areas, Allegion produces a range of solutions for homes, businesses, schools and other institutions. Allegion is a \$2 billion company, with products sold in almost 130 countries. For more, visit www.allegion.com.





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

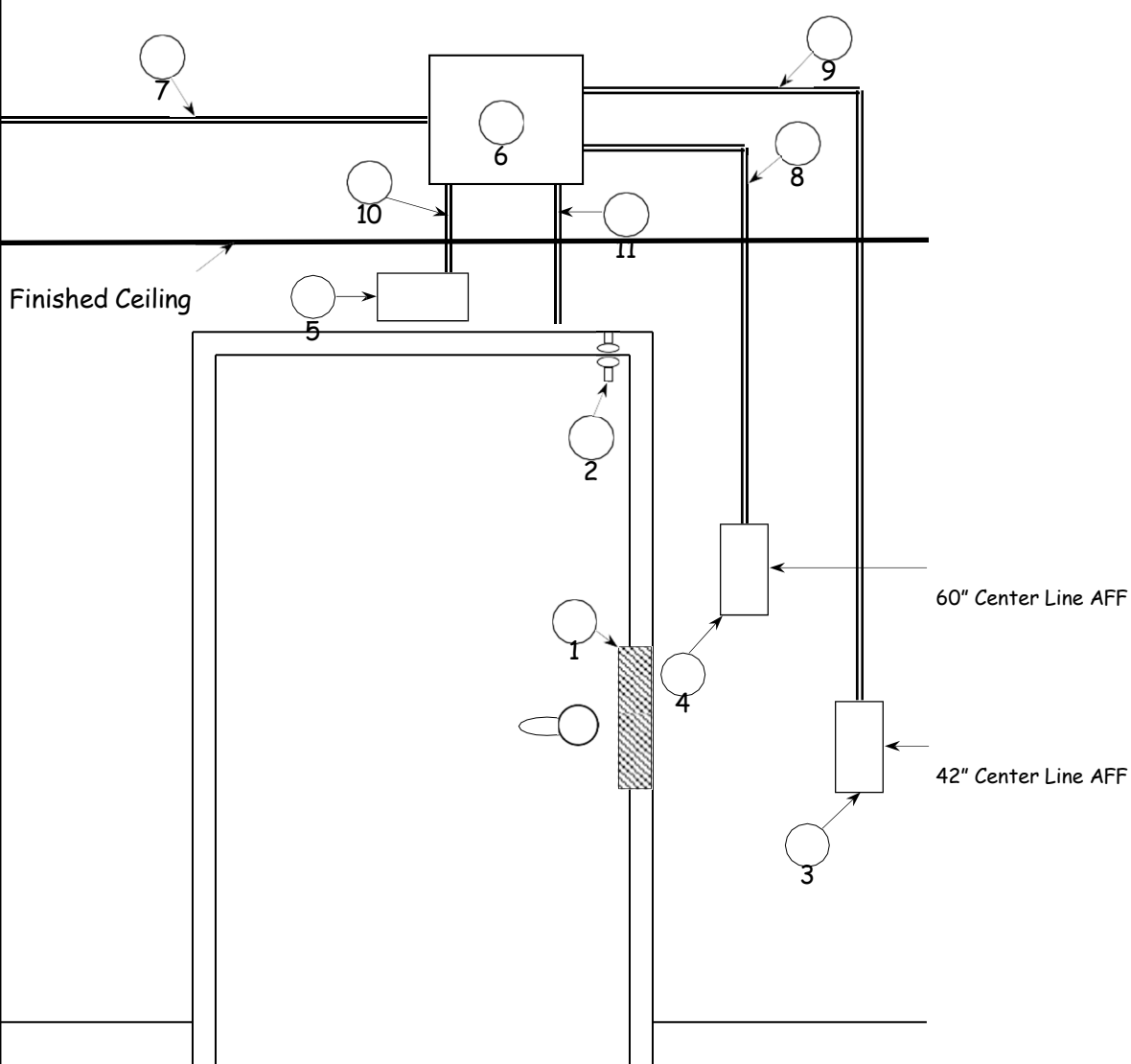
Typical Access Control Single Door Detail W/Door Strike

Drawn

CFV

Date:

10/7/04



- 1 Electrified Door Strike
- 2 Door Position Contacts
- 3 Single Gang Box — For Card Reader (Public Side Of Door)
- 4 Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- 5 Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- 6 8" X 8" X 4" Security Junction Box
- 7 1" Conduit To SER Room Filled With 1 ea — 12/C #22*, 2/C #12*. And 8/C #22* Shielded Pulled Through To Item 4.
- 8 3/4" Conduit Filled With 2/C #22* To Item 5
- 9 3/4" Conduit Filled With 8/C #22* Pulled Through Item 7.
- 10 1/2" Conduit Filled With 4/C #22*.
- 11 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 1 ea. 2/C #12* pulled to Item 1, and 2/C #22* pulled to Item 2.

* All wire shall be Honeywell / Genesis listed part number or equivalent. (<http://www.genescable.com>)

Jacketed Cables Unshielded Stranded 2C/22—#1102 4C/22—#1104

6C/22—#1107 12C/22—#1113 2C/18—#1118 4C/18—#1119 2C/12—#1129

Jacketed Cables Shielded Stranded 8C/22—#1207



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

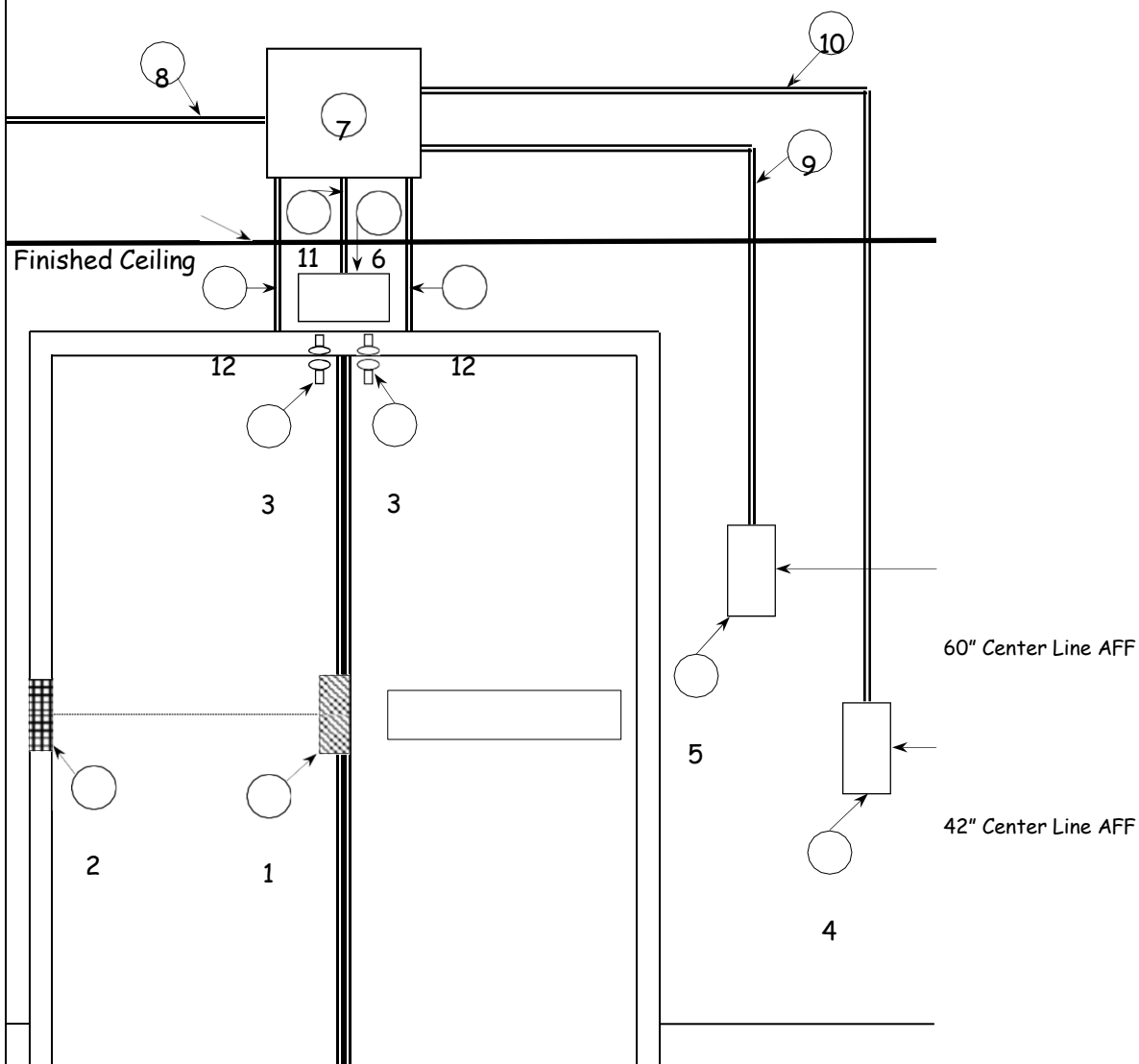
Typical Access Control Double Door Detail
W/Door Strike W/O Center Mullion

Drawn By:

CFV

Date:

10/7/04



- ① Electrified Door Strike
- ② Power Transfer Hinge
- ③ Door Position Contacts
- ④ Single Gang Box — For Card Reader (Public Side Of Door)
- ⑤ Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- ⑥ Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- ⑦ 8" X 8" X 4" Security Junction Box
- ⑧ 1" Conduit To SER Room Filled With 1 ea — 12/C #22*, 2/C #12*. And 8/C #22* Shielded Pulled Through To Item 4.
- ⑨ 3/4" Conduit Filled With 2/C #22* To Item 5
- ⑩ 3/4" Conduit Filled With 8/C #22* Pulled Through Item 7.
- ⑪ 1/2" Conduit Filled With 4/C #22*.
- ⑫ 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 2/C #12* pulled to item 2, and 2/C #22* pulled to item 3.

* All wire shall be Honeywell / Genesis listed part number or equivalent. (<http://www.genescable.com>)

Jacketed Cables Unshielded Stranded 2C/22—#1102 4C/22—#1104

6C/22—#1107 12C/22—#1113 2C/18—#1118 4C/18—#1119 2C/12—#1129

Jacketed Cables Shielded Stranded 8C/22—#1207



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

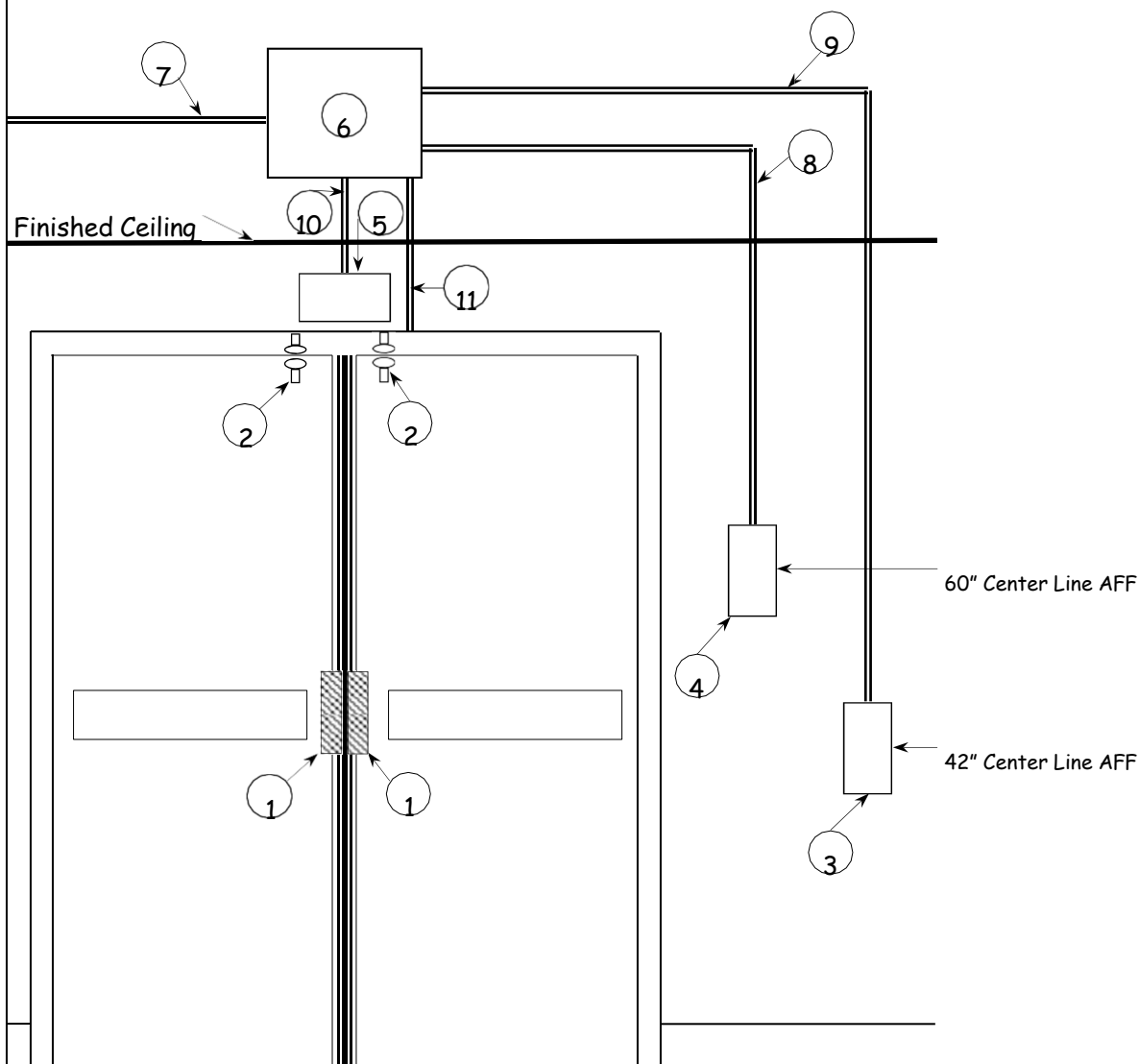
Typical Access Control Double Door Detail
W/Door Strike W/Center Mullion

Drawn By:

CFV

Date:

10/7/04



- ① Electrified Door Strike
- ② Door Position Contacts
- ③ Single Gang Box — For Card Reader (Public Side Of Door)
- ④ Single Gang Box — For Piezo & Key Switch (Secure Side Of Door)
- ⑤ Horizontal Single Gang Box — For RQE Motion Sensor (Secure Side Of Door)
- ⑥ 8" X 8" X 4" Security Junction Box
- ⑦ 1" Conduit To SER Room Filled With 1 ea — 12/C #22*, 2/C #12*. And 8/C #22* Shielded Pulled Through To Item 3.
- ⑧ 3/4" Conduit Filled With 2/C #22* To Item 4
- ⑨ 3/4" Conduit Filled With 8/C #22* Pulled Through Item 6.
- ⑩ 1/2" Conduit Filled With 4/C #22*.
- ⑪ 3/4" Conduit Stubbed Into Top Of Door Frame Filled With 2/C #12* pulled to item 1, and 2/C #22* pulled to item 2.

* All wire shall be Honeywell / Genesis listed part number or equivalent. (<http://www.genescable.com>)

Jacketed Cables Unshielded Stranded 2C/22—#1102 4C/22—#1104

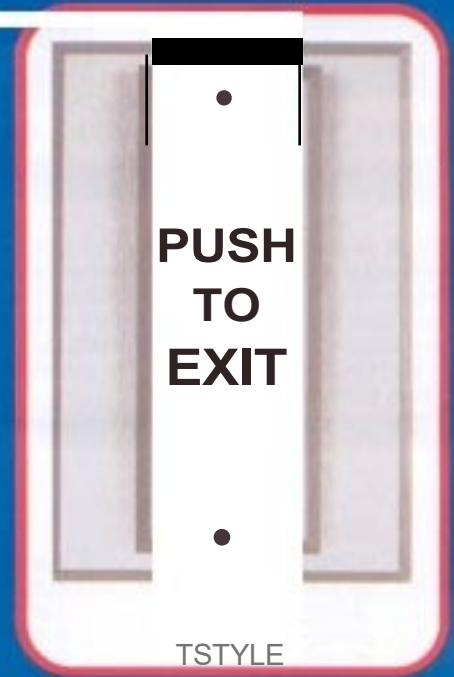
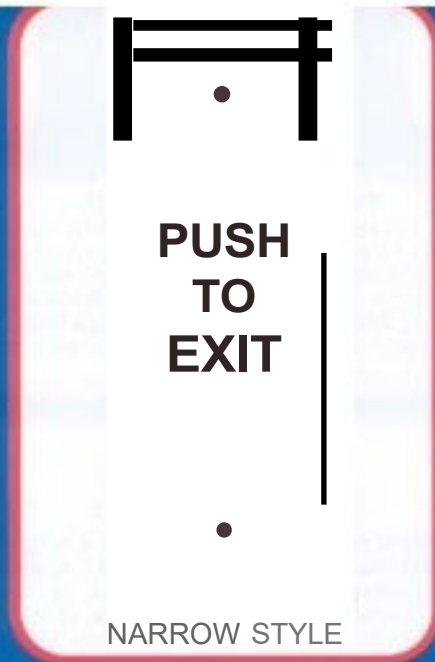
6C/22—#1107 12C/22—#1113 2C/18—#1118 4C/18—#1119 2C/12—#1129

Jacketed Cables Shielded Stranded 8C/22—#1207

PUSH PLATE

EXIT RELEASE STATIONS

FOR ACCESS CONTROL APPLICATIONS



- NARROW STYLE
- T STYLE
- SINGLE GANG STYLE
- COLOR FILLED ENGRAVED LEGENDS
- HEAVY DUTY SOLID ALUMINUM PLATES
- ANODIZED TO INHIBIT CORROSION
- VANDAL RESISTANT MOUNTING
- PNEUMATIC TIME DELAY SWITCH MODELS
- SINGLE POLE AND DOUBLE POLE SWITCH MODELS
- FIVE ARCHITECTURAL FINISHES
- CUSTOM ENGRAVING AVAILABLE



ALARM CONTROLS CORPORATION
DEER PARK, NEW YORK
11729


BOSCH

Invented for life

DS160 Series High Performance Request-to-exit Detectors



- ▶ **Door monitor with sounder alert**
- ▶ **Sequential Logic Input (SLI)**
- ▶ **Internal vertical pointability**
- ▶ **Wrap-around coverage pattern with precise pattern control**
- ▶ **Up to 64 second adjustable latch time**
- ▶ **Selectable relay trigger mode**
- ▶ **Selectable fail-safe or fail-secure modes**
- ▶ **Adjustable sounder volume**
- ▶ **Activation LED**

The DS160 Series consists of the DS160 Detector (light gray) and the DS161 Detector (black) specifically designed for Request-to-exit (REX) applications. With features such as timers, door monitor with sounder alert, and pointable coverage, the DS160 and DS161 have the flexibility to meet the most stringent REX requirements. The exclusive Sequential Logic Input (SLI) provides added security that is not offered in any other REX device.

Sounder Alert

An integrated sounder can be programmed to activate if the door is left open too long. The sounder volume is fully adjustable to 85 dB.

Keycard Input

The keycard input allows the sensor relay to be controlled from an external source, such as an access control system or card reader.

Functions

Sequential Logic Input (SLI)

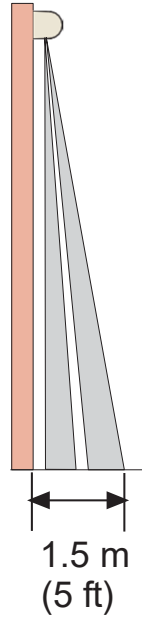
The SLI terminal allows connection of a second device to require sequential detection. This eliminates the possibility that an object that is slid through the door or underneath the door will activate the detector. This input can also be used to lock the sensor if motion is present outside the premises.

