# ACCESS CONTROL ENTERPRISE SYSTEM (ACES) – CARD ACCESS

DIVISION 28 13 00, ISSUE # 8, JANUARY, 2021

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## Stanford University - Information Technology Services

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1. **GUIDELINE DOCUMENT - PURPOSE**

This guideline document contains technical design standards, technical specifications, and detail drawings to be used in the design, installation and activation of the Stanford University (SU) Access Control Enterprise System (ACES) on specified doors in new buildings and major remodel projects.

The Stanford University - Access Control Enterprise System Deployment Guideline for new buildings and major remodel projects is as follows:

1. The Stanford University Information Technology (UIT) – University Information Technology Facility Engineer (UITFE) and the ACES VAR (Access Control Enterprise System VAR) would be involved during the Programming and Schematic Design Phase to understand the program needs for Access Control.

2. At a minimum, each perimeter building door opening should be connected to Stanford University’s approved Access Control Enterprise System (ACES).

3. The access control system general standard will be as follows:
   a. Each perimeter building entrance door opening will be equipped with an approved fail-secure electrified lock (unless otherwise dictated by the program, code or authority having jurisdiction). The electrified lock shall be connected to, and monitored by, the approved ACES.
   b. Each perimeter building exit-only door opening will be equipped with an alarm contact. The alarm contact shall be connected to, and monitored by, the approved ACES. Audible alarm may be included.
   c. Each Telecommunications Room will be equipped with an electrified lock and card reader.

4. Exceptions based on building function or design would be identified and resolved by the project team in the Programming and Schematic Design Phase. Escalations, if required would go to Risk Management and Public Safety for resolution.

This document shall apply to all personnel who are involved with planning, design, installation, maintenance, and administration of the ACES. The following is a list of the key stakeholders:

- SU-Client (building occupant)
- SU-Department of Project Management Project Manager (DPMPM)
- UIT-University Information Technology (UIT)
  - Card System Manager (CSM)
  - Service Consultant (SC)
  - Facility Engineer (FE)
  - Installation & Maintenance Group (I&M)
  - CAD Records Group (CAD)
  - Applications Support (AS)
- Access Control Enterprise System VAR (ACES VAR engaged, and project managed by UIT)
- SU-Fire Marshal’s Office (SUFMO)
- SU-Facility Operations Lock Shop
- Architect
- General Contractor
- Electrical Sub-Contractor
- Door Sub-Contractor
- Fire Systems Sub-Contractor
- Elevator Sub-Contractor
• Access Control Contractor (engaged and project managed by UIT)

2. GUIDELINE DOCUMENT CHANGES

This guideline document replaces existing Access Control Enterprise System (ACES) – Card Access, Division 17920.100, and Issue # 1, dated November 4, 2011. The primary differences between the guideline documents above are as follows:

(1) All access control doors shall require County permits with the exception of replacement of defective parts or system boards in the Access Control Panel. Typically, on construction projects this will be a deferred submittal as with the Fire Control Systems.

(2) All associated drawings, hardware schedules, etc. shall be included in the Access Control Layers of the project submittals. All of this documentation must include the following statement on all drawing and document submittals:

“This type of door does not currently apply to Stanford University Doors with Access Control because all Stanford University doors have FREE EGRESS.”

3. RELATED DIVISION 28 ACES DOCUMENTS

The following is a related FDG document and FDG Drawings CM-100 through CM-119 provides a detailed description of the installation guidelines and specifications at the ACES component level. The document and drawings are available on the Stanford FDG website:

http://maps.stanford.edu/fdg_view_drawings

 Division 28.10.00: Access Control Enterprise System (ACES) - Installation Guidelines FDG Drawings CM-100 through CM-119

4. CAMPUS CARD SYSTEM - BACKGROUND

The Campus Card System controls a variety of facilities and services across the Stanford campus. The Stanford ID Card serves as an identification card, an electronic key, and as a stored value card, enabling use of authorized services and privileges as addressed in these standards.

Access control is one of the service applications offered by the Campus Card System. Access control uses the Stanford ID Card system in place of keys to lock and unlock doors. The ACES is used to manage access at any location including doors, turnstiles, gates, windows, etc. Access can be restricted by day of the week and time of day. Access schedules can be set up for each specific location by individual person(s) or groups of people.

Stanford University’s – University Information Technology Department (UIT) operates and maintains the Campus Card System.

Not included in this standard are the Point of Sale (POS) and Debit services.

Detailed information regarding the Campus Card services and applications is available on the Stanford Website: http://www.stanford.edu/services/campuscard/services.html

5. TYPICAL DOOR APPLICATIONS - ACES

The ACES is used to manage access at any location including doors, turnstiles, gates, windows, etc. However, this guideline document is limited to exterior and interior door applications only. Service applications for turnstiles, gates, windows, etc. will be designed on a case-by-case basis.
The following are typical ACES door service applications for exterior and interior doors in new buildings and major remodel projects.

- **ACES door with card Reader**: This service controls door access to a room or building by presenting an ID card to a reader that controls the locking hardware and allows entry.
- **ACES door with contact & locking hardware only (no card reader)**: This service controls door locking hardware with a pre-programmed schedule. No access is permitted when the door is locked.
- **ACES elevator door with card reader**: This service controls access to enter the elevator or control individual floors. The card reader can be associated with a call button mounted on the outside of the elevator to control who enters the elevator, or the card reader can be mounted inside the elevator to allow individual floor control access.
- **ACES door with local alarm**: This service monitors door status, e.g. door propped open, and reports door egress from a room or building on an exit-only or emergency basis.

Card Access Control is available as an On-line or Off-line service as follows:

- **On-line**: The ACES door is connected to an access control panel (ACP) in the building's telecommunications room (TR). The ACP equipment interfaces in real-time, via the ACES backbone network, to a centralized database that resides on dedicated servers.
- **Off-line**: The ACES door is equipped with a self-contained electronic lock that is not connected to the ACP in the building and does not interface in real-time with the centralized database. Off-line locks are supported by the building client and will have high ongoing support costs for operation and access control management.

### 6. STAKEHOLDER TASKS AND RESPONSIBILITIES

The following is a list of the tasks that stakeholders must perform to install the ACES in new buildings and major remodel projects. Those stakeholders responsible for task completion include the Stanford...
University – Client (Building Occupant), Stanford University – University Information Technology (UIT) and members of the Owner, Architect, Contractor (OAC) Project Team.