Door Monitor

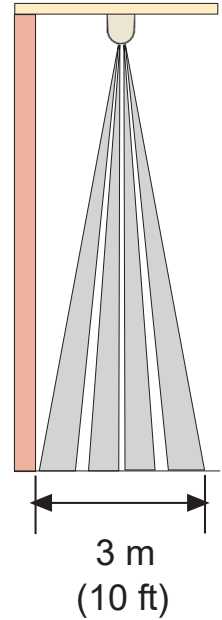
The sensor can monitor a door contact to allow special control of the internal relay. For example, if the door is opened within the relay time period, the sensor can be programmed to halt the timer. If the door is not opened within a specific time period, the relay can be programmed to deactivate.

Certifications and Approvals

Region	Certification
Europe	CE 89/336/EEC, EN55022: 1998 +A1: 2000 +A2: 2003, EN50130-4: 1996 +A1: 1998 +A2: 2003, EN61000-4-2: 1995 +A1: 1998 +A2: 2001, EN61000-4-3: 2002 +A1: 2003, EN61000-4-4: 1995 +A1: 2000 +A2: 2001, EN61000-4-5: 1995 +A1: 2001, EN61000-4-6: 1996 +A1: 2001 +A2: 2001, EN61000-4-11:1994 +A1: 2001, EN60950-1: 2001 2004/108/EC; EN 50130-4:1996 +A1:1998 +A2:2003; EN 60950-1:2006
USA	UL ALVY: Access Control Systems Units (UL294)
Europe	Complies with EN50131-1 Grade 2



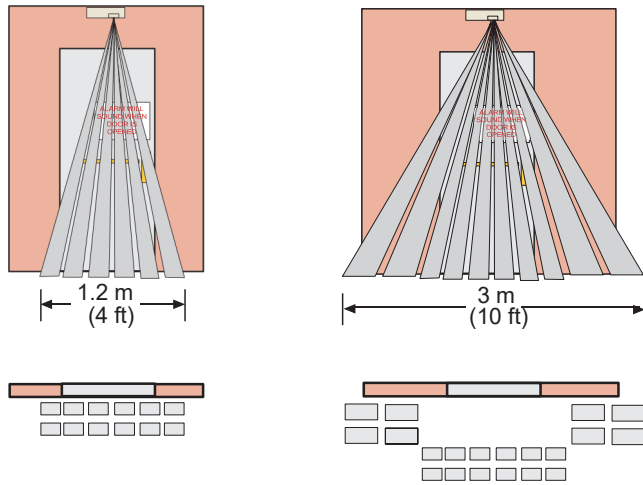
Side View



The higher that you mount the unit, the larger the coverage area. Do not mount the DS160/DS161 more than 4.6 m (15 ft) above the floor.

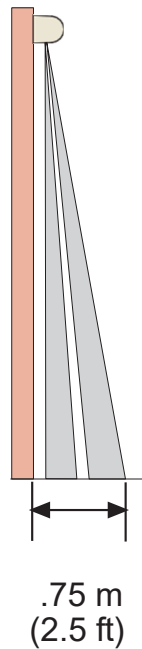
Side view of coverage pattern with the unit mounted at 4.6 m (15 ft) above the floor with the lens pointed straight down.

Installation/Configuration Notes

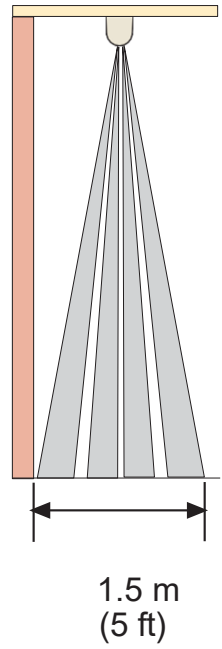


Front View

Mounted on wall above door and mounted on ceiling .75 m (2.5 ft) in front of the door.



Side View



The higher that you mount the unit, the larger the coverage area. Do not mount the DS160/DS161 more than 4.6 m (15 ft) above the floor.

Side view of coverage pattern with the unit mounted at 4.6 m (15 ft) above the floor with the lens pointed straight down.

Coverage Information

The coverage (detection area) varies depending on the mounting height above the floor, angle of the lens, and whether the unit is mounted on a wall above the door or on the ceiling. The coverage is 2.4 m x 3 m (8 ft x 10 ft)

The coverage patterns for the detector at a height of

2.3 m (7.5 ft) are shown. The coverage pattern increases or decreases with height and detector alignment.

Note When you mount the unit on the wall and the

lens points straight down, some detection zones point toward the wall and do not

detect movement.

The diagrams depict views of the coverage pattern with

the detector mounted at 2.3 m (7.5 ft) above the floor

with the lens pointed straight down. Zones that are pointed toward the wall are not shown.

Technical Specifications

Environmental

Operating Temperature: -29°C to +49°C (-20°F to +120°F)
For UL Certificated installations, 0°C to +49°C
(+32°F to +120°F)

Radio Frequency Interference (RFI) Immunity: No alarm or setup on critical frequencies in the range from 26 MHz to 1000 MHz at 50 V/m

Complies with Environmental Class II (EN50130-5)

Mechanical

Dimensions: 4.5 cm x 17.1cm x 4.4 cm
(1.80 in. x 6.75 in. x 1.75 in.)

Material: High impact ABS plastic enclosure

Modes

Power Loss Default: Programmable fail-safe or fail-secure modes.

Timer: Programmable reset accumulative or non-reset counting mode.

Electrical

Current Draw: 8 mA nominal standby current, 39 mA at 12 VDC in alarm

Voltage: 12 VAC or VDC to 30 VAC or VDC

Alarm Output: Two Form C relay contacts each rated 1 A at 30 VAC or VDC for resistive loads

Indicators: 1 activation LED

Relay Latch Time: Adjustable from 0.5 sec to 64 sec.

Ordering Information

DS160 Request-to-exit Detector

DS160

Light gray enclosure. For use in request-to-exit (REX) applications. Provides 2.4 m x 3 m (8 ft x 10 ft) coverage, timers, door monitor

with sounder alert, and pointable coverage.

DS161 Request-to-exit Detector

DS161

Black enclosure. For use in request-to-exit (REX) applications. Provides 2.4 m x 3 m (8 ft x 10 ft) coverage, timers, door monitor

with sounder alert, and pointable coverage.

Accessories

TP160 Trim Plate

TP160

A light gray trim plate used when mounting

the detector over a standard single-gang box.

TP161 Trim Plate

TP161

A black trim plate used when mounting the sensor over a standard single-gang box.

www.boschsecurity.com

Americas:

Bosch Security Systems, Inc.
130 Perinton Parkway
Fairport, New York, 14450, USA
Phone: +1 800 289 0096
Fax: +1 585 223 9180
security.sales@us.bosch.com
www.boschsecurity.us

Europe, Middle East, Africa:

Bosch Security Systems B.V.
P.O. Box 80002
5600 JB Eindhoven, The Netherlands
Phone: + 31 40 2577 284
Fax: +31 40 2577 330
emea.securitysystems@bosch.com
www.boschsecurity.com

Asia-Pacific:

Robert Bosch (SEA) Pte Ltd, Security Systems
11 Bishan Street 21
Singapore 573943
Phone: +65 6258 5511
Fax: +65 6571 2698
apr.securitysystems@bosch.com
www.boschsecurity.com

Represented by

-AG&ORCE 390+

(IGH SECURITY ,OCK



THE 390+ SURFACE MOUNTED ELECTROMAGNETIC LOCK IS IDEAL FOR HIGH SECURITY APPLICATIONS. ITS MODULAR DESIGN EMPLOYS A STANDARDIZED CIRCUIT BOARD WITH EASY-TO-INSTALL CONNECTORS, ADJUSTABLE MOUNTING BRACKETS, INTEGRATED MOUNTING SCREWS, AND SLIDE-IN ARCHITECTURAL FINISH PLATES. A NEW ARMATURE HOUSING HOLDS THE ARMATURE IN PLACE, ELIMINATING THE NOISE AND SAGGING KNOWN WITH ARMATURES, INCREASING THE OVERALL RELIABILITY OF THE PRODUCT. THE ARMATURE HOUSING ALSO PROVIDES AN AESTHETICALLY PLEASING LOOK OVER TRADITIONAL ARMATURE MOUNTINGS, BLENDING INTO THE SURROUNDING ENVIRONMENT MORE EASILY. FINALLY THE ARMATURE HOUSING HOLDS THE MAGNETS FOR THE \$3- OPTION WITHOUT HAVING TO MOUNT AN ADDITIONAL PLATE TO THE ARMATURE, ENSURING QUICKER, MORE RELIABLE INSTALLATIONS.

CERTIFICATIONS. THE 390+ EXCEEDS UL 156.23 GRADE 1 STANDARDS WITH 1650 POUNDS OF DIRECT HOLDING FORCE, IS UL LISTED AS AN AUXILIARY LOCK FOR A 3 HOUR FIRE-RATED OPENING AND FOR BURGLARY RESISTANCE.

1650 LBS
(HOLDING FORCE)



CONFIGURATIONS

- 390+ (SINGLE) FOR HOLLOW METAL, ALUMINIUM OR WOOD DOORS AND FRAMES AND GLASS DOORS
- 392+ (DOUBLE) FOR PAIRS OF HOLLOW METAL, ALUMINUM OR WOOD DOORS AND FRAMES WITHOUT A MULLION, AND PAIRS OF GLASS DOORS
- 391+ (SPLIT ARMATURE) FOR PAIRS OF HOLLOW METAL, ALUMINUM OR WOOD DOORS AND FRAMES WITHOUT A MULLION

LOCK BODY DIMENSIONS

390+/391+	(: 2-3/4v	7: 10-1/2v	\$: 1-11/16v
392+	(: 2-3/4v	7: 20-5/8v	\$: 1-11/16v

(HOLDING FORCE)

390+ (SINGLE)	1650 POUNDS
392+ (DOUBLE) EACH SIDE	1650 POUNDS
391+ (SPLIT ARMATURE) EACH SIDE	825 POUNDS

ELECTRICAL SPECIFICATIONS

120V 60/40%	12 OR 24 VDC
50/20% 20/10%	12VDC 12VDC, 24VDC

5 Year Limited Warranty



90%
11-95%

APPLICATIONS. THE 390+ IS AVAILABLE FOR SINGLE, INSWINGING OR OUTSWINGING, HOLLOW METAL, ALUMINUM, AND WOOD DOORS AND FRAMES AND GLASS DOORS. THE 392+ IS AVAILABLE FOR PAIRS OF HOLLOW METAL, ALUMINUM, AND WOOD DOORS AND FRAMES AND GLASS DOORS WITHOUT A MULLION. THE 391+ WITH SPLIT ARMATURE IS USED WITH PAIRS OF HOLLOW METAL, ALUMINUM, AND WOOD DOORS AND FRAMES WITHOUT A MULLION. A 1200 POWERMISER (07-) OPTION WITH 1200 POUNDS OF HOLDING FORCE IS ALSO AVAILABLE FOR LIMITED POWER APPLICATIONS. ALL MODELS EASILY INTERFACE WITH ELECTRONIC ACCESS CONTROL SYSTEMS, AUTOMATIC DOOR OPERATORS AND FIRE OR OTHER HAZARD SENSING SYSTEMS FOR EGRESS AND EMERGENCY EGRESS.

390+ SUGGESTED ARCHITECTURAL SPECIFICATION:

LOCKS SHALL BE FIELD SELECTABLE DUAL VOLTAGE 12/24 VDC 390+ SERIES ELECTROMAGNETS MANUFACTURED BY LOCKNETICS OR APPROVED EQUAL. LOCKS SHALL MEET UL 156.23-1992 GRADE 1 HIGHEST CLASSIFICATION CRITERIA INCLUDING A MINIMUM HOLDING FORCE OF 1650 LBS., RESIDUAL MAGNETISM WITHIN ONE SECOND OF 4%, & MAXIMUM AND INDUCTIVE KICK-BACK NOT TO EXCEED 53 VOLTS PEAK. LOCKS SHALL BE POWERED BY FILTERED AND REGULATED 5, LISTED POWER SUPPLIES, INSTALLED AND WIRED IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS. FAILURE TO SUPPLY SPECIFIED POWER SUPPLIES MAY VOID WARRANTY. LOCKS USED ON LABELED FIRE DOOR ASSEMBLIES SHALL BE UL LISTED AS AUXILIARY LOCKS, RATED FOR 1-LABEL OPENINGS AND FOR BURGLARY RESISTANCE. WHERE SCHEDULED, LOCKS SHALL BE EQUIPPED WITH CONCEALED SENSORS TO MONITOR LOCK STATUS AND DOOR STATUS. LOCKS SHALL BE SURFACE MOUNTED AND WHERE SCHEDULED INCLUDE HOUSING COVERS THE FULL WIDTH OR HEIGHT OF THE OPENING. TWO ELECTROMAGNETS FOR PAIRS OF DOORS SHALL BE MOUNTED IN A COMMON HOUSING. HOUSINGS SHALL NOT PROJECT MORE THAN 2-3/4 INCHES INTO THE DOOR OPENING. LOCKS SHALL BE FURNISHED WITH AN ADJUSTABLE MOUNTING BRACKET FOR ACCURATE INSTALLATION. LOCKS SHALL BE FURNISHED WITH AN INTEGRAL CIRCUIT BOARD WITH TERMINAL STRIP FOR ACCURATE WIRING. LOCKS FOR INSWING DOORS SHALL BE PROVIDED WITH A TOP JAMB BRACKET WITH NO EXPOSED SCREWS OR FASTENING DEVICES. WHERE REQUIRED, PROVIDE MOUNTING ACCESSORIES INCLUDING FINISH PLATES, ANGLE BRACKETS, GLASS DOOR BRACKETS, INSWING DOOR ADAPTER BRACKETS ETC. FOR PROPER INSTALLATION WITH ALL TYPES OF DOOR AND FRAME ASSEMBLIES ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. LOCKS SHALL CARRY A MANUFACTURER'S WARRANTY OF NOT LESS THAN FIVE (5) YEARS.

**Intrusion Alarm Systems****Recessed 3/4" steel door - GE Sensors****Resources**[> Product Information](#)**Buy**[> Where To Buy](#)**Related****Products/Accessories**

- [> Recessed 1225](#)
- [> Recessed 1015](#)
- [> Recessed 1058](#)
- [> Recessed 1065](#)
- [> Recessed 1072](#)
- [> Recessed 1075](#)
- [> Recessed 1078](#)
- [> Recessed 1078CT](#)
- [> Recessed 1078T](#)
- [> Recessed 1075T](#)
- [> Recessed 1125](#)
- [> Recessed 1125T](#)
- [> Recessed 1275](#)
- [> Recessed R1075](#)
- [> Recessed R1078/R1078C](#)
- [> Recessed R1125](#)
- [> Recessed R1125T](#)
- [> Recessed 1055](#)

Description

The Sentrol 1078 Series Steel Door contacts are designed specifically for use in the steel doors commonly found in commercial building applications. The unique housing design features a rugged unibody construction with flexible ribbed sides for quick, secure installation without gluing. The magnet housing isolates the magnet from the surrounding steel for maximum gap distances, both make and break.



An optional Rare Earth magnet is available. It is designed for use in metal entry/exit doors with a channel in the top of the door. The magnet eliminates the need to cut a mounting hole in the door channel. The flexible magnet housing can be compressed to accommodate a variety of channel widths for quick, easy installation.

Features and Benefits

- 3/4" diameter for easier drilling in metal
- Self-lock mounting
- Rugged construction
- Attractive, added security of recessed installation

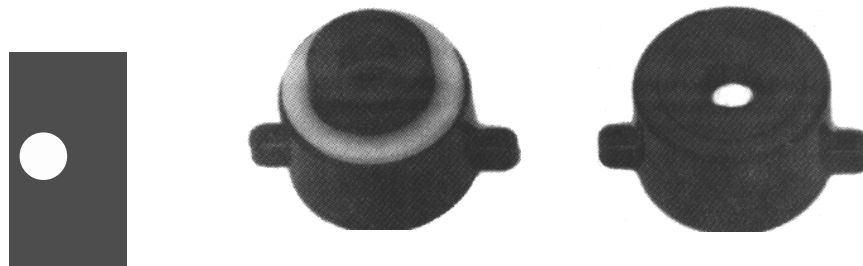


P.A.L. 328 Series

Electronic Piezo-A-Lert Buzzer

LISTED AS UL RECOGNIZED COMPONENT

RJ



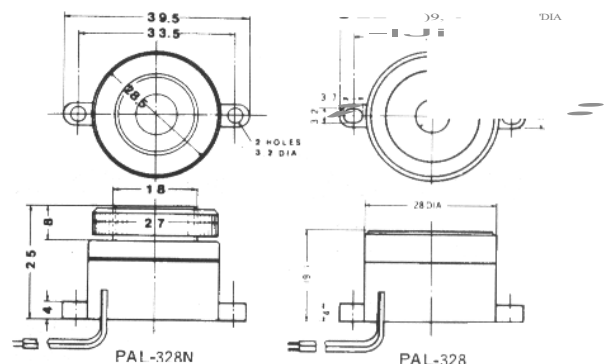
Description

The Piezo-A-Lert is an advanced electronic audible signal device that emits a compelling sound on a minimum current. This solid state device operates from as little as 3 volts DC to as much as 28 volts DC and is rated at 20 mA. Sound output is proportional to input voltages and ranges from a minimum OT 68dB to over 100dB at 28V DC at one foot. The piezo-electronic contact points give it high reliability and an exceptional long life. The Piezo-A-Lert signal operates in free air only. This means that it can be used for any purpose with the exception of under water. The recommended operating temperature range is from -25° C to -70° C. This U.L. recognized Piezo-A-Lert is

available in three models. The PAL-328N, and PAL-328 have a black finish and the PAL-328NC has a chrome finish on the face and nut.

The PAL-328N and PAL-328NC have a multi-functional mounting method. By simply unscrewing the face nut it can be inserted into any standard 3/4 inch knockout hole and by screwing the nut back in place you have a solid mounting. On the base, located to either side are two loops. Insert screws and the unit can be surface mounted. The PAL 328 model can only be installed utilizing the two loops with screws.

Dimensions: mm



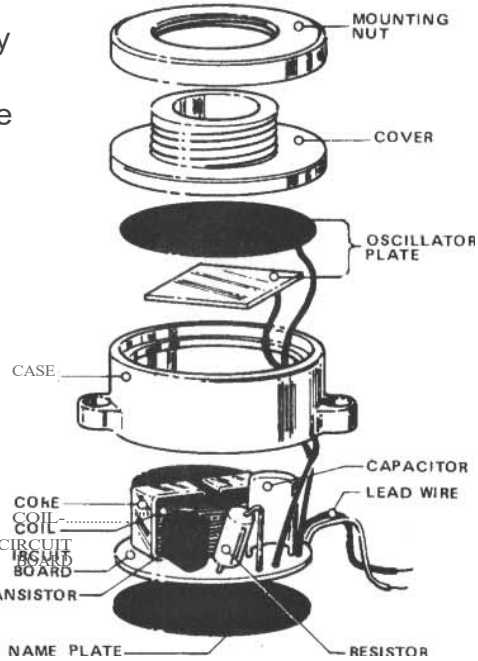
Specifications

Rated Voltage	DC 3-28V
Rated Current	20mA Max. at 28V DC.
Power Output	93 dB at 1 meter
Operating Temperature	-25°C to +70°C (-13° to 158°F)
Expected Life	250 hrs.
Starting Voltage	1.0 V Max.

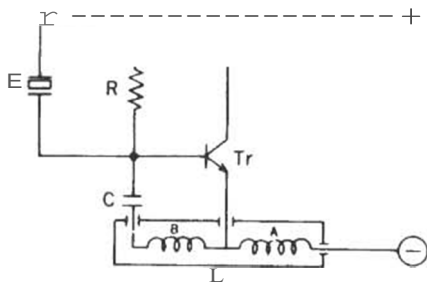


The PAL-328 series Piezo buzzers operate when an audible frequency is applied from a transistor to an oscillator plate containing a piezo-electric element and a metallic vibrating plate.

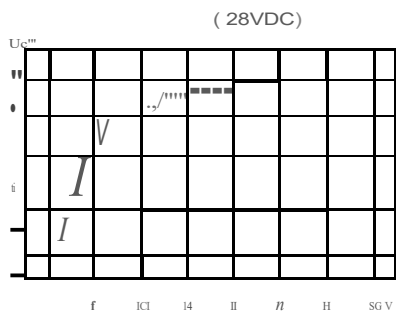
It is important when installing the PAL Series Buzzer within any enclosed area to remove any obstruction in front of the buzzer for it may deflect and prevent the sound of the buzzer from reaching the outside. Any object too close to the buzzer may minimize the sound of the buzzer. Please observe these points when installing the buzzer, and determine experimentally for the best location.



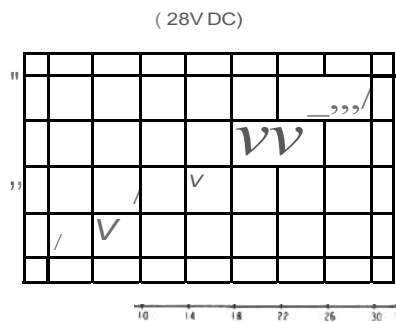
■ Circuit Diagram



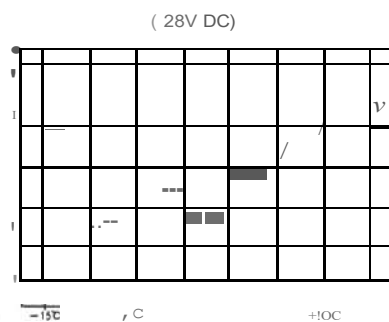
■ Sound Output - Voltage



■ Voltage - Current



■ Current - temperature



Distributed by:



CORPORATE OFFICE & WAREHOUSE

228 EAST STAR OFINDIA LANE, CARSON, CA 90746

PHONE (310) 538-4670 • FAX (310) 538-9932 •

EAST COAST OFFICE & WAREHOUSE

30 F CHAPIN ROAD, PINEBROOK, NEW JERSEY 07058



CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

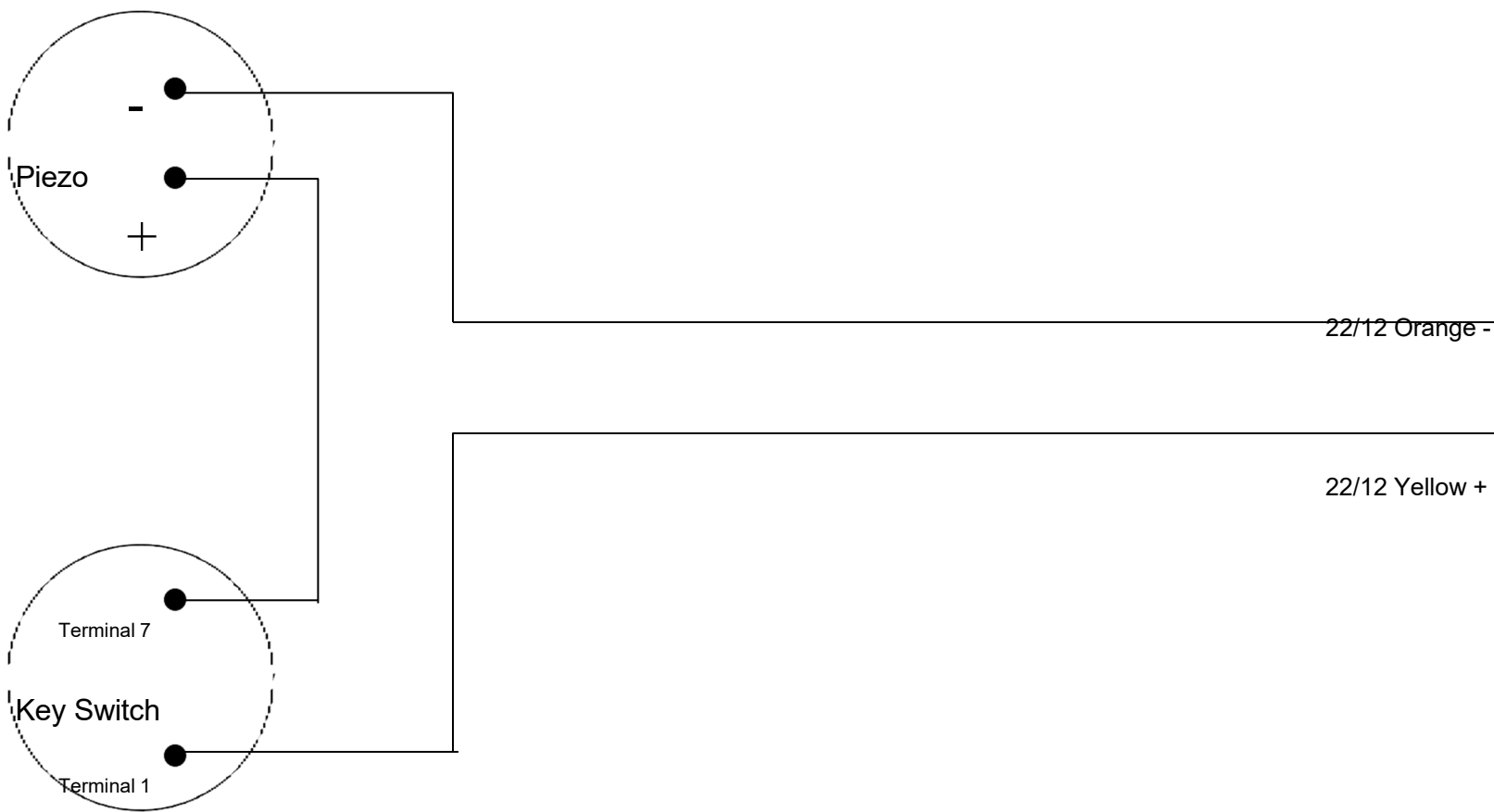
Standard Door Piezo & Key Switch Wiring

Drawn By:

CFV

Date:

4/5/04



Key Switch = ITT Industries Y1417U2C2WCNQE
Digikey Part # CKC8026-ND

3 Position Single Pole Switch wired as above = center position on

C&K Y Series 4 & 6 Tumbler Switchlocks

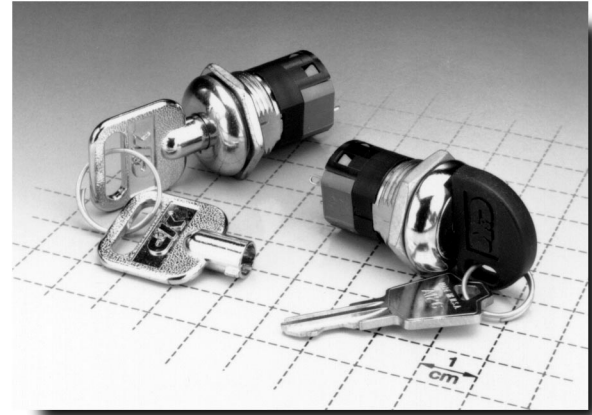


Features/Benefits

- **Anti-static switch**—exceeds 20 KV DC static resistance
- **Momentary models available**
- **Miniature profile**
- **Wire leads and harnesses available**

Typical Applications

- **Point-of-sale terminals**
- **Cash registers**
- **Computers**



Switchlock

Build-A-Switch

Our easy Build-A-Switch concept allows you to mix and match options to create the switch you need. Below is a complete listing of options shown in catalog. To order, simply select desired option from each category and place in the appropriate box. Switchlocks with standard options are shown on page H-4. Available options are shown and described on pages H-5 thru H-10. For additional options not shown in catalog, consult Customer Service Center.

Typical Example: Y 1 0 0 1 3 — 2 — C — 2 — 0 3 — N — Q — —

Switch and Lock Function

Y10013 (STD.) SP, ° 45 Index
Y1011U (STD.) SP, ° 90 Index

Keying

Y20013 DP, 45° Index
Y1001C SP, ° 45 Index
Y2001C DP, 45° Index
Y1001U SP, 45° Index
Y2001U DP, 45° Index
Y10082 SP, 45° Index

2 (STD.) Two nickel plated brass keys (4 tumbler) or two die cast zinc alloy keys with chrome plating (6 tumbler)
J One nickel plated brass key with plastic insert molded round head and one nickel plated brass key
T One nickel plated brass key with plastic

Y20082 DP, 45° Index
Y100AA SP, 45° Index
Y200AA DP, 45° Index

insert molded square head and one nickel plated brass key

Lock Type

Y100AB SP, 45° Index
Y10113 SP, ° 90 Index
Y20113 DP, ° 90 Index
Y1011C SP, ° 90 Index
Y2011C DP, ° 90 Index
Y2011U DP, ° 90 Index
Y14173 SP, ° 90 Index
Y1417C SP, ° 90 Index
Y1417U SP, ° 90 Index

A (STD.) 4 Tumbler lock (YX0B models)
C (STD.) 4 Tumbler lock with detent
V (STD.) 6 Tumbler tubular lock
N 4 Tumbler lock with anti-static switch (YX0B models)
R 4 Tumbler lock with detent and anti-static switch
W 6 Tumbler tubular lock with anti-static switch

Lock Finish

2 (STD.) Stainless steel facing
1 Nickel with removable dress nut
4 Polished nickel with removable dress nut

Y10812 SP, 45° Index, mom
Y20812 DP, 45° Index, mom

8 Gloss black facing
F Polished nickel facing

Y10882 SP, 45° Index, mom
Y20882 DP, 45° Index, mom
Y108AD SP, 45° Index, mom
Y208AD DP, 45° Index, mom
Y108AH SP, 45° Index, mom

Terminations
0.3 (STD.) Solder lug with
0.1 Solder lug with notch
0.2 PC Thru-hole
0.7 Solder lug with hole

Y208AH DP, 45° Index, mom. (Y190XX models only)

WC Wire lead

Y108AJ SP, 45° Index, mom.

Mounting/Lock Style

N (STD.) With nut
D With clip
L With removable dress nut and latch pawl
R With removable dress nut

Contact Material

Y208AJ DP, 45° Index, mom.
Y19073 SP w/common, ° 90Index

Y1907C SP w/common, ° In9d0ex
Y1907U SP w/common, ° In9d0ex
Y19001 SP w/common, ° In9d0ex
Y1900A SP w/common, ° In9d0ex
Y1900S SP w/common, ° In9d0ex

Q (STD.) Silver **Seal**
B Gold **NONE** (STD.) No seal

G Gold over silver **E** Epoxy seal

NONE (STD.) Nickel plated brass
chrome plated zinc alloy

1 White
2 Black
3 Red
T Beige



C&K Y Series 4 & 6 Tumbler Switchlocks



Specifications

CONTACT RATING: Q contact material: 4 AMPS @ 125 V AC or 28 V DC; 2 AMPS @ 250 V AC (UL/CSA). See page H-10 for additional ratings.

ELECTRICAL LIFE: 10,000 make-and-break cycles at full load.

CONTACT RESISTANCE: Below 10 milliohms typ. initial @ 2-4 V DC, 100 mA, for both silver and gold plated contacts.

INSULATION RESISTANCE: 10^9 ohms min.

DIELECTRIC STRENGTH: 1,000 V RMS min. @ sea level.

INDEXING: 45° or 90°, 2-4 positions (4&5 tumbler switchlocks). 45°, 3 positions; or 90°, 2 positions (6 tumbler tubular switchlocks). Other functions available, consult Customer Service Center.

STATIC RESISTANCE: Anti-static models exceed 20 KV DC static resistance @ sea level, lock body to terminals.

Materials

LOCK: Zinc alloy with stainless steel facing, std. (4 tumbler lock and 6 tumbler tubular lock).

KEYS: Two nickel plated brass keys, with code number, std. (4 tumbler lock). Two die cast chrome plated zinc alloy keys, std. (6 tumbler lock).

SWITCH HOUSING: Glass filled polyester (UL 94V-0).

CONTACTS AND TERMINALS: Q contact material: Copper, silver plated. See page H-10 for additional contact materials.

MOUNTING NUT: Zinc alloy or steel, nickel or bright zinc plated.

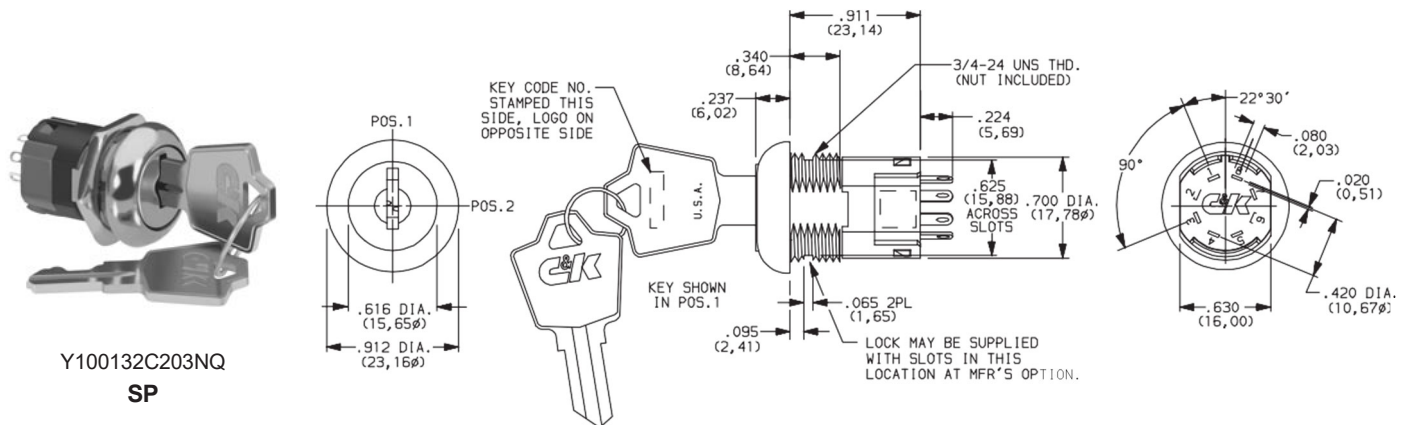
MOUNTING CLIP: Steel, nickel or bright zinc plated.

DRESS NUT: Brass, nickel plated.

TERMINAL SEAL: Epoxy.

NOTE: Specifications and materials listed above are for switchlocks with standard options. For information on specific and custom switchlocks, consult Customer Service Center.

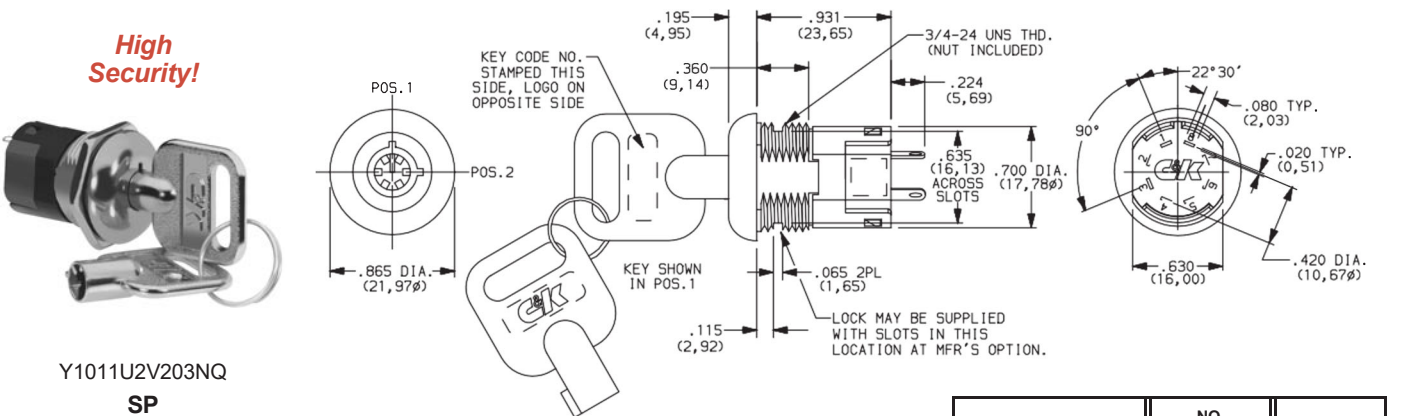
SWITCHLOCKS WITH STANDARD OPTIONS



Y100132C203NQ
SP

PART NUMBER	NO. TUMBLERS	INDEXING
Y100132C203NQ	4	45°

NOTE: For panel mounting information, see page H-10.



Y1011U2V203NQ
SP

PART NUMBER	NO. TUMBLERS	INDEXING
Y1011U2V203NQ	6	90°

NOTE: For panel mounting information, see page H-10.



C&K Y Series 4 & 6 Tumbler Switchlocks

SWITCH AND LOCK FUNCTION



H

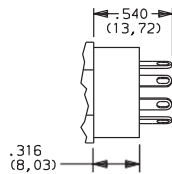
Switchlock

SINGLE & DOUBLE POLE SWITCHES									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4 & 6	SP DP	Y10013 Y20013	8-1 8-1, 4-5	1-2 1-2, 5-6	2-3 2-3, 6-7		Position 1		45°
4	SP DP	Y1001C Y2001C	8-1 8-1, 4-5	1-2 1-2, 5-6	2-3 2-3, 6-7		Position 3		
4 & 6	SP DP	Y1001U Y2001U	8-1 8-1, 4-5	1-2 1-2, 5-6	2-3 2-3, 6-7		Positions 1 & 3		
4	SP DP	Y10082 Y20082	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 1		
4	SP DP	Y100AA Y200AA	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Positions 1, 2 & 3		
4	SP	Y100AB	8-1	1-2	2-3	3-4	Positions 1, 2, 3 & 4		
4 & 6	SP DP	Y10113 Y20113	8-1 8-1, 4-5	1-3 1-3, 5-7			Position 1		90°
4	SP DP	Y1011C Y2011C	8-1 8-1, 4-5	1-3 1-3, 5-7			Position 2		
4 & 6	SP DP	Y1011U Y2011U	8-1 8-1, 4-5	1-3 1-3, 5-7			Positions 1 & 2		
4	SP	Y14173	7-1	1-3	6-7		Position 1		
4	SP	Y1417C	7-1	1-3	6-7		Positions 2 & 3		
4	SP	Y1417U	7-1	1-3	6-7		Positions 1, 2 & 3		

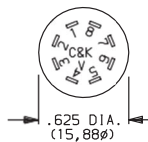
SINGLE & DOUBLE POLE MOMENTARY SWITCHES									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4	SP DP	Y10812 Y20812	8-1 8-1, 4-5	1-2 1-2, 5-6			Position 1		45° Mom.
4	SP DP	Y10882 Y20882	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 1		

LEGEND

- ▲ = Momentary Positions (45°)
- = Detent Positions (45° or 90°)
- ⊙ = Key pull possible in these positions.
- = Stop Positions



TERMINAL NUMBERS



Terminal numbers molded on bottom of housing.

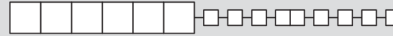
All models with all options when ordered with 'G' or 'Q' contact material.

NOTE: Other 3 position momentary models available, consult Customer Service Center.