6.1 Stanford University – Client:
   1. Identify operational access control needs and requirements, based on the SU Access Control Enterprise System Deployment Guideline, throughout the Project’s Programming, SD, DD, and CD phases with the DPMPM, Architect, FE, UIT Card Services, UIT Card Services Technical and ACES VAR. Identify secured door locations that warrant installation of the ACES in conformance with the Access Control Enterprise System Deployment Guideline. Specify the ACES features required at each door, e.g. card reader, ADA, door management alarm, door phone, camera, etc.
   2. Authorize project funding.
   3. Provide operational ACES door schedule requirements and groups.
   4. Provide a workstation to support the Lenel System software. Assign personnel to perform access control management of the ACES doors. The access control management function can be delegated to any authorized person.
   5. Schedule training for building management personnel that will be managing the operational needs of the project.

6.2 SU-Department of Project Management Project Manager (DPMPM):
   1. Involve the FE and the ACES VAR during the Programming and Schematic Design Phase to understand the program needs for Access Control.
      a. Working with the Client and the Architect, determine the doors to be equipped with ACES in conformance with the Access Control Enterprise System Deployment Guideline.
      b. Working with the Architect, determine the door hardware to be installed at each ACES door.
      c. Working with the Architect and the SU Fire Marshal’s Office (SUFMO), determine that the specified ACES door devices are inter-operable with all other connected systems, i.e. fire alarm, smoke evacuation, magnetic locks, magnetic hold-opens, ADA push buttons, etc.
   2. Work with the General Contractor and Electrical Contractor to provide the required support structure components needed for a complete installation of the ACES at each applicable door, i.e. electrical, conduit, junction boxes, pathways, etc.

6.3 UIT-University Information Technology (UIT):
UIT-University Information Technology department (UIT) operates and maintains the Campus Card System. Access control is one of the service applications offered under the Campus Card System. The following is a list of the UIT work groups and individuals involved with the ACES deployment.
   1. Director of Card Services (DCS): Overall administrative oversight of the Campus Card System including service applications, vendor product selection, client planning and design, service rate development, etc.
   2. Service Integrator (SI): Work with the client in planning, requirements development, service cost development, service work order activation and development of operational schedules.
   3. Facility Engineer (FE): General and specific responsibilities in all aspects of planning, design, construction, testing and activation of the building’s structured cabling system, including the ACES. Works with the General Contractor to jointly coordinate and project manage the work of the ACES Security Contractor.
(4) **Installation & Maintenance (I&M):** Install and maintain the SU Network hardware in the building's telecommunications rooms (TR's) that connect the ACES access control panel (ACP) equipment to the ACES Campus Card Network. Connect the ACP equipment to the ACES Network. Jointly test and activate each building’s ACES with the ACES VAR and Access Control Contractor. Maintain end-to-end ACES network and UPS equipment after activation (24 X 7). Maintain and/or submit updated drawings and records to reflect system changes and field conditions.

(5) **CAD Records (CAD):** Develop and maintain the facility records for the ACES from the initial project construction documents and continuing through to permanent facility records and ongoing records maintenance.

(6) **Card Services Technical (CST):** Working with the Client and ACES VAR, to develop customized access schedules for client locations. Coordinate acquisition and installation of any necessary software and supporting hardware. Apply and test periodic software revisions. Implement appropriate security to maintain integrity of systems and data. Conduct capacity monitoring for existing facilities or systems. Analyze usage data in order to track trends and forecast traffic growth. Produce periodic analysis documents with above findings. Where appropriate, design and code custom tools for interfaces, data analysis, data base extractions, etc.

### 6.4 Access Control Enterprise System Value Added Reseller – ACES VAR (engaged and project managed by UIT):

(1) Work with the Architect, SU-DPM, Client, SUFMO and applicable UIT work groups to coordinate the design and operation of the ACES electrified door hardware and door devices be installed at each designated door. The FE shall engage, and project manages the ACES VAR beginning with the Programming and Schematic Design Phases of the Project.

(2) Work with the General Contractor, designated /sub-contractors and the Access Control Contractor to install, integrate, test and activate the ACES electrified door hardware and door devices be installed at each designated door.

(3) The VAR will be responsible to ensure that all documentation provided to the project has the following statement:

"This type of door does not currently apply to Stanford University Doors with Access Control because all Stanford University doors have FREE EGRESS."

### ACCESS CONTROL ENTERPRISE SYSTEM VALUE ADDED RESELLER – ACES VAR NOTE:

Related to this FDG 28 13 00 are the following FDG Division 28 documents that provide a more detailed description of the Access Control Contractor responsibilities.

- Division 28.10.00: Access Control Enterprise System (ACES) - Installation Guidelines FDG Drawings CM-100 through CM-119

### 6.5 SU - Fire Marshal’s Office (SUFMO):

(1) Ensure that each applicable ACES door design, installation and operation complies with applicable Fire and Life Safety Codes.

(2) Reviews and comments during the normal approval process

### 6.6 SU-Facility Operations Lock Shop:

(1) Develop and maintain the SU building standards for door hardware to be used for new construction and modernization projects (Door Hardware Specification Guideline Section 08710).

(2) Maintain and repair the doors upon release of the building for occupancy. The SU Lock Shop is responsible for maintenance and repair of the mechanical aspects of the electrified door hardware (electrified crash bars, electrified strikes, electrified lockset, power transfer hinges and appurtenant door operators, , door closers, etc.).
6.7 Architect:

(1) The Architect shall involve the DCS and the FE during the Project Programming and Schematic Design Phase, to understand the program needs for access control and/or security and to coordinate the subsequent ACES design.

(2) Issue a door schedule for all doors in the building in accordance with applicable Fire and Life Safety Codes and Stanford Facilities Design Guidelines Section 08710. Submit plans to the Stanford Lock Shop for review and comments.

(3) Issue security drawings for review by the SU Risk Management and Public Safety Departments for conformance to the SU Access Control Enterprise System Deployment Guideline.

(4) Document the electrified door hardware function, the sequence of operation, and the interface with other building control systems.

(5) Issue an electrified door hardware set for each ACES door, including component brand name and part number.

(6) Ensure that the specified door hardware is compatible and inter-operable with all other connected systems, i.e. fire control, smoke evacuation, magnetic locks, ADA push buttons, magnetic hold-opens, etc.


(8) The Architect shall include the following note on all drawings, hardware schedules, etc.;

"This type of door does not currently apply to Stanford University Doors with Access Control because all Stanford University doors have FREE EGRESS."

6.8 General Contractor:

(1) Project manage and coordinate the work of all construction trades (sub-contractors) who provide and install the support structures, hardware components and cabling necessary to support the ACES, i.e. doors, door hardware, electrical conduit, communications conduits and pathways, security junction boxes, etc.

(2) Work with the FE to jointly coordinate the work of the ACES VAR, and the Access Control Contractor.

(3) Engage, projects manage and coordinate the work of the door sub-contractor relative to ACES doors.

(4) Conduct coordination meetings with UIT and all applicable contractors involved with ACES doors to develop an integrated work schedule for door installation, systems wiring, testing and acceptance.