C&K Y Series 4 & 6 Tumbler Switchlocks

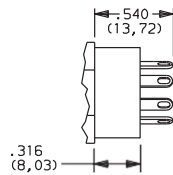
SWITCH AND LOCK FUNCTION



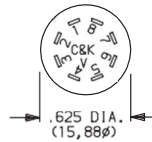
SINGLE & DOUBLE POLE MOMENTARY SWITCHES									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4	SP DP	Y108AD Y208AD	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Positions 1&3		45° Mom.
4	SP DP	Y108AH Y208AH	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 1		
4	SP DP	Y108AJ Y208AJ	8-1 8-1, 4-5	1-2 1-2, 5-6	7-8 7-8, 3-4		Position 3		

LEGEND

- ▲ = Momentary Positions (45°)
- = Detent Positions (45° or 90°)
- ⊙ = Key pull possible in these positions.
- ⊙ = Stop Positions



TERMINAL NUMBERS



Terminal numbers molded on bottom of housing.

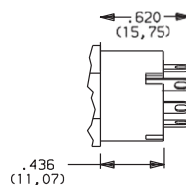
All models with all options when ordered with 'G' or 'Q' contact material.

NOTE: Other 3 position momentary models available, consult Customer Service Center.

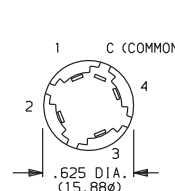
SINGLE POLE SWITCHES WITH COMMON									
NO. TUMBLERS	NO. POLES	MODEL NO.	CONNECTED TERMINALS				KEY PULL POSITIONS	LOCK CONFIGURATION	INDEXING
			POS. 1	POS. 2	POS. 3	POS. 4			
4	SP	Y19073					Position 1		90°
		Y1907C	C-1	C-2	C-4		Positions 2 & 3		
		Y1907U					Positions 1, 2 & 3		
		Y19001					Positions 1 & 3		
		Y1900A	C-1	C-2	C-3	C-4	Positions 2 & 4		
		Y1900S					Positions 1, 2, 3 & 4		

LEGEND

- = Detent Positions (45° or 90°)
- ⊙ = Key pull possible in these positions.
- ⊙ = Stop Positions



TERMINAL NUMBERS



TERM.)

Terminal numbers marked on insulator.

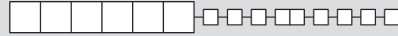
All models with all options when ordered with 'G' or 'Q' contact material.

NOTE: Epoxy seal not available. Removable dress nut not available with Y1900A models.



C&K Y Series 4 & 6 Tumbler Switchlocks

SWITCH AND LOCK FUNCTION



H

Switchlock

AVAILABLE OPTION COMBINATIONS															
MODELS	LOCK TYPES						TERMINATIONS					MOUNTING/LOCK STYLES			
	A	C	N	R	V	W	01	02	03	07	WC	D	L	N	R
YX0013		*			*	*	*	*	*		*	*	*	*	*
YX001C		*					*	*	*		*	*	*	*	*
YX001U		*		*	*	*	*	*	*		*	*	*	*	*
YX0082		*		*			*	*	*		*	*	*	*	*
YX00AX		*		*			*	*	*		*	*	*	*	*
YX0113		*		*	*	*	*	*	*		*	*	*	*	*
YX011C		*		*			*	*	*		*	*	*	*	*
YX011U		*		*	*	*	*	*	*		*	*	*	*	*
Y141XX		*		*			*	*	*		*	*	*	*	*
YX0812	*		*				*	*	*		*	*	*	*	*
YX08AH	*		*				*	*	*		*	*	*	*	*
Y190XX		*		*			*	*	*	*	*	*	*	*	*
YX08AD	*		*				*	*	*		*	*	*	*	*
YX08AJ	*		*				*	*	*		*	*	*	*	*

KEYING

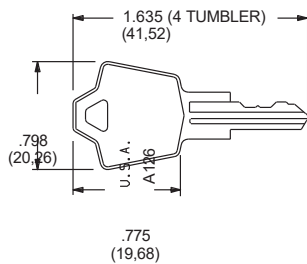


OPTION CODE	KEYING OPTIONS	CODE NO. ON KEY	CODE NO. ON LOCK
2	(STD.) 2 NICKEL PLATED BRASS KEYS (4 TUMBLER) or 2 DIE CAST CHROME PLATED ZINC ALLOY KEYS (6 TUMBLER)	YES	NO
J	1 NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED ROUND HEAD AND 1 NICKEL PLATED BRASS KEY	YES	YES
T	1 NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED SQUARE HEAD AND 1 NICKEL PLATED BRASS KEY	YES	NO

OPTION CODE	KEY COLOR
NONE	(STD.) NICKEL PLATED BRASS (4 TUMBLER) OR CHROME PLATED ZINC ALLOY (6 TUMBLER)
1	WHITE
2	BLACK
3	RED
T	BEIGE

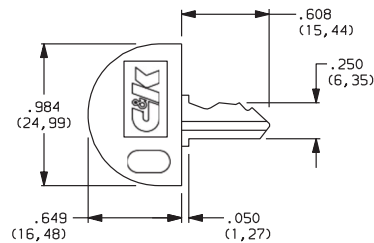
NOTE: All orders keyed alike, standard. For more than one key code, master keying, replacement keys, or other special features, consult Customer Service Center.

NICKEL PLATED BRASS KEY



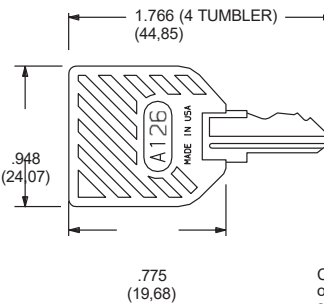
Key part number: 115140126

NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED ROUND HEAD



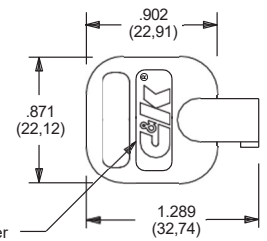
Key part number: 16564112602

NICKEL PLATED BRASS KEY WITH PLASTIC INSERT MOLDED SQUARE HEAD



Key part number: 11599112602

CHROME PLATED ZINC ALLOY KEY



Key part number: 1110801

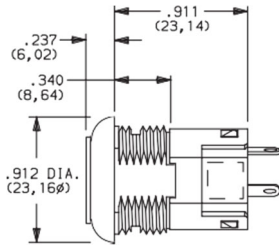


C&K Y Series 4 & 6 Tumbler Switchlocks

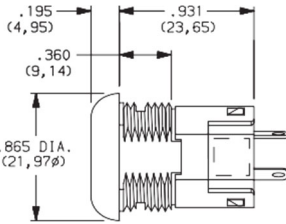


LOCK TYPE

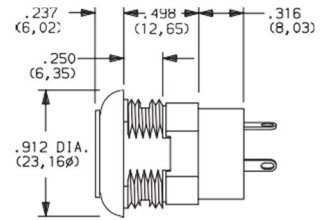
C (STD.) 4 TUMBLER LOCK WITH DETENT



V (STD.) 6 TUMBLER TUBULAR LOCK



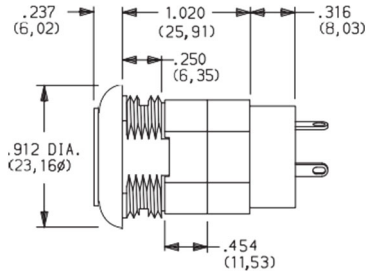
A 4 TUMBLER LOCK (MOMENTARY MODELS ONLY)



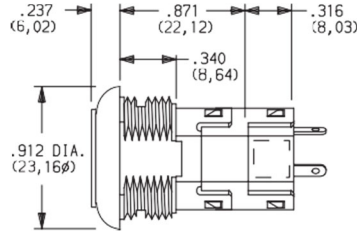
Available with Lock Finish '2' only.

SHORT ANTI-STATIC LOCK TYPES

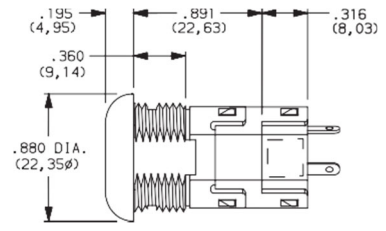
N 4 TUMBLER LOCK WITH SHORT ANTI-STATIC SWITCH (MOMENTARY MODELS ONLY)



R 4 TUMBLER LOCK WITH DETENT AND SHORT ANTI-STATIC SWITCH



W 6 TUMBLER TUBULAR LOCK WITH ANTI-STATIC SWITCH



Available with Lock Finish '2' only.

NOTE: For available option combinations, see chart on page H-10.
U.S. Pat. No. 4,639,562 Exceeds 20 KV DC static resistance @ sea level, lock body to terminals.

LOCK FINISH

2 (STD.) STAINLESS STEEL

1 NICKEL

4 POLISHED NICKEL

8 GLOSS BLACK

F POLISHED NICKEL



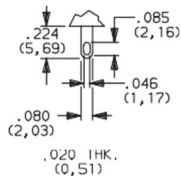
Available with
Lock Types 'V' & 'W' only.

NOTE: For available option combinations, see page H-10.

TERMINATIONS

03 (STD.) SOLDER LUG WITH HOLE

All Models Except Y190



01 SOLDER LUG WITH NOTCH

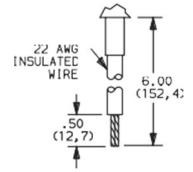
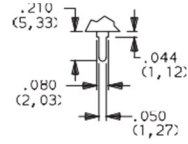
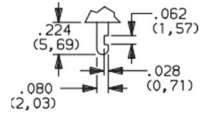
02 PC THRU-HOLE

WC WIRE LEAD

1015.

.020 THK.
(0,51)

.020 THK.
(0,51)



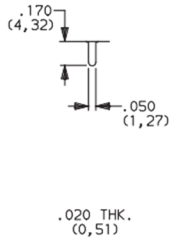
B
l
a
c
k
w
i
r
e
s
t
a
n
d
a
r
d
.
o
t
h
e
r
c
o
l
o
r
s
a
n
d
l
e
n
g
t
h
s
a
v
a
i
l
a
b
l
e
.
c
o
n
s
u
l
t
C
u
s
t
o
m
e
r
S
e
r
v
i
c
e
C
e
n
t
e
r
.
U
L
S
t
y
l
e

C&K Y Series 4 & 6 Tumbler Switchlocks

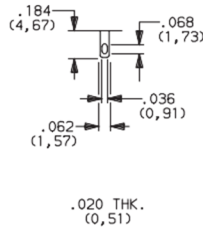


TERMINATIONS

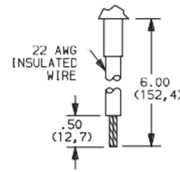
02 PC THRU-HOLE



07 SOLDER LUG WITH HOLE

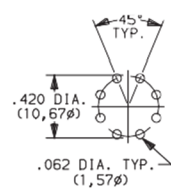


WC WIRE LEAD



Black wire standard, other colors and lengths available, consult Customer Service Center. UL style 1015.

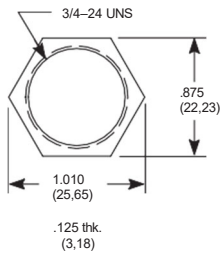
PC MOUNTING



Y190 Model Only

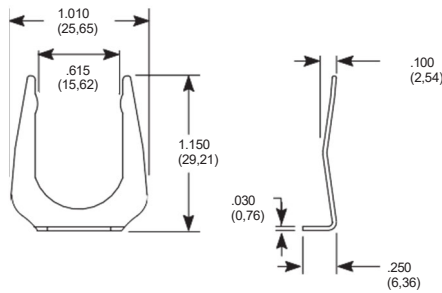
MOUNTING/LOCK STYLE

N (STD.) WITH NUT



Nut part number: 175050700

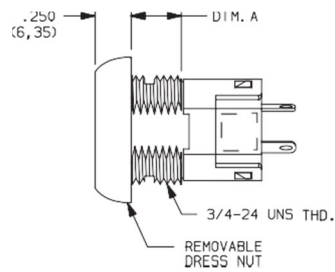
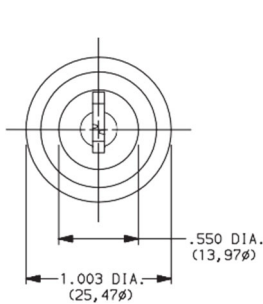
D WITH CLIP



Clip part number: 175050300

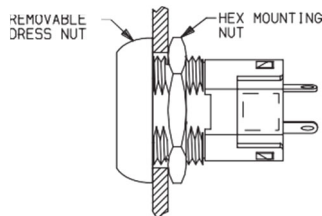
OPTION CODE	MOUNTING STYLE	PANEL THICKNESS
N	(STD.) WITH NUT	.085-.105 (2,16-2,67)
D	WITH CLIP	.085-.105 (2,16-2,67)

R REMOVABLE DRESS NUT



TYPICAL INSTALLATION

Install hex nut with enough clearance to allow for dress nut and panel. Place switch through cutout in rear of panel. Install and tighten dress nut by hand, then tighten hex nut. Always tighten assembly with back of panel hex nut to avoid damaging front of panel.



LOCK DIMENSIONS	
LOCK TYPES	DIMENSIONS
A, N	.270 (6,68)
C & R	.360 (9,14)

NOTE: Removable dress nut not available with Y1900A model.

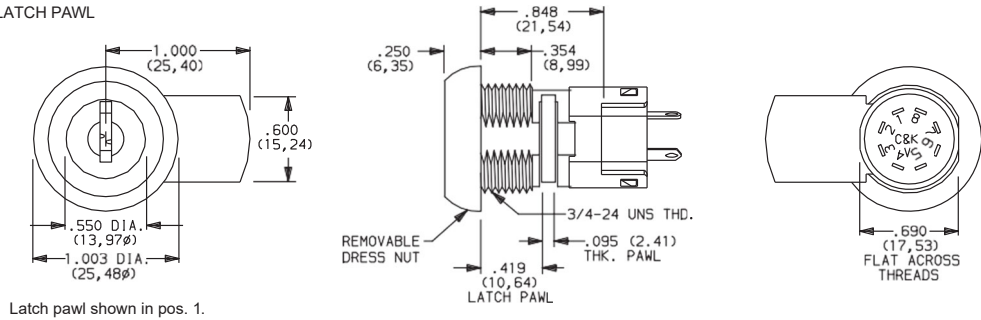


C&K Y Series 4 & 6 Tumbler Switchlocks



MOUNTING/LOCK STYLE

L REMOVABLE DRESS NUT WITH LATCH PAWL



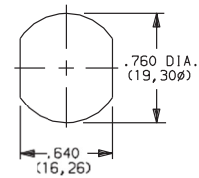
Latch pawl shown in pos. 1.

Mounting Information (All Models)

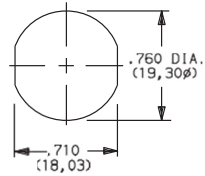
MOUNTING STYLES	PANEL THICKNESS		
	A, N LOCK TYPES	C, R LOCK TYPES	V, W LOCK TYPES
D	.065-.085 (1, 65-2, 16)		.085-.105 (2, 16-2, 67)
N	.105 (2, 67) max.	.195 (4, 95) max.	.215 (5, 46) max.
L	.215 (5, 46) max.		
R	.125 (3, 18) max.	.215 (5, 46) max.	

MOUNTING STYLES	AVAILABLE OPTION COMBINATIONS										
	LOCK FINISHES					LOCK TYPES					
	1	2	4	8	F	A	C	N	R	V	W
D	-	-	-	-	-	-	-	-	-	-	-
N	-	-	-	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-	-	-	-
L	-	-	-	-	-	-	-	-	-	-	-

PANEL MOUNTING



For models with 'N' or 'D' mounting styles.



For models with 'R' or 'L' mounting style.

CONTACT MATERIAL

OPTION CODE	CONTACT AND TERMINAL MATERIAL	RATINGS	
Q (STD.)	SILVER ²	POWER	4 AMPS @ 125 V AC OR 28 V DC; 2 AMPS @ 250 V AC (UL/CSA).
B	GOLD ¹	LOW LEVEL/DRY CIRCUIT	0.4 VA MAX. @ 20 V AC OR DC MAX.
G	GOLD OVER SILVER ³	LOW LEVEL/DRY CIRCUIT OR POWER	0.4 VA MAX. @ 20 V AC OR DC MAX. OR 4 AMPS @ 125 V AC OR 28 V DC; 2 AMPS @ 250 V AC (UL/CSA).

CONTACT MATERIAL/APPLICATION RECOMMENDATIONS — SEE CHART, PAGE L-31.

¹ CONTACTS & TERMINALS: Copper, with gold plate over nickel plate.

² CONTACTS & TERMINALS: Copper, silver plated (std. with all termination options).

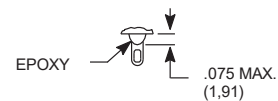
³ CONTACTS & TERMINALS: Copper, with gold plate over silver plate.

All models with all options when ordered with 'G' or 'Q' contact material.

SEAL

NONE (STD.) NO SEAL

E EPOXY SEAL



STI SERIES 2000 STOPPER STATIONS

Standard and custom, ADA compliant, low/high voltage switches

These North American style, ADA compliant, multi-purpose push-button switches cover a wide range of applications both indoors and outdoors. They're called Stopper Stations because they incorporate a unique, patented design that helps dramatically to stop accidental activation. A number of standard models are available for speedy delivery or we can create custom units to meet your needs exactly. Either way, you have your choice of any of five universal colors identifying switch usage, wording and language.

They work as great as they look

Because of their superior, patented design combined with quality construction throughout, you can expect outstanding performance for years to come. In fact, many STI customers are surprised to find that all this quality is available at no increase in price. Plus, customers appreciate the option to protect the switches with STI protective covers which carry a lifetime guarantee against breakage in normal use. For indoor applications, you can order your Stopper Station with a pre-alarm cover to help stop malicious activation.



SS-2004



SS-2204



SS-2400



SS-2107X



SS-2301



SS-2403E



ADA
Compliant

Features

- Unique, curved design helps protect against accidental activation.
- Stainless steel backplate.
- 5VA flammability rating on backplate and spacer.
- Station housing molded of super-tough polycarbonate.
- Illuminated button ratings are 0.125 amps @ 250 VDC or 7 amps @ 250 VAC.
- Your choice of colors—red, green, yellow, white or blue.
- Raised standard or custom vinyl labeling.
- Polycarbonate tested -40°F (-40°C) to 120°F (49°C).
- Wording in virtually any language.
- Interchangeable or replaceable N.O. or N.C., SPST gold-plated contact blocks rated for 3 amps @ 600 VAC or 1 amp @ 250 VDC.
- ADA compliant.
- Lifetime guarantee against breakage of polycarbonate cover (one year on electronic components).



Safety Technology International, Inc.
2306 Airport Road · Waterford, Michigan 48327-1209
Phone: 248-673-9898 · Fax: 248-673-1246
Toll Free: 800-888-4STI · E-Mail: info@sti-usa.com

Web: www.sti-usa.com

Safety Technology International (Europe) Ltd.

Unit 3 Olton Wharf · Richmond Road · Olton

Solihull · B92 7RN · England · Telephone: 44 (0) 121 707 2999

Facsimile: 44 (0) 121 707 8999 · E-mail: info@sti-europe.com Web:

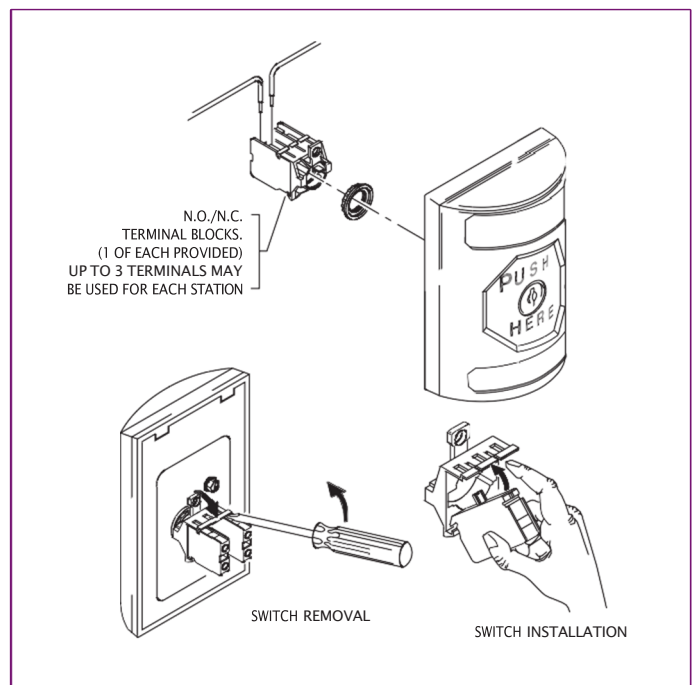
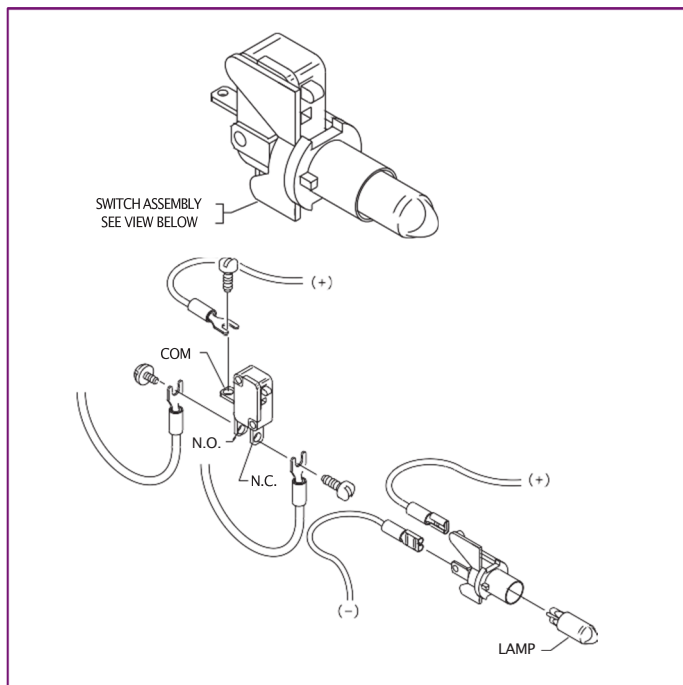
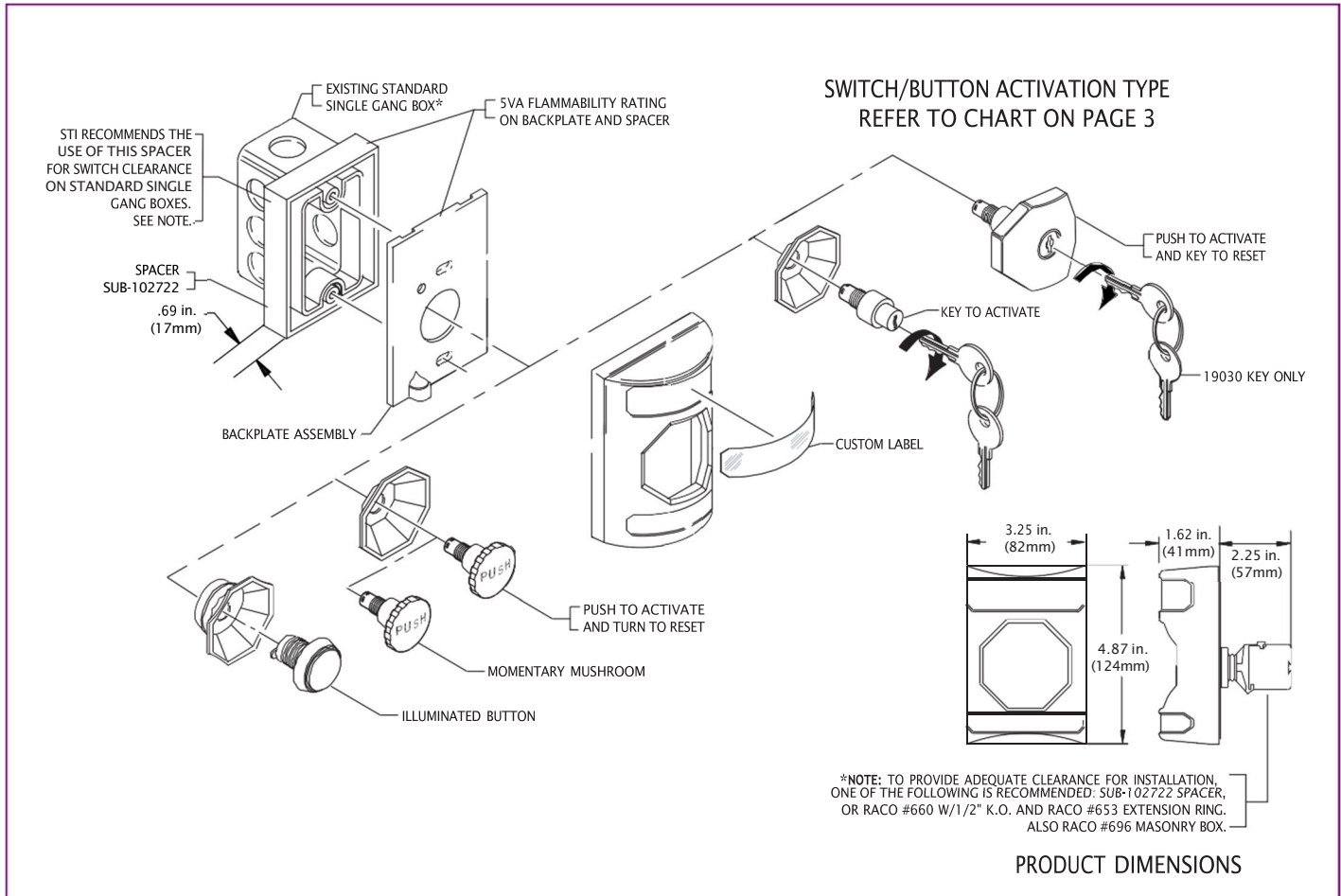
www.sti-europe.com

Dimensions and Technical Information

Testing Approvals

It has been tested and approved or listed by:

- Underwriter Laboratories No. S7255
- Canadian Underwriter Laboratories No. S7255
- ADA compliant





CASE

CASE WESTERN RESERVE UNIVERSITY

Drawing Name:

Card Access Door — Standard Wire Usage

Drawn By:

CFV

Date

4/7/04

Card Reader — 8/22 Shielded

- RED— +VDC
- BLACK— -VDC
- WHITE— DATA*
- GREEN— DATA*
- BLUE— LED
- BROWN— BEEP
- YELLOW— TAMPER
- ORANGE— TAMPER

- * LITTON CONVERSIONS— GREEN = DATA 1 WHITE = DATA 0
- * NEW INSTALLATIONS— GREEN = DATA 0 WHITE = DATA 1

WHEN USING THE MR-10-OT READER—ORANGE & YELLOW ARE SPARES

Peripheral Devices — 12/22

- RED— RQE +VDC
- BLACK— RQE -VDC
- GREEN— DOOR CONTACT
- WHITE— DOOR CONTACT
- BLUE— REX CONTACT
- BROWN— REX CONTACT
- YELLOW— PIEZO +VDC
- ORANGE— PIEZO -VDC
- VIOLET— SPARE
- SLATE— SPARE
- PINK— SPARE
- TAN— SPARE

Mag Locks — 18/4

- RED— LOCK +VDC
- BLACK— LOCK -VDC
- GREEN— SPARE
- WHITE— SPARE

SECTION 28 23 00 - VIDEO SURVEILLANCE SYSTEMS

CLOSED CIRCUIT TELEVISION (CCTV) INTERNET PROTOCOL (IP) CAMERA SYSTEM

1.0 CLOSED CIRCUIT TELEVISION (CCTV)

1.1 GENERAL DESCRIPTION

The CCTV IP-camera system shall include be one of the following types:

AXIS Q6035-E-1080P – PTZ Outdoor

AXIS P3346 – Fixed Outdoor/Indoor

The CCTV IP-camera system will be capable of user selectable video compression rates of H.264, MPEG-4 or MJPEG.

1.2 CLOSED CIRCUIT-TELEVISION (CCTV) IP CAMERA EQUIPMENT

The CCTV communications subsystem will provide for two basic functions: (1) the exchange of control and status data from the local control to the IP-camera and the pan tilt zoom (PTZ) unit on which the IP-camera is mounted, and (2) the transmission of images from the video IP-camera to the local control.

Video images will be generated at the CCTV Site at the rate of no less than thirty frames per second according to the applicable Multi-stream H.264, MPEG-4 and motion JPEG. Images captured by the IP camera will be continually transmitted via hardwired communication to the IP-camera control unit.

1.3 FUNCTIONAL PROVISIONS

The CCTV will include, but not be limited to, the following components and features:

- Password Protection: Programmable settings with optional password protection
- Open API for software integration
- A CCTV IP camera with auto focus zoom lens in an outdoor dome attached to the IP-camera-lowering device.
- A domed, watertight, environmental housing with an integrated positioner for pan and tilt unit
- and CCTV IP-camera, as determined per IP-camera site by the Department and as detailed herein, within the plan set, and/or in the Contract;
- Domed mounting hardware of the vertical or adapted wall mounting type with no exposed camera control wiring;
- IP-Camera site Exterior Ethernet Cat-6 STP or equal composite cabling;
- Junction boxes as required herein, within the plan set, and/or in the Contract;
- IP-Camera control electronics and equipment (i.e., hardware and software);
- A IP-CCTV assembly with azimuth positioning capabilities;

- Exterior Ethernet STP Cat-6 or equal composite , power, and data/video cables for power supply, images, and camera controls;
- Transient voltage suppression and protection;
- IP-Camera Controller.

1.4 IP-CAMERA ASSEMBLY ELECTRICAL PROVISIONS

The IP-camera assembly will be furnished with any and all equipment required for a fully functional system, including all appropriate power and communication cables as defined by the manufacturer. The power cables will be sized to meet the applicable National Electrical Code (NEC) requirements. The communication cables from the IP-camera assembly to the network communication devices will be appropriate for the technology employed (e.g., fiber optic, twisted pair,) and will meet the minimum size and/or bandwidth requirements defined by the manufacturer. The Exterior camera CAT-6 STP or equal composite cable will be outdoor NEC rated.

All devices supplied as system components will accept, as a primary power source, of 120 volts alternating current (VAC)/60 Hertz (Hz) input, excluding cameras. Any device that requires source input other than 120 VAC/60 Hz, such as cameras, PTUs, and dome heaters/blowers that operate at 24 volts, will be furnished with the appropriate means of conversion.

1.5 PROTOCOL

At a minimum, the following supported Protocols will be provided for the IP-Camera:

- IP, HTTP, UPnP, SNMP, RTSP, RTP, TCP, UDP, IGMP, DHC, H.264, MPEG-4, MJPEG

1.6 IP-CAMERA ASSEMBLY PERFORMANCE PROVISIONS

1.6.1 IP-CAMERA IMAGE SENSOR PROVISIONS

The CCTV IP-camera image sensor will be a day/night camera that provides color images during daytime and black and white (monochrome) images during nighttime both with manual or automatic control capabilities. The IP-camera video output will be compliant with **ITU-T Video Coding Experts Group (VCEG)** and **ISO/IEC Moving Picture Experts Group (MPEG)** standards. The IP-camera sensor will be a Charge-Coupled Device (CCD) with 1/4 inch Progressive Scan.

The minimum resolution supported will be NTSC: 700x480 to 176x120. The CCTV assembly will provide video images with minimal quality/bandwidth degradation in various environmental conditions. The CCTV assembly will provide low light-level sensitivity to achieve desired levels of operation at night.

The IP-Cameras will include frame integration to enhance night viewing. Minimum illumination at (COLOR) 0.5 lux at 30 IRE and (B/W) .008 lux at 30 IRE. Make a videotape that verifies the CCTV IP-camera performance during night conditions at five CCTV IP-camera locations. The selected five locations will be approved by the Department before making the videotape. This field demonstration test will be performed and the results approved by the CASE representative before the IP-camera selection is finalized.

The IP-camera will support the following image settings:

- Wide Dynamic Range (WDR),
- Electronic Image Stabilization (EIS),

- Manual shutter time color, brightness, contrast, sharpness
- Text and image overlay and privacy mask

The IP-camera will support automatic shutter time/speed that is selectable allow setting to yield optimal results under low lighting conditions without blooming or smearing.

The IP-camera sensor will support automatic and manual iris adjustment. The IP-camera will support Automatic Gain Control (AGC). The IP-camera assembly will be capable of generating and overlaying lines of English language text on the video image. A minimum of twenty alphanumeric characters per line will be supported. Control (enable, disable, and edit) of this feature will be available remotely and at the site using a laptop computer. The text messages will be stored in non-volatile memory. The IP-Camera ID text will consist of one line of text. Sector text will consist of text messages that change based on the position of the IP-camera within a sector. A minimum of eight uniform sectors will be provided.

The IP-camera will include privacy zones so that the operator cannot view scenes at preprogrammed camera positions. This prevents viewing the windows of private homes, hotels, or other buildings in the vicinity of the camera. The privacy zones will be user definable. There will be a minimum of eight privacy zones. Provide a IP-camera interface compatible with the communication equipment.

1.6.2 IP-CAMERA LENS PROVISIONS

The IP-camera lens will be motorized, and be mechanically or electrically protected from overrunning in extreme positions. Integrated camera/lens combination may be substituted.

Optical zoom range will be 35X. Digital zoom range will be 1X through 12X with a smooth transition from optical to digital zoom.

The lens will have an automatic iris capability with manual override.

The zoom lens will be selected automatically or manually to provide a minimum focal length of 0.14 to 3.2 inches (3.5 to 81 mm) that provides the full coverage of the corridor mainlines and shoulders. The minimum focusing distance will be a distance of 4 feet (1.2 m). The lens will also have a minimum aperture of f/1.2 and a 1/4 inch [0.6 cm] with 10 preset position points. The iris, zoom and focus will be controlled from the central location via HTTP protocol. The motors controlling the iris, zoom and focus will not be damaged due to overload at travel limits. The IP-camera lens will support optical zooming ranging from 2.5° telephoto (max) to 25° wide angle (min). The IP-camera will support automatic focus adjustments, with manual override. Vibration or ambient temperature changes will not affect the automatic iris function, focus mechanism, and zoom mechanism.

The IP-camera/lens combination will support automatic recovery from over and under voltage conditions, when power is returned to normal values. The lens will return to the last position prior to the over/under voltage condition.

The dome lens will be optically clear, impact resistant and acrylic. The acrylic dome lens will not yellow, introduce appreciable light loss, or distort over a 10-year service life when exposed to anti-icing chemicals. Certification of meeting this requirement will be required. The dome lens will be of anti-fog design with nominal light loss of no greater than 5 percent and geometric distortion of no more than 1 percent.

1.6.3 IP-CAMERA PAN/TILT UNIT (PTU)/POSITIONER PROVISIONS

The PTU will be a doom integrated motorized, remotely controlled device that allows the operator to point the IP-camera into a pan (horizontal vectoring) range with the following requirements:

- 360° Continuous rotation capability in either direction. Software limits provided for pan mode.
- 90° of tilt movement, video rotation at 90° down with auto-flip.
- Pan Speed (Operator Control): Variable from 0.1°/s to 80 °/s
- Pan Speed (Preset Control): minimum 200°/s
- Tilt Speed (Operator Control): Variable from 0.1°/s to 40 °/s
- Tilt Speed (Preset Control): 60°/s
- Minimum sixty-four preset positions with repeatability within $\pm 0.1^\circ$

1.6.4 IP-CAMERA CONTROLLER

The IP-camera controller will provide a single point interface for control and video communications. It will also provide a single point interface for prime power that provides power protection, conversion, and distribution to the IP-camera assembly.

1.7 IP-CAMERA ENVIRONMENTAL ENCLOSURE PROVISIONS

The CCTV IP-camera assembly will meet NEMA Type 4X and IP66 environmental standards and include an unpressurized dome-type housing enclosure with an minimum ambient operating temperature of -40 to 140 °F (-40 to 60 °C) with 100 percent relative humidity that provides complete protection for the camera and zoom lens assembly from moisture and airborne contaminants. The enclosure will protect the camera electronics and zoom lenses from blowing rain at storm rates, blowing sand, blowing dust, temperature, and solar loading, with an internal heater and blower. The enclosure will be corrosion resistant, and mountable in a manner, which leaves no exposed cabling. The maximum outside diameter of the dome will be a minimum of 11.1 inches (280 mm), with a maximum overall dimension of 15 X 15 in (380 x 380 mm).

The dome-type housing's lower section will be site-coated with Rain-X or an equivalent product prior to final acceptance;

1.8 IP-CAMERA CONSTRUCTION PROVISIONS

Furnish all tools, equipment, materials, supplies, and manufactured articles, and perform all operations and equipment integration necessary to provide a complete, fully operational IP-camera site as depicted herein, within the plan set, and/or in the Contract.

Provide CASE with a written inventory by location including serial numbers of items received and the condition in which they were received. Once received, the equipment becomes the Contractor's responsibility. Provide all labor and equipment necessary to move inventory out of the designated storage facility and to transport it to the installation location. All items will be installed in accordance with the manufacturer's instructions or as directed by a CASE representative.

Messenger wire (if required) will be used for all overhead wiring of IP-camera cable. Cables will be attached to messenger wire as per plan sheet TC-24.81.

If it is determined that radio frequency interference (RFI) is inducing noise and degrading the quality of the video images being transmitted by the IP-camera assembly or its components, if required by the Department, furnish and install ferrite coils or other radio frequency (RF) suppression devices for RFI dampening. This installation and the placement of these RF suppression devices will be as recommended by the manufacturer. The furnishing and installation of these devices will be an ancillary cost to the IP-camera assembly pay item.

1.9 IP-CAMERA TESTING PROVISIONS

Testing process will include IP-camera cable testing and IP-camera local control testing.

CASE will be notified at least fourteen working days prior to installation of the IP-camera assembly so that the CASE representative can be present to establish the appropriate CCTV settings.

1.9.1 IP-CAMERA CABLE TESTING PROVISIONS

Furnish all equipment, appliances, and labor necessary to test the installed IP-camera cable between the IP-camera assembly and the network communication device. Before any connections are made.

- Verify exterior IP-camera CAT-6 STP cable is outdoor NEC rated and is compliant to Telecommunications Industry Association (TIA). International Organization for Standards (ISO/IEC) creates and maintains standards for telecommunication cabling.
- Perform a cable analysis to ANSI/TIA-568-C.2 standards of category 6 cabling and continuity test on the IP-camera cable, which must not exhibit any discontinuities, such as openings, shorts, crimps, or defects;
- Replace any cable that fails to meet these parameters, or if any testing reveals defects in the cable, and retest new cable as specified above; and
- Furnish all test equipment.