(5) Participate in a final integrated test, upon activation of the ACES to ensure all connected life safety systems perform as specified.

6.9 Electrical Sub-Contractor:

(1) Provide and install all communications cable support structures from the designated TR to each ACES door location, e.g. conduit, security junction boxes, pull strings, etc. and the cable support structure and pathways at each applicable ACES door.

(2) Provide and install specified dedicated 120VAC/20AMP circuit(s) at each applicable serving TR’s access control panel (ACP) location. Connect to emergency power if available.
(3) Provide and install a 16"H x 12"W x 4"D, Hoffman, Type 1 Control box, Part Number ASE16X12X4-MOD security junction box (SJB) when flush mounted with oversized cover Part Number AFE18X12-MOD, secure oversize cover to SJB with beauty washers Grainger Part number INU84 & secure to enclosures with Grainger part number 5JE65 tamper proof screws Part Number A16N126 Hinged SJB when placed above ceiling. All SJB’s should be placed on the secure side of the door (within five radial feet, but not to exceed 25 radial feet). Mount the SJB above the door in an accessible ceiling space on the secure side of door.

(4) Participate in a final integrated test, upon activation of the ACES to ensure all connected safety systems perform as specified.

6.10 Door Sub-Contractor:
(1) Provide and install the door and all specified electrified door hardware.
(2) Participate in a final integrated test, upon activation of the ACES, to ensure all connected life safety systems perform as specified.
(3) The Door Sub-Contractor shall include the following note on all drawings, hardware schedules, etc.;

"This type of door does not currently apply to Stanford University Doors with Access Control because all Stanford University doors have FREE EGRESS."

6.11 Fire Systems Sub-Contractor:
(1) Provide and install a fire alarm notification relay and if applicable, a smoke evacuation notification relay, from the fire control panel to the designated serving TR. Install the control relay(s) in the designated TR adjacent to the ACES access control panel.
(2) Participate in a final integrated test; upon activation of the ACES, to ensure all connected life safety systems perform as specified.

6.12 Elevator Sub-Contractor:
The Elevator Sub-Contractor is responsible for:
(1) Interconnect the ACES wiring into the elevator control system.
(2) Provide necessary wire for reader placement in the cab
(3) Participate in a final integrated test to ensure all connected life safety systems perform as specified.

6.13 Access Control Contractor, engaged and project managed by UIT:
(1) Provide and install the Lenel Systems access control panel (ACP) equipment and cabling in the building’s telecommunications rooms (TR’s).
(2) Provide and install ACES backbone cables from designated TR to each ACES service junction box (SJB) located above each ACES door. Perform applicable wire map and conformance testing of the ACES cables.
(3) Provide and install ACES devices and cabling at the door. This may include card readers, request-to-exit (RX) devises, door management alarm (DMA), camera, entry telephone unit, etc.
(4) Provide and install inter-connection terminal block wiring inside the ACES service junction box (SJB). The inter-connection wiring connects applicable ACES devices back to the TR Access Control Panel (ACP).
(5) Provide and install cable wiring from the ACES service junction box to appropriate intercept locations in the door operator housing, e.g. fire alarm relay, ADA operator buttons, door operator, door management alarm, etc.
(6) Activate and test the ACES including all higher-level hierarchy emergency door features (fire control, smoke evacuation) and lower hierarchy level door features, e.g.
card reader, request-to-exit, door contact, ADA, door management alarms, cameras, etc.

(7) Coordinate end-to-end ACES commissioning tests with the ACES VAR, I&M group, FE and Access Control Contractor.

ACCESS CONTROL CONTRACTOR NOTE: RELATED TO THIS FDG 17920.100 ARE THE FOLLOWING FDG DIVISION 17920 DOCUMENTS THAT PROVIDE A MORE DETAILED DESCRIPTION OF THE ACCESS CONTROL CONTRACTOR RESPONSIBILITIES. THE DOCUMENTS AND DRAWINGS ARE AVAILABLE ON THE STANFORD FDG WEBSITE:

HTTP://MAPS.STANFORD.EDU/FDG_VIEW_DRAWINGS

☐ Division 17920.101: Access Control Enterprise System (ACES) – Installation Guidelines
☐ FDG Drawings CM-100 through CM-119

7. **KEY TASKS SUMMARY LIST**

The following is a workflow summary of key tasks and the stakeholder(s) responsible for task completion. Attachment #1 to this document is a RACI Matrix that fully describes the supporting roles required of all stakeholders.

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<tr>
<td>1. PLANNING (ACES DOORS)</td>
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<td>2. In conformance with applicable Fire and Life Safety Codes, Stanford Facilities Design Guidelines Section 08710 and the Access Control Enterprise System Deployment Guideline, confirm the requirements for each ACES door. Authorize project funding. Provide preliminary ACES door schedule requirements (lock/unlock schedules and groups) to determine integration requirements with other connected building systems.</td>
<td>Client, DPMPM, FE, ACES VAR, SUFMO, Architect, General Contractor</td>
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<tr>
<td>3. Issue a revised door hardware set for each ACES door, including component brand name and part number. For buildings more than 50 years old, the design, finish and location must be approved by the University Architect / Campus Planning and Design Office.</td>
<td>FE, ACES VAR, General Contractor, Architect,</td>
</tr>
<tr>
<td>4. Develop an ACES network connection plan and costs. Provide requirements and costs to UIT FE for inclusion in the integrated ACES cost estimate.</td>
<td>I&amp;M</td>
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<tr>
<td>5. Review and submit I&amp;M’s ACES network connection plan and cost estimate to the Client and DPMPM for overall cost integration, review and approval.</td>
<td>FE</td>
</tr>
<tr>
<td>6. Review the ACES design plan and integrated costs. Authorize the Work upon approval of a final plan.</td>
<td>Client, DPMPM</td>
</tr>
<tr>
<td>7. DRAWINGS AND SPECIFICATIONS</td>
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<td>7. Issue revised TSO Bible Sheets to OAC and UIT Teams to reflect the ACES door locations. Note: The UIT Facility Engineer will provision a minimum 2-Port ACES TSO (2U) at each TR’s ACES ACP and assign an ACES TSO at each ACES door location.</td>
<td>FE, CAD</td>
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<td>8. Order the ACES network connection equipment and assign IP addresses for all applicable network connected devices, i.e. network switch devices, Lenel System hardware, UPS, etc. for each applicable TR.</td>
<td>I&amp;M</td>
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## PERMITTING

| 9. | Provide permitting documentation for County submittals | FE, ACES VAR, General Contractor, Architect |