1.9.2 IP-CAMERA LOCAL CONTROL TESTING

The following local field operational tests will be performed at the IP-camera assembly field site in accordance with the test plans. A computer will provide IP-camera control and positioning. After the IP-camera assembly, including the camera hardware, power supply, and connecting cables, has been installed:

- Verify that physical construction has been completed as detailed herein, within the plan set, and/or in the Contract;
- Inspect the quality and tightness of ground and surge protector connections;
- Check the power supply voltages and output;
- Connect devices to the power source;
- Verify installation of specified cables and connections between the IP-camera, PTU, and IP-camera control receiver;
- Connect to IP-camera through a laptop Ethernet connection and establish communication with IP-camera via TCP/IP-HTTP protocols.
- Set the IP-camera address;
- Verify the presence of industry compliant video image i.e. H.264 with local or remote laptop/computer,. Exercise the pan, tilt, zoom, focus, iris opening, and manual iris control selection, and the operation, low pressure alarm (if present), preset positioning, and power on/off functions;
- Observe the video picture on a laptop/computer,; Demonstrate IP-camera sensitivity at low light levels to meet the provisions;
- Demonstrate the pan/tilt speed and extent of movement to meet the provisions;

- Verify proper voltage of all the power supplies.

1.10 VENDOR AND MANUAL PROVISIONS

Provide a training and maintenance manual for the IP-camera assembly and the CCTV networks, including detailed provisions and information regarding the following CCTV system components.

Weight and dimensions;

Resolution;

Sensitivity;

Power consumption;

Optical zoom range;

Digital zoom range;

Zoom and focus presets;

Pan/tilt presets;

Ethernet connection;

Security;

Supported network protocols;

Video Compression;

Frame Rate;

Number of video streams and stream outputs;

IP-Camera control interface as required by recommended Standard

10/100 Base-T RJ-45 Ethernet, etc.;

Operating temperature and relative humidity; and General maintenance procedures

Provide documentation detailing the technical and operational aspects of the completed system. This will include device manuals, system diagrams, cabling diagrams, any and all field engineering notes specific to each installed IP-camera assembly, and any other documentation as required by CASE.

1.11 WARRANTY

Equipment furnished under this Specification will be guaranteed to perform according to these specifications and to the manufacturer's published specifications. Equipment will be warranted for a minimum of five (5) years from time of installation against manufacturer's defects and/or failure in design, materials or workmanship. Unless otherwise specified in the invitation for bids, warranty coverage will become effective on the date of final acceptance of the system by CASE. The CCTV IP-camera system manufacturer(s) will assign to CASE all manufacturer's normal warranties or guarantees, on all such electronic, electrical and mechanical equipment, materials, technical data, and products furnished for and installed on the project. Defective equipment will be repaired or replaced, at the manufacturer's option, during the warranty period at no cost to CASE. The manufacturer will provide replacement parts and/or complete unit(s) within ten (10) business days after notification by CASE.

END OF SECTION

SECTION 28 31 10 - FIRE DETECTION AND ALARM SYSTEMS - GENERAL

1.1 GENERAL

- A. Case Western Reserve University (CWRU) Protective Services coordinates the testing, maintenance and upgrading of all campus Fire Detection and Alarm Systems. The interfacing of all building Fire Detection and Alarm Systems to the campus Central Monitoring System (Lenel) or to any monitoring system will be done in coordination with CWRU Protective Services. All Fire Detection and Alarm Systems equipment shall be coordinated with the design of the facility and the stated operational use of the facility, and shall be approved by Protective Services.

1.2 GENERAL SCOPE OF WORK

- A. An Addressable Fire Detection and Alarm System shall be provided throughout the building to satisfy all National, State and Local Codes, including ADA Guidelines.
- B. In existing buildings where the Fire Detection and Alarm System is being replaced, the new system shall be completely installed, tested, and approved prior to the disconnection and removal of the old system. After the new system has become operational, Contractor shall remove the existing system in its entirety and repair all finished surfaces to a "like new" condition.
- C. The Fire Detection and Alarm Systems shall include a main control panel with battery back-up, a remote annunciator panel, all devices, backboxes, and amplifiers/power supplies required.
- D. All Fire Detection and Alarm Systems shall report to the local security system panel for release of all electro-magnetically locked doors and notification to the Fire Department.
- E. All Fire Detection and Alarm System devices and equipment shall be flush mounted in finished areas unless otherwise noted. All masonry walls shall be channeled, patched and painted to match existing finishes, as directed by CWRU.

1.3 REQUIRED LOCATIONS

- A. In addition to the location of devices required by the OBC and NPFA 72, fire alarm initiating and annunciating appliances shall be provided as follows:
 - 1. Area Smoke Detectors:
 - a. Communication Closets.
 - b. Corridors/Atriums.
 - c. Electrical Rooms.
 - d. Elevator Machine Rooms and Lobbies.
 - e. Laboratories.
 - f. Mechanical Rooms.
 - g. Residence Hall Suites.
 - h. Rooms with high value equipment or research material.
 - i. Storage Rooms.

- j. SER Rooms.
2. Audible or Visual Annunciating Appliances:
- a. Classrooms.
 - b. Lecture Halls.
 - c. Resident Room Suites.
 - d. Toilet Rooms.
 - e. Elevator Lobbies and Cars

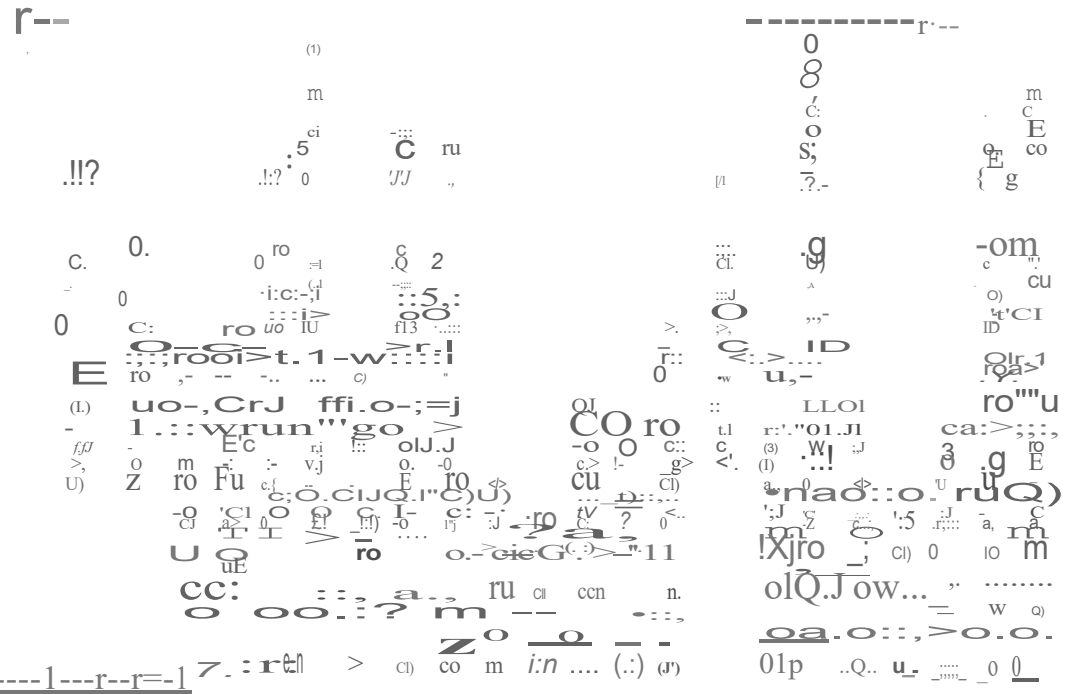
1.4 FIRE ALARM PERFORMANCE MATRIX

- A. See **Attachment 28 31 10.01** for the “Fire Alarm Performance Matrix”, sometimes referred to as the “Sequence of Operation.”

1.5 SPECIAL CONDITIONS

- A. In renovation work, while the intent is to provide a complete and operational Fire Detection and Alarm System upgrade, the building may contains sensitive finishes that need to be considered. Contractor shall utilize extreme care while working near sensitive finishes and shall provide protection as directed by Owner. Such protection shall include relocation and storage of removable artwork and covering of all permanent artwork. All methods of protection shall be approved by the owner prior to commencing work. All liabilities for damage occurring during the project shall be borne by the Contractor under a separate agreement with the Owner.
- B. Buildings may be utilized for individual testing. If that is the case, Contractor shall coordinate with the Owner to allow for the accessibility of testing areas and Contractor shall work operations around the testing areas.
- C. All wiring shall be in conduit. The minimum conduit size for all wiring is 1/2”. The use of wiremold is permitted on stone walls or ceilings with plaster on concrete. Wiring shall be concealed in all stud walls or suspended ceilings. All wiremold shall be painted to match adjacent surfaces. Above accessible ceilings, plenum rated wiring may be utilized, except in residence halls. The wiring shall be supported by wall mounted bridal rings at approximately 36” on center.
- D. Exposed conduits in unfinished spaces shall have a band of red paint every five feet.
- E. Contractor shall provide (3) copies of the Operating and Maintenance Manual for the fire alarm system. These manuals shall include all cut sheets and wiring diagrams as provided by equipment manufacturer.
- F. The Fire Detection and Alarm System shall provide a general evacuation signal throughout the building when activated.
- G. Fire Detection and Alarm System testing shall be completed during normal business hours, and pre-scheduled with CWRU.

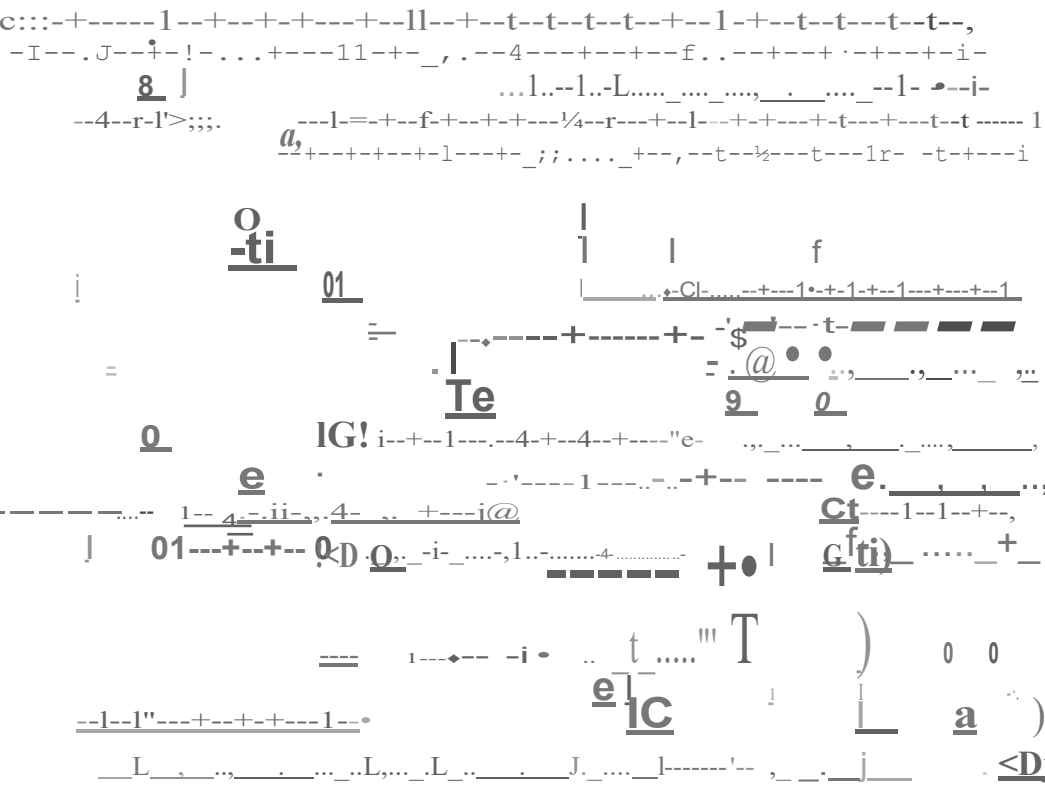
END OF SECTION



S-y s t e r n I n p u t s

l o c a t i o n

1	Rate of Rise/135°F Fixed Heat Detector	Attic
2	135°F Fixed Heat Detector Rate Compensating Detector	Attic Basement Storage
4	Rate of Rise/135°F Fixed Heat Detector	1st Floor Storage
5	Thermal-rated Cable Detector	1st Floor Storage
6	Manual Pull Station	3rd Floor West
7	Sprinkler Valve Tamper Switch	2nd Floor Sprinklers
8	Water Flow Switch	2nd Floor Sprinklers
9	Ionization Smoke Detector	1st Floor West Wing
10	Ionization Smoke Detector	1st Floor Center
11	Ionization Smoke Detector	1st Floor East Wing
12	Gas Detector (Liquid or Natural Gas)	Basement Mechanical Room
13	Ionization Smoke Detector	3rd Floor Restaurant
14	Infrared Flame Detector	1st Floor South
15	Ionization Smoke Detector	3rd Floor South
17	Beam Detector (CICCIO)	Atrium 2nd Level
18	Duct Detector with Sample (In-line Mounted)	13rd Floor HVAC Return
19	Beam Detector (In-line Mounted)	Basement HVAC Supply



FIRE ALARM
PERFORMANCE MATRIX

SECTION 28 31 20 - FIRE DETECTION AND ALARM SYSTEMS - DEMOLITION

1.1 RELATED DOCUMENTS

- A. Divisions 00 and 01 contain additional provisions that apply to this Section and shall be reviewed thoroughly.

1.2 TIMING AND COORDINATION OF DEMOLITION

- A. Existing Fire Detection and Alarm Systems shall remain in use until new Fire Detection and Alarm Systems have been installed, tested, and approved. After complete installation, testing, and approval of new Fire Detection and Alarm Systems, Contractor shall disconnect and remove all existing Fire Detection and Alarm Systems, in their entirety, and repair all finished surfaces to a "like new" condition.

1.3 SCOPE OF WORK

- A. "Electrical equipment" and "electrical work", as used in this section, shall refer to Fire Detection and Alarm System devices, conduit, wire and all other power and communication system devices.
- B. Contractor shall remove and/or relocate all existing electrical work made necessary because of project alterations as indicated or implied on the Contract Documents of all trades. All existing electrical equipment and systems not affected by these changes shall remain and shall be protected whether shown on the Drawings or not.
- C. Contractor shall maintain existing circuit continuity as described in the Specifications and on the Drawings, or as required for continued operation of the electrical equipment and systems.
- D. Electrically disconnect equipment shall be removed at the point of power source. Conduit and wiring from equipment shall be removed completely back to the point of power source.
- E. Where building systems or circuits are interrupted because of the demolition work, they shall be rerouted or relocated, modified and reconnected to provide a continuous system.
- F. All cutting, patching, finishing, etc., for removed and relocated electrical equipment shall be included as part of the Electrical Work. All holes and damage caused by the demolition work shall be properly patched with suitable materials to match existing surfaces. All painting shall cover a wall from corner to corner and floor to ceiling and shall cover the ceiling from wall to wall or break in the ceiling plane.
- G. All existing equipment indicated to be salvaged by the Owner shall be carefully removed and stored on site by the Contractor for review by the Owner. All equipment acceptable to the Owner shall be delivered by the Contractor to the Owner's storage facility and all other materials, equipment and debris shall become the property of the Contractor and shall be removed from the site.

- H. In all cases where existing branch circuit conduit and wiring is to be re-used within the remodeled area, the Contractor shall test for grounding continuity and shall test the existing branch circuit wiring as though new, in accordance with the testing procedures outlined elsewhere in these Specifications.
- I. All empty conduits from demolished fire alarm wiring shall be disconnected and removed. Where conduits are embedded in the structure, cap existing empty conduits, provide blank cover plates and plug open knockouts in existing electrical equipment.
- J. Properly dispose of all ionization type smoke detectors during demolition work as required by Local, State and Regional Codes.
- K. Properly dispose of batteries during demolition work as required by Local, State and Regional Codes.

END OF SECTION

SECTION 28 31 30 - FIRE DETECTION AND ALARM SYSTEMS – EQUIPMENT

1.1 RELATED DOCUMENTS

- A. Divisions 00 and 01 contain additional provisions that apply to this Section and shall be reviewed thoroughly.

1.2 WORK INCLUDES

- A. Provide Addressable / Voice Fire Detection and Alarm System.
- B. For use in high rise buildings requiring voice evacuation. Replace voice devices with horns in other buildings.
- C. CWRU Protective Services coordinates the testing, maintenance and upgrading of all campus fire systems. The interfacing of all building fire alarm systems to the campus Central Monitoring System (Lenel) or to any monitoring system will be done in coordination with CWRU Protective Services. All fire alarm equipment will be coordinated with the design of the facility and the stated operational use of the facility, and shall be approved by Protective Services.

1.3 QUALITY ASSURANCE

- A. All Fire Detection and Alarm Systems (the System) shall be the product of a single manufacturer, shall bear the Underwriter's Laboratory (UL) label, and shall meet the requirements of the NEC, NFPA, ASME/ANSI and all State and Local Codes. All control equipment shall be listed under UL category UOJZ as a single control unit. All System components shall be FM approved.
- B. All System control equipment shall be provided with transient protection to comply with UL864 requirements.
- C. All System controls shall be UL listed for Power Limited Applications.
- D. Entire System shall conform to the latest requirements of the Americans with Disabilities Act (ADA).
- E. State of Ohio Certification for installation of each complete System shall be provided to the Owner prior to the start of any installation.

1.4 ACCEPTABLE EQUIPMENT MANUFACTURERS

- A. System:
 - 1. Simplex.
 - 2. Fire Control Instruments.

- B. All associated equipment shall be from the same manufacturer whenever possible.

1.5 DESCRIPTION OF WORK

- A. Furnish and install a complete, operating, multiplexed, Addressable/Voice Fire Detection and Alarm System (the System) as specified herein. Include sufficient wiring, conduit, terminations, electrical boxes, and all other necessary material for a complete operating system.
- B. The System shall be microprocessor based and shall allow for loading and editing special instructions and operating sequences. The System shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the System Control Panel. Loss of primary and secondary power shall not erase the instructions stored in memory. Full flexibility for selective input/output control functions based on ANDing, ORing, NOTing, timing, and special coded operations shall also be incorporated in the resident software programming of the system.
- C. The programmable software shall allow for full configuration of initiating circuits such that additional hardware shall not be necessary to accommodate changing sensing of normally open contact devices to sensing of normally closed contact devices, changing sensing of normally open contact devices to sensing of a combination of current limited and non-current limited devices on the same circuit and being able to differentiate between the two, and changing from a non-verification circuit to a verification circuit. The software shall allow for configuration of indicating appliance and control circuits so that hardware shall not be necessary to accommodate changing a non-coded indicating appliance circuit to a coded circuit.
- D. The System shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event history.
- E. Existing Buildings: All panels and peripheral devices shall be furnished to the Contractor by the Owner. The System shall be by Fire Control Instruments as represented by Continental Fire and Security, Inc. (Mr. Terrence Kovacs, 216-749-5522).
- F. New Buildings: All panels and peripheral devices shall be furnished by the Contractor. The System shall be by Fire Control Instruments as represented by Continental Fire and Security, Inc. (Mr. Terrence Kovacs, 216-749-5522).
- G. All panels and peripheral devices shall display the manufacturer's name on each component. The catalog numbers specified under this section are those of Simplex Time Recorder Co.
- H. Fire Control Instruments, FCI, (as distributed by Continental Fire and Security) shall be an acceptable alternate manufacturer.

1.6 DESCRIPTION OF OPERATION

- A. The Fire Detection and Alarm System (the System) alarm operation after activation of any manual station, automatic detection device, or sprinkler flow switch shall be as follows:

1. All alarm indicating devices shall operate until the System is reset.
 2. All audible alarm indicating devices shall sound a continuous fire alarm signal (custom voice message or tone) until the System is reset.
 3. All visible alarm indicating devices shall flash continuously until the System is reset.
 4. All doors normally held open by door control devices shall release.
 5. A supervised signal to notify the campus security service shall be activated.
 6. All smoke dampers shall close.
 7. If a Smoke Control System is a part of the Work, then it shall be activated. For high rise buildings, atrium spaces, etc. verify requirements with Mechanical Engineer and local Fire Marshall having jurisdiction.
 8. All mechanical air handling units with duct smoke detectors shall shutdown in accordance with NFPA 90. For high rise buildings, atrium spaces, etc. verify requirements with Mechanical Engineer and local Fire Marshall having jurisdiction.
 - a. Provide duct smoke detectors in return ductwork (Per Ohio Mechanical Code, 606.2.1) and supply ductwork (Per NFPA 90A, 4-4.2(1)) for all air handling units with greater than 2,000 CFM of supply air distribution.
 - b. Upon reset of the fire alarm system, mechanical air handling units shall sequentially start up to minimize power demand.
 - c. "On/Off/Auto" switches with software for the automatic mode shall be provided in the Control Panel, with separate and distinct "on" and "off" LED indicators. Manual control shall override the automatic function.
 - d. The alarm activation of any elevator control smoke detector shall, in addition to the other operations listed, cause the elevator cabs to be recalled according to the following sequence:
 - e. If the alarmed detector is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.
 - f. If the alarmed detector is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.
 - g. All elevator control detectors shall be wired directly to the elevator controller through dedicated contacts on the detector base, and they shall be monitored by an addressable interface module.
 9. The alarm activation of any elevator control heat detector shall, in addition to the other operations listed, cause the power to the elevator controllers to shutdown.
 10. All security system doors shall unlock.
 11. All Sprinkler and Fire Suppression Control Panels shall be monitored and/or activated as described on the Drawings.
- B. If a part of the Scope of the Work, all alarms shall be displayed on an alphanumeric LED display. The system alarm LED shall flash on the Control Panel (and the Remote Annunciator) until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on. A subsequent alarm received from another zone shall flash the system alarm LED on the Control Panel (and the Remote Annunciator). The LED display shall show the new alarm information. A pulsing alarm tone shall occur within the Control Panel (and the Remote Annunciator) until the event has been acknowledged.
- C. The activation of any system smoke detector shall initiate an Alarm Verification operation whereby the Control Panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or

any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute the system shall resume normal operation. The Alarm Verification shall operate only on smoke detector alarms. Other activated initiating device signals shall be processed immediately. The alarm verification operation shall be selectable by zone.

1. The Control Panel shall have the capability to display the number of times a detector has gone into a verification mode. Should this smoke verification tally reach a pre-programmed number, a trouble condition shall occur.
- D. The Control Panel shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.
1. If a part of the Scope of the Work, the activation of any standpipe or sprinkler valve supervisory tamper switch shall activate the system supervisory service audible signal and illuminate the LED at the Control Panel (and the Remote Annunciator). Differentiation between valve tamper activation and opens and/or grounds on the initiation circuit wiring shall be provided.
 2. Pressing the Supervisory Service Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory Service LED "on" indicating the off-normal condition.
 3. Restoring the valve to the normal position shall cause the Supervisory Service LED to extinguish, indicating restoration to normal.
- E. A manual evacuation (drill) switch shall be provided to operate the alarm indicating appliances without causing other control circuits to be activated. Should a true alarm occur while in the drill mode, all alarm functions would occur as described previously.
- F. The system shall have a single key that will allow the operator to display all alarms, troubles, and supervisory service conditions including the time of each occurrence.
- G. All doors normally held open by door control devices shall not have battery back-up and shall release upon AC power failure.
- H. The actuation of the "Enable Walk Test" program at the Control Panel shall activate the "Walk Test" mode of the system which shall cause the following to occur:
1. The security system circuit connection shall be bypassed.
 2. Control relay functions shall be bypassed.
 3. The Control Panel shall show a trouble condition.
 4. The alarm activation of any initiation device shall cause the audible signals to activate voice annunciation of the device's zone or system address.
 5. The Control Panel shall automatically reset itself after signaling is complete.
 6. Any momentary opening of an initiating or indicating appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating a trouble condition.
 7. The system shall have the capacity of 8 (minimum) distinctive walk test groups, such that only a portion of the system need be disabled during testing.
- I. The system shall contain independently supervised initiating device circuits. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit. The system shall contain two spare initiating device circuits.

- J. There shall be supervisory service initiation device circuits for connection of all sprinkler valve supervisory (tamper) switches. Device activation shall cause a supervisory alarm at the Control Panel.
- K. There shall be independently supervised and independently fused indicating appliance circuits for alarm indicating devices. Disarrangement conditions of any circuit shall not affect the operation of other circuits.
- L. Auxiliary manual controls shall be supervised so that an "off normal" position of any switch shall cause an "off normal" system trouble.
- M. Each independently supervised circuit shall include a discrete LED readout to indicate disarrangement conditions per circuit.
- N. The incoming power to the system shall be supervised so that any power failure must be audibly and visually indicated at the Control Panel (and the Remote Annunciator). A green "power on" LED shall be displayed continuously while incoming power is present.
- O. If a part of the Scope of the Work, the system batteries shall be supervised so that a low battery condition or disconnection of the batteries shall be audibly and visually indicated at the Control Panel (and the Remote Annunciator).
- P. The System Modules shall be electrically supervised for module placement. Should a module become disconnected the system trouble indicator shall illuminate and the audible trouble signal shall sound.
- Q. The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.
- R. There shall be independent supervision for opens of any mechanical system control output wiring. A discrete trouble LED readout per output circuit shall be provided for indication. A ground condition of any mechanical system control output wiring shall indicate a common ground trouble at the Control Panel.
- S. The Control Panel shall receive 120 VAC power as indicated on the Drawings.
- T. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of twenty-four (24) hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operations shall be automatic.
- U. All external circuits requiring system operating power shall be 24VDC and shall be individually fused at the Control Panel.
- V. If a part of the Scope of the Work, the Sprinkler System Fire Pump shall be monitored, with visual signals at the Fire Alarm Control Panel to indicate "Fire Pump Running", "Loss of Fire Pump Power", and "Fire Pump Phase Reversal". (Duplicate signals shall be provided at the Remote Annunciator).

1.7 FIRE DETECTION AND ALARM PANEL

- A. The Control Panel shall be flush or surface mounted. The Control Panel construction shall be modular with solid state, microprocessor based electronics. It shall display only those primary controls and displays essential to operation during a fire alarm condition. Keyboards shall not be required to operate the system during fire alarm conditions. An integral audible device shall sound during Alarm, Trouble or Supervisory conditions. This audible device shall sound differently during each condition to distinguish one condition from another without having to view the panel. This audible device shall also sound during each keypress to provide an audible feedback to ensure that the key has been pressed properly.
- B. The primary controls such as: 80 character LED display, alarm LED, supervisory service LED, trouble LED, power on, Alarm Acknowledge key, Supervisory Acknowledge key, Trouble Acknowledge key, Alarm Silence key, and System Reset key shall be visible through a front access panel.
- C. A minimum of five programmable secondary control switches and LED's shall be available behind an access door.
- D. The Control Panel shall provide for testing, condition listing, point activation/deactivation, software revisions and point listings. For maintenance purposes all points shall be available from the point lists menu.
- E. The Control Panel shall have a 2 line x 40 character liquid crystal display.
- F. Under normal condition the front panel shall display a "System is Normal" message and the current time and date. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions. The LED shall display the following information relative to the abnormal condition of a point in the system: 40 character custom location label, type of device (smoke, pull station, waterflow), and point status (alarm, trouble).
- G. System Reset:
 - 1. The SYSTEM RESET button shall be used to return the system to its normal state after an alarm condition has been remedied. The LED display shall step the user through the reset process with simple English Language messages. The message "SYSTEM RESET IN PROGRESS" shall first be displayed followed by the message "SYSTEM RESET COMPLETED"; and finally, "SYSTEM IS NORMAL" should all alarm conditions be cleared.
 - 2. Should an alarm condition continue to exist the message "SYSTEM RESET IN PROGRESS" shall be followed by the message "SYSTEM RESET ABORTED" and the system shall remain in an abnormal state. System control relays shall not reset. The tone alert and the Alarm LED shall be on. The display shall indicate the total number of alarms and troubles present in the system along with a prompt to use the ACK keys to review the points. These points shall not require acknowledgment if they were previously acknowledged.
 - 3. Should the Alarm Silence/Reset Inhibit function be active, an Alarm Silence or System Reset key press shall be ignored. The message "ALARM SILENCE/SYSTEM RESET INHIBITED" shall be displayed for a short time to indicate the action was not taken. As feedback to the operator, the message "ALARM SILENCE/SYSTEM RESET

ALLOWED" shall be displayed when the inhibit function times out.

- H. The system shall be capable of logging and storing 300 events in an alarm log and 300 events in a trouble log. These events shall be stored in a battery protected random access memory. Each recorded event shall include the time and date of that event's occurrence.
- I. The system shall be capable of being tested by one person. While in the testing mode the alarm activation of an initiating device circuit shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after logging of the alarm. The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The Control Panel shall automatically reset itself after logging of the trouble condition. The Control Panel shall be capable of supporting up to 8 separate testing groups whereby one group of points may be in a testing mode and the other (non-testing) groups may be active and operate as programmed per normal system operation. After testing is complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.
- J. There shall be four (4) access levels with level 4 being the highest level. Level 1 actions shall not require a passcode. Passcodes shall consist of up to ten (10) digits. Changes to passcodes shall only be made by authorized personnel. Access to a level will only allow the operator to perform all actions within that level plus all actions of lower levels, not higher levels.
- K. Provide cabinets of sufficient size to accommodate the equipment. Cabinets shall be equipped with locks and transparent door panels providing freedom from tampering yet allowing full view of the various lights and controls.

1.8 REMOTE ANNUNCIATOR

- A. The Remote Annunciator shall be serial LED type. The Annunciator shall be flush mounted. The Annunciator shall have a beige enamel finish and shall provide two line by 40 character LED display. The Annunciator shall provide a common alarm and trouble circuit consisting of:
 - 1. Control switches for: alarm silence, trouble silence, system reset manual evacuation, and other control functions duplicating the Control Panel switches. A key "enable" switch shall be provided to activate or deactivate the control switches.
 - 2. Tone Alert - Duplicates the Control Panel tone alert during alarm & trouble conditions.
 - 3. System trouble LED.
 - 4. Power on LED.

1.9 PERIPHERAL DEVICES

- A. Magnetic door holders shall have an approximate holding force of 35 lbs and be 24VDC. The door portion shall have a stainless steel pivotal mounted armature with shock absorbing nylon bearing. Unit shall be capable of being either surface, flush, semi-flush, or floor mounted as required. Door holders shall be UL listed.
 - 1. Provide wall extension kits at locations required.

1.10 ADDRESSABLE NETWORK COMMUNICATION SYSTEM

- A. The system shall provide communication with initiating and control devices individually. All of these devices shall be individually annunciated at the Control Panel. Annunciation shall include the following conditions for each point:
 - 1. Alarm.
 - 2. Trouble.
 - 3. Open.
 - 4. Short.
 - 5. Device missing/failed.
- B. All addressable devices shall have the capability of being disabled or enabled individually.
- C. Up to 127 addressable devices may be multidropped from a single pair of wires. Systems that require factory reprogramming to add or delete devices are unacceptable.
- D. The communication format shall be a completely digital poll/response protocol to allow tapping of the circuit wiring. A high degree of communication reliability must be obtained by using error checking routines for address codes and for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.
- E. Each addressable device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set an address will not be acceptable due to the potential of vibration and poor contact. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable. The system must verify that the proper type device is in place and matches the desired software configuration.
- F. Wiring types shall be approved by the equipment manufacturer.
- G. Addressable Device Types
 - 1. The Control Panel shall be capable of communicating with all types of addressable devices.
 - 2. Addressable smoke and heat detector heads shall be pluggable into their bases. The bases shall contain electronics that communicate the detector status (normal, alarm, trouble) to the Control Panel over two wires. The same two wires shall also provide power to the base and detector. Different detector heads (smoke or heat) shall be interchangeable. Upon removal of the head, a trouble signal will be transmitted to the Control Panel.
 - a. Analog Addressable Smoke and Heat Detectors
 - 1) The smoke detectors shall be of the photoelectric type and shall communicate actual smoke chamber values to the Control Panel.
 - 2) The heat detectors shall sense within a temperature range of 32°F to 158°F. The Control Panel shall be capable of sensing either a set point of 135°F, or a rate-of-rise of 15°F per minute for fire sensing. For utility sensing, a set point may be chosen within the stated range and the Control Panel programming shall be capable of using that information to determine specific responses such as warning of failure of local temperature controls.

- 3) The detectors shall be listed to UL Standard 268 and shall be documented as compatible with the control equipment to which they are connected. They shall be listed for both ceiling and wall mount applications.
- 4) Each base shall contain an LED that shall flash each time it is scanned by the Control Panel (once every 4 seconds). When the Control Panel determines that a detector is in an alarm or a trouble condition, the Control Panel shall command the LED on the base to illuminate continuously, indicating the abnormal condition.
- 5) Each detector shall contain a magnetically actuated test switch to provide for easy alarm testing.
- 6) Each detector shall be scanned by the Control Panel for its type identification to prevent inadvertent substitution of another detector type. The Control Panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed detector type is changed.
- 7) The detector's electronics shall be immune from false alarms caused by EMI and RFI.
- 8) Smoke detectors shall be smoke density measuring devices having no self contained alarm set point (fixed threshold). The alarm decision for each detector shall be determined by the Control Panel. The Control Panel shall determine the condition of each detector by comparing the current sensor value to the stored values.
- 9) The Control Panel shall maintain a moving average of the detector's smoke chamber value to automatically compensate (move the threshold) for dust and dirty conditions that could affect detection operations. The system shall automatically maintain a constant smoke obscuration sensitivity for each detector (via the floating threshold) by compensating for environmental factors. Photoelectric smoke obscuration sensitivity shall be adjustable to within 3% of either limit of the UL window (0.5% to 4.0%) to compensate for any environment.
- 10) The system shall automatically indicate when an individual smoke or heat detector needs cleaning. When a detector's average value reaches a predetermined level, a "DIRTY SENSOR" trouble condition shall be audibly and visibly indicated at the Control Panel for the individual detector. Additionally, the LED on the base shall continuously illuminate. If a "DIRTY SENSOR" is left unattended, and its average value increases to a second predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the Control Panel for the individual detector. To prevent false alarms, these "DIRTY" conditions shall not decrease the amount of smoke obscuration necessary for smoke detector activation. For scheduling of maintenance, the Control Panel shall be able to generate an "ALMOST DIRTY" indication for any detector approaching a "DIRTY" trouble condition.
- 11) The Control Panel shall continuously perform an automatic self-test routine on each detector which shall functionally check the electronics and ensure the accuracy of the values being transmitted to the Control Panel. Any detector that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition with the detector location at the Control Panel.
- 12) An operator at the Control Panel, having a proper access level, shall have the capability to manually access the following information for each detector:

- a) Primary status.
 - b) Device type.
 - c) Present average value.
 - d) Present sensitivity selected.
 - e) Peak detection values.
 - f) Sensor range (normal, dirty, etc.).
 - g) Values shall be in “percent of smoke obscuration” format so that no interpretation is required by the operator.
- 13) Detectors shall be compatible with other addressable detectors, addressable manual stations, and addressable interface modules on the same circuit. The detectors shall also fit into a non-addressable base that is capable of being monitored by an addressable interface module.
- 14) For elevator control smoke and heat detectors, provide (1) N.O. and (1) N.C. auxiliary contact. The detector shall be monitored through an addressable interface module.
3. Analog addressable photoelectric duct smoke detectors shall be non-polarized 24VDC type which obtains operating power from the supervisory current in the fire alarm detection loop.
- a. The detectors shall be capable of being reset at the Control Panel.
 - b. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housings front cover.
 - c. To minimize false alarms, voltage and RF transient suppression, a smoke signal verification circuit, and an insect screen shall be provided.
 - d. Auxiliary SPDT relays and key operated test stations shall be installed.
 - e. Lengths of sample tubes shall be as dictated by ductwork shown on the Mechanical Drawings.
 - f. Furnish alarm indicators with a remote test switch for all duct detectors located above suspended ceilings (For use in atriums, and large open areas with high ceilings).
4. Photoelectric Projected Beam Detectors shall have a separate transmitter and receiver and shall be capable of long range coverage of up to 350 ft. and shall have six (6) sensitivity settings. Automatic compensation for lens contamination shall be incorporated. The detectors shall include a normal status indicator (Green Pulsing LED), and alarm indicator (Red LED), and a trouble indicator (Amber LED).
5. Addressable pull stations shall contain electronics that communicate the station's status (alarm, normal) to the Control Panel over two wires which also provide power to the pull station. The address shall be set on the station. They shall be manufactured from high impact red Lexan. The station shall mechanically latch upon operation and remain so until manually reset by opening with a key common to all system locks. Pull stations shall be double action, semi-flush mounted unless otherwise indicated.
- a. Protective Shield: Provide a tamperproof, clear polycarbonate shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85 db at 10 feet and shall be powered by a 9 VDC battery. Provide in gymnasiums and other areas as identified by the University.

- b. Provide wire guards for gym area devices.
 - c. Provide humidity gaskets for devices in locker area, pool area, and pool pump room.
6. Addressable interface modules shall be used for monitoring or control of devices and systems as described on the Drawings.
- a. An addressable interface module shall be provided for interfacing normally open direct contact devices to an addressable initiating circuit.
 - b. The modules shall be capable of mounting in a standard electrical outlet box. The modules shall include cover plates to allow surface or flush mounting.
 - c. Addressable interface modules shall be supervised and uniquely identified by the Control Panel. Device identification shall be transmitted to the Control Panel for processing according to the program instructions. Should a module become non-operational, tampered with, or removed, a discrete trouble signal, unique to the device, shall be transmitted to, and annunciated at, the Control Panel.
 - d. The modules shall be capable of being programmed for individual locations on the addressable device initiating circuit. The modules shall be compatible with addressable manual stations and addressable detectors on the same addressable initiating circuit.
7. Audible/Visible Notification
- a. Audible/Visible devices shall be horizontal wall mount. The devices shall be UL listed to Standard 1971 and have a circumpolar light output allowing mounting in either vertical or horizontal positions. The devices shall be rated as follows:
 - 1) In corridors or rooms of 400 square feet or less, provide not less than 75 cd as required by the ADA.
 - 2) In rooms or areas greater than 400 square feet where only one device is used, provide not less than 110 cd.
 - 3) In sleeping rooms, provide not less than 110 cd.
 - a) The light unit shall be of ABS polycarbonate and the lens of high grade, optical quality LEXAN. For optimized light distribution, the xenon flash tube shall be installed perpendicular to the device's back plane. A special compound reflector shall be utilized to maximize and best distribute the light pattern in key axis directions.
 - b) The effect of the illuminated visible devices shall be observable in a circumpolar pattern. The visible devices shall be labeled with the word "FIRE" in a contrasting color and the height of each character shall be a minimum of 5/8". In its quiescent state, the word "FIRE" shall be visible.
 - c) All visible devices shall flash in a synchronized pattern.
 - d) The audible portion of the devices shall be a speaker or electronic horn.
 - e) Devices shall be semi-flush mounted (unless otherwise indicated on the Drawings)
 - f) Provide wire guards for gym area devices.
 - g) Provide humidity gaskets for devices in locker area, pool area, and pool pump room.