## INSTALLATION

| 10. | Conduct coordination meetings with all applicable contractors involved with the ACES doors. Develop an integrated work schedule for door installation, systems wiring, testing and acceptance. Conduct scheduled progress meetings to ensure the work is on schedule. | FE, General Contractor, Access Control Contractor |

| 11. | Provide and install communications cable support structures from the designated TR to each ACES door, e.g. conduit, junction boxes, pull strings, etc. Above each ACES door, provide and install a 12" W x 16" H x 4" D security junction box (SJB). Provide and install access control cable support structures from the ACES SJB to access control device locations in the doorframe assembly and in-wall outlet boxes. Provide and install access control cable support structures from the ACES SJB to the door operator housing. | FE, General Contractor, Electrical Sub-Contractor, Door Sub-Contractor, Access Control Contractor |

| 12. | Provide and install a fire alarm notification relay and if applicable, a smoke evacuation notification relay, from the fire control panel to the designated serving TR ACP. Install the control relay(s) in the designated TR adjacent to the ACES ACP. | FE, General Contractor, Electrical Sub-Contractor, Fire Systems Sub-Contractor, Access Control Contractor |

Provide and install the door and all specified electrified door hardware. Note: Doors designated for Access Control shall be acceptance tested to a fully functioning state, including all appurtenant systems, e.g. door operators, emergency systems (fire, smoke, alarms, etc.), ADA controls, magnetic locks, magnetic hold opens, etc. prior to the complete activation of ACES. | FE, General Contractor, all applicable Sub-Contractors |

| 13. | Acceptance test and approve each ACES door for full operability and receive the Temporary Certificate of Occupancy (TCO) for the building, before FE, ACES VAR, I&M, and the Access Control Contractor activate ACES on the doors. | FE, General Contractor, applicable Sub-Contractors |

| 14. | Provide and install the ACES network switch equipment in each ACES TR and at the Lenel System server location. Install network connections required to link each TR's ACES equipment to the Lenel System Server. Install the network connections for the UPS management card. | I&M |

| 15. | Provide and install the Lenel System ACP equipment and cabling in the building's telecommunications rooms (TR's). Connect the ACP equipment to the Campus Card Network. Provide and Install the ACES backbone cables from the designated TR ACP to each SJB located above each ACES door. Provide and install the ACES door devices and cabling at each door. Provide and install cable wiring from the SJB to appropriate intercept locations as applicable, i.e. door operator housing, fire alarm relay, ADA operator buttons, door operator, door management alarm, camera, etc. | FE, Access Control Contractor, UIT Cabling Contractor (If Applicable) |

## TEST & TURN-UP

| 16. | Activate and test the ACES network equipment from each TR through to the Lenel System Server. Activate and test the UPS management card. Jointly activate and test each door configuration through to the Lenel System Server. | FE, CST, ACES VAR, Access Control Contractor |

| 17. | Activate and test the ACES and each applicable fire system door to ensure interoperability of fire and life safety systems with all connected access control devices e.g. exit hardware RX, door contacts, card reader, ADA operator buttons, electrified lockset/strike, door management alarm, camera, etc. Coordinate the delivery with the TCO testing schedule. | FE, CST, ACES VAR, Access Control Contractor, SUFMO, General Contractor |
18. Activate and test ACES and each applicable non-fire system door to ensure operability of access control devices e.g. exit hardware RX, above door RX, door contacts, card reader, ADA operator buttons, electrified lockset/strike, door management alarm, camera, etc.  
FE, CST, ACES VAR, Access Control Contractor, General Contractor

19. Document and submit "As Built" components and connection information for each ACES door. SJB locations, if not adjacent or above the door, shall be noted on As-Built. "As Built" to be submitted to CAD Records for inclusion in building CAD records.  
FE, Access Control Contractor

20. Update CAD bible sheets to document the building’s installed Access Control Enterprise System (as built records)  
CAD

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**ACTIVATION & MAINTENANCE**

21. Issue updated ACES door schedule requirements (lock/unlock schedules) and list of patron groups (access rights and privileges associated with end client cards).  
Client, ACES VAR,

22. Develop customized access schedules for client’s doors. Coordinate acquisition and installation of any necessary software and supporting hardware.  
Client, ACES VAR,

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8. **DOOR DESIGN**

8.1 **Overview**

The ACES installed at Stanford is provided by Lenel Systems. The HID Seos with Bluetooth card system and all associated parts and components shall be compatible with this system. Door access control is defined by function. The four major functions and the local door devices recommended for On-line access doors are the following:

A) **ACES door with card reader**: This service controls door access to a room or building by presenting an ID card to a reader that controls the locking hardware and allows entry.

   1. Electrified hardware locking mechanism options.
      - Electrified Lockset (24VDC mortise or cylindrical).
      - Electrified Trim on exit hardware device (crash-bar) without local power supply. A request-to-exit (RX) switch device should be specified in the crash-bar.
   2. Request-to-enter (card reader).
   3. RX switches in exit hardware (crash-bar). RX switches to be specified in Von Duprin crash-bar part number.
   4. Door contact (monitor switch).
   5. Door management alarm.
   6. IP Camera. An IP camera should be considered for all exterior doors. If a camera is not initially installed, the support structure (conduit, single gang outlet box) shall be provisioned from the SJB box to a future IP camera location or to accessible space for future extension.
   7. Entry telephone (If interface with the ACES specified)
   8. Others as specified:
      - Interface connection to the building fire control system.
      - Interface connection to a door power operator.
      - Interface connection to an ADA door-opening button and/or wireless remote button transmitter and receiver.
B) **ACES door with contact & locking hardware only (no card reader):** This service controls door locking hardware with a pre-programmed schedule. No access is permitted when the door is locked.
   
   (1) Same features and options as above except no card reader.

C) **ACES door elevator (card reader):** This service controls access to enter the elevator to control access to individual floors.
   
   (1) The card reader can be associated with a call button mounted on the outside of the elevator to control who enters the elevator.
   
   (2) The card reader can be mounted inside the elevator to allow individual floor control access.
   
   (3) IP camera (if specified).

D) **ACES door with monitoring only:** This service monitors door status, e.g. door propped open, and reports door egress from a room or building on an exit-only or emergency basis.
   
   (1) Door contact.
   
   (2) Door management alarm.
   
   (3) IP camera (if specified).

Each of the above door functions are linked together electronically. At each ACES door device, cables are run to an SJB terminal block assembly located above the door. Interconnection wiring on the terminal block assembly routes the access controls on cables back to an ACP in the serving telecommunications room. The ACP is network-connected back to a centralized Campus Card System server, via the Card Net backbone fiber network, to a centralized Oracle database that resides on a dedicated server.

### 8.2 Designation of ACES doors

In conformance with the Access Control Enterprise System Deployment Guideline, the **CLIENT and DPMPM** shall confirm the requirements for each ACES door. The client shall provide preliminary ACES door schedule requirements (lock/unlock schedules and groups) so that interoperability requirements with other connected building systems can be determined, e.g. fire alarm, smoke control, door management alarms, etc.

- On-line ACES doors.
- Off-line ACES doors (Building client supported)

The Architect (Team Lead), DPMPM, UITFE, and ACES VAR shall jointly develop the access control requirements for each designated door based on the following considerations:

1. **What type of door?**
   
   - Single leaf?
   
   - Double leaf? If double leaf door, are one or both leafs electrified for access control? Are leafs independent of one another?
   
   - Elevator door? If card access is required, where will the card reader be located, i.e. outside door on which floor(s), inside cab with access to which floor(s), etc.?
   
   - Fire Control System doors? These doors must comply with Santa Clara County Fire Department’s Access Control Systems Standard (SI-6), see website: [http://www.sccfd.org/fps_doorlocks.html](http://www.sccfd.org/fps_doorlocks.html).

2. **Is the door connected to the fire control system fire?**
   
   - If a fire system door, the ACES interface connection point will be located in the serving TR (adjacent to the ACP area).
The Project’s Electrical Contractor or Fire Control Contractor shall install the interface connection cabling and control relay from the fire control panel to the designated serving TR (required for each fire door).

Is smoke evacuation required at a fire system door (blow open)?

(3) What type of electrified hardware is required, i.e.

- Electrified exit hardware device (crash-bar). If an electrified exit hardware device (crash-bar) is specified, a request-to-exit (RX) device should be specified in the crash-bar. The “dogged-down” capability must be removed if the ACES are installed on the door.
- Electrified lockset handle (24VDC cylindrical or mortise)
  NOTE: IT IS RECOMMENDED THAT AN ELECTRIFIED LOCKSET HANDLE, EQUIPPED WITH A REQUEST-TO-EXIT DEVICE (RX), BE INSTALLED IN NON-ADA DOORS AND THOSE DOORS NOT EQUIPPED WITH EXIT HARDWARE.

(4) Is an ADA operator with push buttons required? If so,

- The exterior and interior ADA push button door operators can be hard-wired.
- A wireless ADA door operator button application requires a minimum of one hard-wired button into the door operator and must be equipped with a double-pull, double-throw relay or a dual channel receiver for control by the ACES.
- Refer to FDG drawing MA-33 for coordination with push buttons.

(5) Is a non-ADA door operator required?

(6) Is a card reader required?

- If yes, what type HID reader is required, e.g. single gang box mount or mullion door frame mount?
- If no, it is recommended that support structure (conduit, single-gang outlet box) be provisioned from the SJB box to a future card reader location or to accessible space for future extension.

(5) Is an IP camera required?

- An IP camera should be considered for all exterior doors. If a camera is not initially installed, the support structure (conduit, single gang outlet box) shall be provisioned from the SJB box to a future IP camera location or to accessible space for future extension.
- If yes, what type of IP camera (fixed or pan/tilt/zoom)?
- If yes, IP camera locations (secure side of door, ceiling, wall).
- If no, it is recommended that support structure (conduit, single gang outlet box) be provisioned from the SJB box to a future IP camera location or to accessible space for future extension.

(8) Is an IP entry telephone required that will interface to the ACES for remote entry?

(9) Is a push button required to enable turn-off the Door Management Alarm sounder?

(10) Is the building historic?

- Install card reader on a post unless University Architect / Campus Planning and Design Office approves a wall-mounted installation. Refer to FDG drawing MA-33 for details.

8.3 Access Control –Door Hardware Set Development

The Architect shall provide a door hardware set for each ACES door, including component brand name and part number. Door hardware set to include;

1. ACES security junction box (SJB).
2. Electrified door hardware (, electric lock set, crash bar exit hardware).
3. Access control devices e.g. card reader, request-to-exit hardware devices, door contact devices, door management alarm, IP camera, IP entry telephone, etc.
(4) Other door hardware and cable components that by-pass the security junction box to connect with other door systems, e.g. ADA operator buttons, door operator, fire control system, electrical power transfer hinge/pivot, etc.

8.4 Access Control – On-line Door Hardware Schedule

Upon receipt of the Architect's door hardware set specifications for each ACES door, the Access Control Contractor shall issue an ACES – On-line Door Hardware Schedule that details the following information for each door.

1. Room # (as designated on project construction drawings)
2. Door # (as designated on project construction drawings)
3. Door TSO # (assigned by FE)
4. Serving telecom room # (assigned by FE)
5. Door TSO # (assigned by the FE).
6. Hardware set (designated by Architect on project construction drawings)
7. Door attributes:
   - Electrified exit hardware device (Crash-bar equipped with RX unless ADA)
   - Electrified door handle type (24VDC cylindrical/mortise)
   - ADA door operator(s). Note: A wireless ADA door operator application requires a minimum of one hard-wired button into the door operator.
8. RX model type and location (crash bar, lockset handle)
9. Camera model type and location (wall, ceiling, other).

NOTE: IF AN EXTERIOR PAN-TILT-ZOOM CAMERA IS SPECIFIED, A 120VAC/15AMP DEDICATED CIRCUIT MAY BE REQUIRED FOR ENVIRONMENTAL CONDITIONING OF THE CAMERA DOME HOUSING.

10. INSTALLATION OF PATHWAYS AND SUPPORT STRUCTURES

10.1 Access Control Panel Support Structure – Telecommunication Room

The access control panel equipment will be placed in the telecommunications room (TR) on the floor served. In most TR's, a minimum clear mounting space measuring 4'W x 8'H shall be allocated for access control equipment. A 4'W x 8'H backboard can conveniently serve 16 ACES doors. However, a maximum of 24 doors is possible with FE and Access Control System Contractor approval.

The FE shall:
1. Allocate wall space to mount the access control panel equipment, controllers, power supply units and all other appurtenant equipment.
2. Specify the number and type of electrical outlets to be installed.
The General Contractor shall provide and install a minimum 4'W x 8'H x 3/4" fire-rated plywood backboard in each designated telecommunications room. A 4'W x 8'H backboard can conveniently serve 16 ACES doors. A maximum of 24 doors is possible with FE and Access Control Contractor approval.

The Electrical Sub-Contractor shall provide and install the following:

1. Install one dedicated 4-plex 120VAC/20AMP outlet at the designated location off the backboard (15" AFF). Power shall be wired to Emergency Power where such power exists.
2. Install the 120VAC/20AMP 4-plex outlet and extend through conduit to the designated Altronix Power Supply cabinet(s) to be located on the ACP backboard.
3. If not already provided in the TR, install a Telecommunications Ground Bar 2" W x ¼"H x 10" L (CPI Part No. 13622-010 or equivalent) on the lower left corner edge of the backboard.
4. If not already provided in the TR, install a 120VAC/20AMP duplex electrical work outlet on the wall within 12" of the backboard and 15" AFF.