8. Visible Only Notification

- a. Visible only devices shall be vertical wall mount. The devices shall be UL listed to Standard 1971 and have a circumpolar light output allowing mounting in either vertical or horizontal positions or on the ceiling. The devices shall be rated as follows:
 - 1) In corridors or rooms of 400 square feet or less, provide not less than 75 cd as required by the ADA.
 - 2) In rooms or areas greater than 400 square feet where only one device is used, provide not less than 110 cd.
 - 3) In sleeping rooms, provide not less than 110 cd.
- b. The light unit shall be of ABS polycarbonate and the lens of high grade, optical quality LEXAN. For optimized light distribution, the xenon flash tube shall be installed perpendicular to the device's back plane. A special compound reflector shall be utilized to maximize and best distribute the light pattern in key axis directions.
- c. The effect of the illuminated visible devices shall be observable in a circumpolar pattern. The visible devices shall be labeled with the word "FIRE" in a contrasting color and the height of each character shall be a minimum of 5/8". In its quiescent state, the word "FIRE" shall be visible.
- d. All visible devices shall flash in a synchronized pattern.
- e. Devices shall be semi-flush mounted unless otherwise indicated.
 - 1) Provide wire guards for gym area devices.
 - 2) Provide humidity gaskets for devices in locker area, pool area, and pool pump room.

- H. In all high rise buildings unless otherwise directed by the Owner, all devices shall be supervised for trouble conditions. The Control Panel shall be capable of displaying the type of trouble condition (open, short, device missing/failed). Should a device fail, it shall not hinder the operation of other system devices.

1.11 ONE-WAY COMMUNICATION

- A. Provide one-way voice communication with tone generating capabilities.
- B. A Central Audio Control Module shall be provided for the alarm message/tone generation, main and remote microphone connections, and mixer/pre-amplifier circuits. Continuous supervision shall be provided. Audio outputs shall have individual gain control.
- C. A hand-held, push-to-talk microphone shall be provided recessed within a protective panel-mounted enclosure. The microphone shall be a dynamic communication type microphone with a frequency range of 200 Hz to 4000 Hz and shall be equipped with a self-winding five foot coiled cable. An LED indicator shall be provided to indicate the microphone push-to-talk button has been pressed and speaker circuits are ready for transmission. The microphone shall be supervised in the event of disconnection.
- D. An Audio Control Switch Module shall be provided for the audio functions. These switches

and associated LED indicators shall be supervised in the event of disarrangement or failure.

- E. Audio power amplifiers shall be provided with self-contained filtered 24VDC power supplies, transformers and amplifier monitor circuits. The amplifiers shall provide a 25V RMS output with a frequency response of 120 Hz to 12,000Hz. Provide a sufficient quantity of amplifiers to operate all system speakers simultaneously plus twenty (20) percent spare capacity.
- F. In addition, provide at least one back-up amplifier capable of automatically replacing any failed amplifier.
- G. Provide speaker circuits which are capable of supplying audio signals at 25V RMS derived from the system amplifiers. Supervision for open, short and ground fault conditions shall be provided. Individual and distinct trouble indications shall be provided for each fault. Provide one circuit for each zone or area of distinct communication.
- H. Tones - Digitized tones for alarm or auxiliary requirements shall be provided. The Owner shall have the ability to select one of the tones from the following list.
 - 1. A Slow Whoop shall be a slowly ascending tone from 200 Hz to 830 Hz in 2.5 seconds.
 - 2. A Wail shall ascend and descend from 600 Hz to 940 Hz.
 - 3. A Beep shall be a 470 Hz tone. The time duration shall be 0.7 seconds on and 0.7 seconds off.
 - 4. A Horn shall be a continuous 470 Hz tone.
 - 5. A Stutter shall be a 470 Hz tone which is on for 100 milliseconds and off for 100 milliseconds.
 - 6. A Hi/Low shall be a free running tone with a high frequency of 544 Hz and a low frequency of 440 Hz. The on time (Hi) shall be 100 milliseconds while the off time (low) shall be 400 milliseconds.
- I. Pre-recorded digitized voice message capability shall be provided for automatic transmission to building occupants during alarm conditions. Three (3) custom messages shall be provided, one for alarm, one for testing, one for weather advisory, etc. The message player shall not rely on a tape or other mechanical means of transmitting the evacuation message. Systems that do use tape players must provide a backup player designed to automatically operate should the primary device jam or otherwise fail to operate. A standard evacuation message shall be provided under this Contract. However, the message player must be capable of transmitting customized messages of up to 4 minutes long. A self-contained speaker shall provide testing of the messages without disturbing the occupants of the facility.
- J. Should a two-way Fire Fighters Voice Communication System be provided, a method for remote fire fighters communication patch-in to the one-way voice communication speakers shall be provided. Manual operation shall be provided at the Firefighters Voice Communication System Central Control Station.
- K. Automatic Voice Evacuation Sequence:
 - 1. The audio alarm signal shall consist of an alarm tone for a maximum of 10 seconds followed by automatic pre-selected voice evacuation messages. At the end of each voice evacuation message, the alarm tone shall resume. The alarm tones shall sound until the system has been reset.

L. Manual Voice Paging Sequence:

1. In all high rise buildings unless otherwise directed by the Owner, the System shall be configured to allow selective voice paging. Upon activation of any speaker manual control switch, two (2) seconds of tone shall sound over the speakers indicating an impending voice message will occur.

1.12 TWO-WAY FIREFIGHTERS COMMUNICATION

- A. Provide a two-way Firefighters Voice Communication System between the Central Control Station and Remote Emergency Telephone Jacks. All wires between the Central Control Station and remote emergency telephone jacks shall be continuously supervised. Any fault which occurs shall be reported visually and audibly at the Central Control Station. Provide one of the following:
 1. The Central Control Station shall be an integral part of the Main Fire Alarm Control Panel.
 2. The Central Control Station shall be a Remote Firefighters Command Station as located on the Drawings.
- B. A Master Telephone Control Module shall be provided at the Central Control Station for processing of all two-way communication functions. This module shall include an audible alert for call and trouble signaling, a trouble silence switch with ringback, a trouble indication and a supervising monitor circuit.
- C. A Master Telephone Handset with a five (5) foot cord shall be provided and recessed within a protective panel mounted enclosure at the Central Control Station. This enclosure shall also provide locations for the telephone control and flasher/busy tone oscillator.
- D. Provide one line (talk) circuit for each (floor corridor), (elevator cab) and (stairwell). Line (talk) circuit modules shall be provided to electrically supervise for shorts, opens and grounds of circuit wiring. Each line module shall contain a "Call" and "Trouble" indication and a two position switch to enable two-way voice communication.
- E. The Firefighters Communication System shall be capable of handling single or simultaneous conversations with all telephones connected into the system.
- F. The system shall indicate to the person attempting to use a remote telephone that the signal is being received at the Central Control Station and that the lines are intact. As many as six (6) telephones shall be able to be connected into active conversation at the Central Control Station.
- G. Each emergency telephone jack shall be mounted on a stainless steel single gang plate with the words "Fire Emergency Telephone" screened on each.
 1. Provide Emergency Telephone Jacks for installation in each elevator cab by the Elevator Contractor. Required wiring from elevator controls to each elevator cab shall be furnished and installed by the Elevator Contractor.
- H. Provide a minimum of five (5) pluggable emergency telephones within a storage cabinet at the Central Control Station.

- I. Provide actual remote telephones in addition to the jacks in break rod cabinets as shown on the Drawings. These emergency telephones shall be constructed of red cicolac type t, a thermal ABS material and shall be equipped with an armored cable.

1.13 SUBMUTTALS

- A. Submittals shall include installation and wiring diagrams and instructions for installation, operation and maintenance, to be suitable for inclusion in the Maintenance Manuals.
- B. Submittals shall include reproducible vellum floor plans (1/16" scale, minimum) showing device locations and required conduit and wiring connections.
- C. Submittals shall include descriptive literature for all system components, size and type of recommended conduit and wiring, bill of materials, and sequence of system operation.

1.14 PERFORMANCE, WARRANTY, SERVICE AGREEMENT, TESTING, AND CLOSEOUT

- A. Contractor shall furnish and install, in accordance with manufacturer's instructions and contract documents, all system components and devices, wiring, conduit, outlet boxes, etc., as required for a complete, functional System. All final connections shall be made under the direct supervision of the manufacturer's factory trained technical representative.
 1. Above accessible ceilings, plenum rated wiring may be utilized. The wiring shall be supported by wall mounted bridal rings at approximately 36" on center. All wall penetrations shall utilize conduit sleeves with bushings on both ends.
- B. The Riser Diagram shows the intent of these Specifications and shall be used as a guide only. The conduit sizing and number of wires are to be verified with the manufacturer prior to submitting a bid and prior to installation in the building.
- C. Contractor shall guarantee all equipment and wiring to be free of mechanical and electrical defects for a period of one year from the date of acceptance by the Owner. The manufacturer shall furnish, at no additional cost to the owner, a one (1) year contract effective from the date of acceptance for maintenance and inspection service of the manufacturer's equipment. The Owner shall deal with one organization for total system responsibility. The manufacturer shall make available to the Owner an extended Maintenance Contract after the initial year's agreement has expired.
- D. The manufacturer shall provide to the owner during the period of the guarantee, emergency preventative maintenance service on a 24 hour standby basis.
- E. The manufacturer shall maintain an adequate supply of spare parts and a full time service facility with factory trained service technicians to provide supervision of the installation.
- F. Upon completion of the installation and after satisfactory testing of the system by the Contractor in the presence of the equipment supplier, the Contractor shall test the system in the presence of the Architect, Fire Marshall, and/or Owner's Representative, and other authorities having jurisdiction. Provide a written start-up report.

- G. A representative of the system manufacturer shall provide all system programming and testing, and shall instruct the Owner's personnel in the operation and maintenance of the system. The training session shall be video-taped by the Contractor for future Owner use.

- H. Upon completion of the project, Contractor shall provide the Owner the following:
 - 1. One (1) hardcopy of the "as-built" drawings, specifications, and submittals for the Fire Detection and Alarm System showing wiring fill, wire tag numbers, junction boxes and connection of devices.
 - 2. One (1) electronic copy of the "as-built" drawings, specifications, and submittals for the Fire Detection and Alarm System showing wiring fill, wire tag numbers, junction boxes and connection of devices. Provide in an electronic format that is acceptable to the Owner.

END OF SECTION

SECTION 32 10 00 - CONCRETE PAVING AND SURFACING

1.1 SUMMARY

- A. Walkways (Sidewalks).
- B. Roadways.

1.2 QUALITY ASSURANCE

- A. Quality Standard: ACI 301.
- B. Mockup: Construct 5 feet by 5 feet walkway mockup, to demonstrate typical joints, surface finish, texture, tolerances, color, and standard of workmanship. Locate mockup in location indicated or, if not indicated, as directed by Architect.
- C. See Campus Master Plan for additional details on different types of walkways throughout the Campus.

1.3 LAYOUT

- A. Walkways shall be not less than 5 feet wide to allow for truck mounted snow removal equipment.
- B. Minimum Thicknesses:
 - 1. 5 feet wide walkways shall be not less than 5 inches thick.
 - 2. 8 feet or wider walkways shall be not less than 8 inches thick.

1.4 MATERIALS

- A. Reinforcement:
 - 1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 - 2. Welded Wire Reinforcement: ASTM A185, plain steel.
 - a. Walkways: Not less than #10, 6" x 6".
 - b. Roadways: Not less than #4, 6" x 6".
 - 3. Steel Wire: ASTM A82, as drawn, plain.
 - 4. Joint Dowel Bars: ASTM A615 Grade 60, epoxy-coated, plain steel.
- B. Concrete:
 - 1. Portland Cement: ASTM C 150, white.
 - 2. Normal-weight aggregate.

3. Air-entraining admixture.
4. Compressive Strength: 3500 psi at 28 days.
5. Mixing: Ready mixed in accordance with ASTM C94.

C. Base:

1. Base shall be not less than 4 inch thick, crushed limestone, compacted to 95% maximum dry weight, in accordance with ASTM D698.

1.5 FINISHING AND CURING

- A. Finishes: Medium-to-fine-textured broom.
- B. Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these.

END OF SECTION

SECTION 32 90 00 - LANDSCAPING

1.1 GENERAL

- A. Plantings shall be not greater than 4 feet in width, to allow for debris removal and maintenance.
- B. Planting in non-bed locations shall have a minimum clearance of 72 inches from buildings, walls, each other, etc., to allow for mower access.
- C. Planting shall not be used in areas where individuals could be expected to use them for personal concealment.
- D. Local plant species shall be used whenever possible, due to severe range of temperatures (104° F to -24° F) and other local climate constraints.
- E. All plant selections shall be subject to review and approval by Owner.
- F. All grass seed mixes shall be subject to review and approval by Owner. Grass seed shall be by Lesco unless otherwise directed by Owner.
- G. All grass seed and plants shall be planted in accordance with American Nurseryman's Standards.
 - 1. Grass Seed Mixture:
 - a. 50% Perennial Rye and 50% Perennial Kentucky Bluegrass.
- H. All irrigation systems shall be as manufactured by Hunter. Pipes shall be Class 200 or better.

1.2 LEED SUBMITTALS

- A. Plant List indicating.
- B. Irrigation System Product Data and Shop Drawings.

END OF SECTION

SECTION 33 05 00 - COMMON WORK FOR SITE UTILITIES

1.1 SITE DOMESTIC WATER DISTRIBUTION

- A. Underground water piping shall be type "K" copper only. Piping over 3" shall be Ductile Iron class 55, cement lined and shall meet the ANSI standard in the plumbing code.

1.2 SITE STEAM AND CHILLED WATER DISTRIBUTION

- A. Utility chilled water and steam is supplied by The Medical Center Co. All installations, tie-ins, etc. shall be in accordance with The Medical Center Co. specifications which are located at <http://www.mcco.org/img/mir12.10.1.pdf> .

END OF SECTION

- C. Regulatory Requirements: Assure that Contractor complies with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference: Contractor's Waste Management Coordinator shall conduct a conference at Project site prior to the start of any work, to review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss draft waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.
 - 6. Representatives from the University Office for Sustainability as well as the Design Team LEED Coordinator must be present at these conferences.

1.4 PERFORMANCE GOALS AND REQUIREMENTS

- A. End-of-Project Salvage/Recycle Goal: The University desires to strive for exemplary performance of 95% of all demolition and/or construction waste to receive an innovation point/credit.
- B. End-of-Project Salvage/Recycle Minimum Requirement: 75% of all demolition and/or construction waste.

1.5 ACTION SUBMITTALS

- A. Draft Waste Management Plan: Assure that Contractor prepares and presents draft Waste Management Plan at Waste Management Conference for review and discussion.
- B. Final Waste Management Plan: Assure that Contractor submit final Waste Management Plan within fourteen (14) days of the Waste Management Conference.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, Contractor shall submit report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated

by the Work.

- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- H. Qualification Data: For waste management coordinator and, if appropriate, refrigerant recovery technician.
- I. Statement of Refrigerant Recovery, if included in the Work: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a Waste Management Plan for both demolition and construction waste, according to the USGBC and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 3. Total cost of disposal (with no waste management).
 4. Revenue from salvaged materials.
 5. Revenue from recycled materials.
 6. Savings in hauling and tipping fees by donating materials.
 7. Savings in hauling and tipping fees that are avoided.
 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
 9. Net additional cost or net savings from waste management plan.
- E. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
1. Documentation of each training class shall be submitted to Owner and the Architect's LEED Coordinator for record.
 2. The status of this training shall be an agenda item at every Progress Meeting.
- F. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- 1.8 SALVAGING NONHAZARDOUS CONSTRUCTION AND/OR DEMOLITION WASTE
- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and/or Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.

3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's on-campus storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- 1.9 RECYCLING GENERAL OFFICE, NON-CONSTRUCTION WASTE
- A. General: Recycle general office paper, plastic, metal, glass, and cardboard used by on-site workers.
1. Contractor may use Owner's Recycling Center for this purpose.
- 1.10 RECYCLING AND DISPOSAL OF NONHAZARDOUS DEMOLITION AND/OR CONSTRUCTION WASTE
- A. Recycling: Contractor shall engage the services of a Construction/Demolition Waste Recycling Company to:
1. provide dumpster(s) to the job for the use of all construction personnel;
 2. remove and sort contents of dumpster(s) at their own, off-site, local facility, on a regular basis, recording and recycling/disposing of the contents of the dumpster(s);
 3. recycle all waste that can be recycled and legally dispose of all waste that cannot be recycled, and;
 4. submit their Recycling and Processing Records as well as their Landfill and Incinerator Records, demonstrating their efforts to meet or exceed the goals, to the Owner and Architect on a monthly basis.

END OF SECTION

1. Three (3) complete sets of all Contract Documents.
 - a. Note: larger Projects may require review by additional Owner entities and additional sets of documents shall be provided as appropriate.
 2. A list of suggested Bidders.
 3. A program estimate of the annual energy consumption of the building's mechanical and electrical systems.
- H. Owner has preferred pricing Contracts for selected products and services, e.g., hardware and furniture. Design Team shall contact Owner for details regarding how these products should be specified.
- I. All design structural load values, i.e. Dead Loads, Live Loads, Wind Loads, Seismic Loads, etc. shall be determined/calculated by the Structural Engineer member of the Design Team. All of these design loads shall be shown in tabular format, on a single sheet, in the Structural Drawings, and in turn, all other members of the Design Team shall refer to those loadings for their work in all other locations.
- J. All Contract/Bidding Documents shall be prepared using AUTOCAD or BIM, and shall be provided to Owner in hard copy as well as an agreed upon electronic format.

1.3 BUILDING CODES

- A. All designs shall comply with current Ohio Building Code, current NEC Standards, current Municipal Building Codes if applicable, current Municipal Zoning Ordinances, and any other applicable specialized codes and ordinances.
- B. All designs shall comply with current ADA Requirements.
- C. All designs shall exceed current ASHRAE 90.1 Standards by 30%.
- D. All designs shall comply with current EPA Energy Star Standards.

1.4 SPECIAL CONDITIONS

- A. The following Special Conditions shall apply to all construction. Design Team shall assure that these directions are included in the Contract Documents.
 1. Contractor(s) shall have a CWRU service vehicle permit for all vehicles parked at the site.
 2. Normal work hours in buildings shall be 7:30 am to 4:30 pm unless stated otherwise in the Bidding Documents.
 3. Buildings shall normally be open to the public from 9:00 am to 5:00 pm unless stated otherwise in the Bidding Documents. All noisy construction operations shall be performed prior to or after these public hours. All overtime expenses for these operations shall be included in the Bid.
 4. The Contractor shall clean and protect all finishes in the work areas to minimize dust transmission throughout the building, vacuum carpeting as required but not less than once a day, and shall leave work area in a "like new" condition.

5. Some areas of work may require access by appointment only, premium time, and/or protective clothing. All overtime expenses for these operations shall be included in the Bid.
6. Contractor shall be responsible for painting and patching all surfaces where existing equipment or wiring has been removed. All painting shall cover a wall from corner to corner and floor to ceiling and shall cover the ceiling from wall to wall or break in ceiling plane.
7. The expense of all bonds, permits, etc. shall be included in the Bid.
8. Contractor shall submit a Work Schedule for the project with their Bid. This Work Schedule shall include all significant milestones, particularly milestones identified by CWRU.
9. Contractor shall be responsible for protecting all occupants' private property within the construction area in existing buildings. All methods of protection shall be approved by the Owner prior to commencing work.
10. Existing buildings may be occupied during the construction period. A class schedule will be provided to the Contractor as soon as available. Noisy construction operations shall be suspended during mid-term and final exams.
11. Some areas of buildings may operate 24 hours per day, 7 days a week. Extreme care shall be utilized while working in these areas to minimize noise transmission and dust generation.
12. Areas of work may have Asbestos Containing Materials (ACM). Contractor shall coordinate with the Owner all work in areas with ACM. All work in or on ACM or demolition of ACM shall be provided by the Owner's asbestos abatement contractor under a separate agreement with the Owner.

END OF SECTION