NOTE: A TYPICAL ACCESS CONTROL PANEL BACKBOARD LAYOUT IS SHOWN ON FDG DRAWING CM-100. THIS DRAWING IS AVAILABLE ON THE STANFORD DESIGN GUIDELINES WEBSITE: http://maps.stanford.edu/fdg_available UNDER THE "VIEW FDG DRAWINGS".

10.2 Cable Pathways – Telecommunication Room To The Door

The FE and Access Control Contractor shall specify the cable support pathways to be provided from each serving Telecommunication Room to each floor area served, i.e. cable tray, j-hook run, home-run conduit, etc.

The Electrical Sub-Contractor shall provide:

1. All access control cable support pathways from each ACES door’s security junction box to the serving Telecommunications Room.
2. Provide one 1-1/4" diameter conduit from the 16"H x 12" W x 4"D Hoffman Security junction box to the serving Telecommunications Room via an approved accessible pathway, i.e. cable tray, j-hook run, home-run conduit, etc.

10.3 Cable Pathways and Support Structure – At the Door

The Electrical Sub-Contractor shall provide and install all access control cable pathways and support structure at the door. The pathways include junction boxes, conduits, pull boxes, pull strings, sleeves, junction boxes, terminal block assemblies, etc. as required to install and connect the ACES cables to each applicable electrified hardware connection point. Provide and install the following:

1. Provide and install a 16"H x 12"W x 4"D, Hoffman, Type 1 Control box, Part Number ASE16X12X4-MOD security junction box (SJB) when flush mounted with oversized cover Part Number AFE18X12-MOD, secure oversize cover to SJB with beauty washers Grainger Part number INU84 & secure to enclosures with Grainger part number 5JE65 tamper proof screws Part Number A16N126 Hinged SJB when placed above ceiling. All SJB’s should be placed on the secure side of the door (within five radial feet, but not to exceed 25 radial feet). Equip the SJB with a standoff mounting panel part number A16N12P. Mount the SJB above the door in an accessible ceiling space on the secure side of door.
2. One 1-1/4” diameter conduit from the Hoffman SJB to the serving Telecommunications Room via an approved accessible pathway, i.e. cable tray, j-hook run, home-run conduit, etc.
3. One 1” diameter conduit from the Hoffman SJB to the door operator housing(s) to enable interface connections to other building control door system cables, i.e. fire door magnetic release device, ADA push buttons, door operator, etc.
(4) One 1" diameter conduit from the Hoffman SJB at the operated door, to the external bollard supporting the ADA push plates and card reader (if applicable). Refer to FDG section 27-05-43 for installation details for underground conduits.

(5) One 3/4" diameter conduit as required, from the Hoffman SJB to an in-wall and/or door frame assembly door management alarm, dual-gang outlet box

(6) One 3/4" diameter conduit as required, from the Hoffman SJB to an in-wall entry telephone unit housing enclosure (if specified to interface with the ACES).

(7) One 1/2" diameter conduit(s), as required, from the Hoffman SJB to the following on/in-door and/or door frame assembly locations as applicable:
   - RX(s), in exit hardware.
   - Door contact(s).
   - Exit hardware crash-bar(s)
   - Electrified lever lockset
   - Card reader (in-frame mount or single-gang wall outlet box).
   - Camera (wall or ceiling mounted single gang outlet box).

**NOTE:** IF MULTIPLE ACCESS CONTROL DEVICES ARE WIRED TO A DOOR FRAME WITH UNIVERSAL ACCESS, ONE 1.0" CONDUIT CAN BE INSTALLED FROM THE HOFFMAN SJB TO THE DOOR FRAME AS A COMMON PATHWAY. AN INDIVIDUAL PULL STRING SHALL BE PROVIDED FROM THE SJB TO EACH ACCESS CONTROL DEVICE LOCATION.

(8) One 2" W x 4"H single-gang box for card reader, on un-secure side of door, at ADA compliance height.

(9) One 4" W x 4"H x 2-7/8" D dual-gang box for the door management alarm at 96" AFF or 6" below finished ceiling, whichever location is higher, on the secure side of door.

(10) One 2" W x 4"H single-gang box outlet box for each IP camera as specified on the secure and or non-secured side of door as specified.

**NOTE:** IF AN EXTERIOR PAN-TILT-ZOOM IP CAMERA IS SPECIFIED, A 120VAC/15AMP DEDICATED CIRCUIT MAY BE REQUIRED FOR ENVIRONMENTAL CONDITIONING OF THE CAMERA DOME HOUSING.

(11) Install pull strings in conduits and within the door frame or mullions for placement of access control cables

(13) Conduit runs shall not exceed more that 100’ in length or contain more than two 90-degree bends or 180 degrees of bend total. If exceeded, an intermediate 4" W x 4" L x 2-3/4" deep junction box placed as a pull point. The distance from the TR location to the door junction box location shall not exceed 275 feet.

(14) Use of flex conduit from the access Hoffman SJB to door component locations shall be pre-approved for use by the FE.

(15) SJB’s located above ceiling shall be labeled on the cover as well as the adjacent ceiling grid with the TSO number of serving door and serving TR.

(16) Intermediate junction boxes, in pathways sections, installed above ceiling grids shall be mounted facing down for identification from below.

(17) All cable pathways in the frames and doors shall be accessible with no sharp edges or spaces that are not continuous

**NOTE:** TYPICAL ACES DOOR TYPES ARE SHOWN ON FDG DRAWINGS CM-100 THROUGH CM-107. THESE DRAWINGS ARE AVAILABLE ON THE STANFORD DESIGN GUIDELINES WEBSITE: http://maps.stanford.edu/fgd_available UNDER THE “VIEW FDG DRAWINGS”

11. INSTALLATION OF DEVICES AND CABLES

11.1 General

The Door Sub-contractor shall:

(1) Provide and install all electrified door hardware as specified by the Architect.

(2) Provide, install and label all connective wiring to the door operator housing.
NOTE: Doors designated for ACES shall be acceptance tested to a fully functioning state, including all appurtenant systems, e.g. door operators, emergency systems (fire, smoke, alarms, etc.), ADA controls, etc. Prior to insertion of ACES.

The Access Control Contractor shall provide, install and activate all ACES cabling, ACP equipment and door devices.

The General Contractor and FE shall acceptance test and approve each designated ACES door, for full operability and receive the Temporary Certificate of Occupancy (TCO) for the building, before the Access Control Contractor insert ACES on the door.

11.2 Access Control Cables – Telecommunications Room to The Door

The UIT FE shall assign a TSO number to each ACES door. The TSO number and hexagon symbol will be posted on the TSO Bible Sheet drawings.

The Cabling Contractor shall:

1. Provide and install a bundled five (5) cable-set (non-plenum or plenum as applicable) to each ACES door to enable full provisioning of all ACES features (initial and/or future). Bundled five (5) cable-sets are available from Anixter as follows:

   - Non-plenum rated: Anixter Part Number SP0807-79
     - Request-to-exit (RX): One 6 conductor, 22 AWG, stranded conductors, shielded. Belden Part Number 5504FE.
     - Door contact (DC): One 4 conductor, 22 AWG, stranded conductors, shielded. Belden Part Number 5502FE.
     - Lock power (LP): One 4 conductor, 18 AWG, stranded conductors, shielded. Belden Part Number 5302FE.
     - Power Over Ethernet – Integrated Protocol (IP): One CAT 6, 4-pair, 23 AWG, solid conductors. Belden Part Number 2412 00x A1000

   - Plenum rated: Anixter Part Number SP1301-95
     - Request-to-exit (RX): One 6 conductor, 22 AWG, stranded conductors, shielded. Belden Part Number 6504FE.
     - Door contact (DC): One 4 conductor, 22 AWG, stranded conductors, shielded. Belden Part Number 6502FE.
     - Lock power (LP): One 4 conductor, 18 AWG, stranded conductors, shielded. Belden Part Number 6302FE.
     - Power Over Ethernet – Integrated Protocol (IP): One CAT 6, 4-pair, 23 AWG, solid conductors. Belden Part Number 2413 00x A1000

2. Each cable shall be labeled at each end per applicable cable use designation, e.g. “CR”, “RX”, “DC”, “LP”, and “IP”.

3. At the door, the cables shall be terminated on the designated terminal assembly blocks in the 16”H x 12” W x 4” D Hoffman SJB. A wire map test shall be performed to ensure that the cables are good.

4. Install all cables in the backbone cable pathway system as specified by the FE for the floor served. Where the access control cables branch off from the main cable tray run, cables shall be run parallel to building lines in J-hooks, at a maximum 60” spacing, or in 1-1/4” diameter conduit installed by the Electrical Sub-Contractor.
Install cables in accordance with approved industry practices and Stanford Facilities Design Guidelines, Contractor Requirements And Specifications, Division 17000.001, see http://maps.stanford.edu/fdg_available

11.3 Access Control Electrified Door Hardware & Cabling – At the Door

The Electrical Sub-Contractor Provide and install a 16”H x 12”W x 4”D, Hoffman, Type 1 Control box, Part Number ASE16X12X4-MOD security junction box (SJB) when flush mounted with oversized cover Part Number AFE18X12-MOD, secure oversize cover to SJB with beauty washers Grainger Part number INU84 & secure to enclosures with Grainger part number 5JE65 tamper proof screws Part Number A16N126 Hinged SJB when placed above ceiling. All SJB’s should be placed on the secure side of the door (within five radial feet, but not to exceed 25 radial feet). Equip the SJB with a standoff mounting panel part number A16N12P. Mount the SJB above the door in an accessible ceiling space on the secure side of door. If the SJB is located in an accessible public area, equip SJB with a tamper switch (Part Number ALFSWD). See attached CM-109 drawing.

The Access Control Contractor shall provide and install the following access control devices and cables, as specified by the Architect and the FE, from the security junction box to those access control devices located on/in the door and/or door frame assembly (see CM-113 thru CM-119 Drawings):

(1) Universal Terminal Block Assembly (inside SJB): Phoenix Contact Part No’s as follows:
   - DIN Mounting Rail – Order No.: 0801733, Type: NS 35/7, 5 PERF 2000MM
   - Terminal Blocks – Phoenix Contact Part No. 3044636 UTTB 2,5 Double-level terminal block with screw connector, gray.
   - Terminal Blocks – Phoenix Contact Part No. 3044665 UTTB 2,5-PE Double-level terminal block with screw connector, green/yellow.
   - End Clamp - Part No. 1201442
   - Cover – Part No. 3047293
   - Terminal Marker Strip Carrier – Part No. 0800307
   - Zack strip – Part No. 1050295 ZB: SO/CMS (Stanford Label)

(2) Door Contact: General Electric Sentrol 1078C; 1125TW; 2505A (contacts to match paint on frame)

(3) Request-To-Exit Crash-Bar Switch: Von Duprin exit hardware models

(4) Card Reader: All readers must be HID Seos with Bluetooth encryption model. Order the following models only: 900NMTEKMA0KC, 910NMTEKMA0KC, 920NMTEKMA0KC AND 921NMTEKMA0KC. Order optional single gang mounting adapter when required.


(6) Door Management Alarm: Quam 0602-CISX/8 Speaker and Visonic SP-3 speech processor.

(7) Camera (if specified): Stanford UIT approved IP network camera system.
   - Requires a Stanford approved power-over-Ethernet network switch and 12VDC to 48VDC power converter to be mounted in SJB.

(8) Entry Telephone (if specified): Stanford UIT approved IP network camera system.
   - Requires a Stanford approved power-over-Ethernet network switch and 12VDC to 48VDC power converter to be mounted in SJB.

(9) Door Contact Cable: One 4 conductor, 22 AWG, stranded conductors, shielded. Belden Part Number 5502FE or 6502FE as applicable. Install END-OF-LINE resistors within 6 inches of the door contact terminals.
(10) Request-To-Exit above Door Cable: One 6 conductor, 22 AWG, stranded conductors, shielded. Belden Part Number 5504FE or 6504FE as applicable.

(11) Request-To-Exit Crash-Bar Cable: Belden 5501UE (3 conductor, 22 AWG, stranded, shielded, drain wire).

(12) Card Reader Cable: One 3-pair, 22 AWG, stranded conductors, drain wires, shielded. Belden Part Number 8777 or 88777 as applicable.

(13) Lockset Cable: One 4 conductor, 18 AWG, stranded conductors, shielded. Belden Part Number 5302FE or 6302FE as applicable. Install IN4004 or equal diode within 18 inches of the lockset.

(14) Door Management Alarm Cable: Belden 5302UE (4 conductor, 18 AWG, stranded, shielded, drain wire).

(15) Camera Cable: One CAT 6, 4-pair, 23 AWG, solid conductors. Belden Part Number 2412 00x A1000

(16) Entry Telephone Cable: One CAT 6, 4-pair, 23 AWG, solid conductors. Belden Part Number 2412 00x A1000 (SJB to entry telephone).

(17) Entry Telephone Cable Power Cable: One 4 conductor, 18 AWG, stranded conductors, shielded. Belden Part Number 5302FE or 6302FE as applicable (SJB to entry telephone).

**NOTE:** THE ABOVE LIST DOES NOT INCLUDE OTHER DOOR HARDWARE AND CABLE COMPONENTS THAT BY-PASS THE SJB TO CONNECT WITH OTHER DOOR SYSTEMS, E.G. ADA OPERATOR BUTTONS, DOOR OPERATOR, EXIT HARDWARE POWER SUPPLY CABLE, FIRE CONTROL SYSTEM, ELECTRICAL POWER TRANSFER HINGE/PIVOT, ETC. THE ARCHITECT MUST INCLUDE THESE REQUIREMENTS IN THE OVERALL DOOR HARDWARE SET.

### 11.4 Access Control Panel Equipment – Telecommunication Room (TR)

The **Access Control Contractor** shall provide and install the access control power supply units, Lenel System controllers and the expansion boards required to support the ACES device at each door. Each Lenel System controller shall be configured to support either 8 card readers or 16 card readers. The following is a typical list of common equipment that may be required:

- Altronix 12VDC 24VDC Power Supply/Charger, Part No.: DSMaxim37E
- Altronix PD8CB Fuse boards for field device power termination
- Altronix DSACM8/8CB Fail Safe lock hardware release relay module
- Battery Backup. Use (4) Powersonic PS-1212 12VDC/12AH Battery for both 12 volt and 24-volt systems (minimum 4-hours backup).
- Hoffman A-TC36246S Enclosure for termination of field devices and mounting Lenel System controller and modules.
- Equip each Hoffman A-TC36246S Enclosure with a Hoffman ALFSWD door activated enclosure tamper switch
- Panduit 2” X 2” and 1.5” X 2” Finger Duct with covers
- Phoenix or Wiedmuller dual height terminal blocks with labels and din rail.

**NOTE:** TYPICAL TELECOMMUNICATION ROOM ACP’S ARE SHOWN ON FDG DRAWINGS CM-109 THRU CM-119. THESE DRAWINGS ARE AVAILABLE ON THE STANFORD DESIGN GUIDELINES WEBSITE: http://maps.stanford.edu/fgd_available UNDER THE “VIEW FDG DRAWINGS”.

The **Electrical Sub-Contractor or Fire Control Sub-Contractor** shall install the interface connection cabling and control relay from the fire control panel to the designated serving TR (fire alarm notification relay and, if applicable, a smoke evacuation notification relay).

The **Access Control Contractor** shall provide and install all ACES door cables and all circuit control wires to relay components in higher hierarchy emergency systems, i.e. fire control interface relay.
The **UIT Cabling Contractor** shall provide and shall install a 2-Port CAT 6 TSO (2 universal ports) at each Access Control Panel backboard location in each serving TR.

12. **ACES - TESTING AND COMMISSIONING**

12.1 General

The **General Contractor** shall acceptance test and approve each designated ACES door, for full operability and receive the Temporary Certificate of Occupancy (TCO) received, before the FE and the ITS Access Control Contractor shall insert the Access Control Enterprise System on the door.

The **Access Control Contractor** shall provide and install inter-connection terminal block wiring, in each door's security junction box, to connect to:

1. The electrified door hardware and access control component cables, e.g. card reader, request-to-exit, door contact, door lockset, door management alarm, camera, etc.
2. The appropriate interception points on the door operator housing, e.g. fire alarm relay, ADA operator buttons, door operator, alarms, etc.

The **FE, ACES VAR, Access Control Contractor and General Contractor/Sub-Contractors**, shall jointly activate and test the ACES for **fire system doors** to insure inter-operability with all connected fire and life safety systems.

The **FE, ACES VAR, and the Access Control Contractor** shall jointly activate and test the ACES for **non fire system doors**, e.g. crash-bar RX, ADA operator buttons, electrified door handles, card readers, etc.

The **UIT I&M Technician, FE, ACES VAR and the Access Control Contractor** shall jointly activate and test the ACES through to the network server.

The **Access Control Contractor** shall document “As Built” component and connection information for each ACES door. The **FE and the Access Control Contractor** are responsible for submitting the consolidated “As Built” to CAD Records for inclusion in the building CAD records.

13. **RECORDS**

13.1 General

The ACES records designations are required on the following documents and field plant facilities:

- Construction Drawings (Placing, Terminating, Splicing)
- Quad/Building TSO Bible Sheet Records
- Access Control layer of CAD Drawings (Permanent Records)
- Field Plant Identification Labels (cables, enclosure housings, TR equipment rooms, etc.)

**Note:** ACES ACCESS CONTROL SYMBOLS USED ON RECORDS AND DOCUMENTS ARE SHOWN ON FDG DRAWING CM-108. THIS DRAWING IS AVAILABLE ON THE STANFORD DESIGN GUIDELINES WEBSITE: [http://maps.stanford.edu/fdg_available](http://maps.stanford.edu/fdg_available) UNDER THE “VIEW FDG DRAWINGS”.

14.
15. FACILITIES DESIGN GUIDELINE REFERENCE DOCUMENTS, REFERENCE DRAWINGS, SECURITY CONTRACTOR REQUIREMENTS AND SPECIFICATIONS

15.1 General
This document, Division 17: Communications Services, Section Number 17920.100 (Access Control Enterprise System), is available on the Stanford Design Guidelines website: http://maps.stanford.edu/fdg_available.

15.2 Reference Drawings:
The UIT reference drawings (CM-XX) listed below is available on the Stanford Design Guidelines website: http://maps.stanford.edu/fdg_available/ under the “View FDG Drawings” tab.

- CM-103: Single Door E/W Electrified Handle, Card Reader, Door Management Alarm, Camera.
- CM-104: Single Door E/W Electrified Crash-bar, Card Reader, ADA, Door Management Alarm, Camera.
- CM-105: Double Doors E/W Electrified Crash-bars, Card Reader, ADA, Door Management Alarm, Camera.
- CM-113: Security Junction Box (SJB), 16'H X 12"W x 4"D (At Door).
- CM-114: SJB Card Reader Door Wiring Diagram (Typical).
- CM-115 SJB Card Reader Door Wiring Diagram e/w Alarm Shunt Button (Typical).
- CM-116: SJB Alarm Door Wiring diagram (Typical).
- CM-118: SJB Card Reader Door Wiring e/w ADA operator & Entry Telephone (Typical).
- CM-118.1: SJB Card Reader Door Wiring e/w ADA operator w/Wireless Remote Button Function (Typical).

16. ACCESS CONTROL DOOR TERMINOLOGY
Access Control Automatic Door Opener - An automatic door operator is a device that is specifically designed to provide easy access for the disabled. The majority of these are located at building entrances where a push-plate or wireless remote button are used to open the doors automatically.

Access Control locks – Door mounted Electrified control lock hardware.
- Door mounted hardware - Includes electrified cylindrical locks, mortise locks or exit hardware devices. Power is run to the frame, from the frame to the door, through the door to the lock.
Active Door (in a pair of doors) - The leaf that opens first and the one to which the lock is applied.

Astragal: An astragal is commonly used to seal between a pair of doors. Exterior astragals are kerfed for weather-stripping. Also, flush bolt hardware is commonly mortised into the astragal to hold the inactive door in place at the top and bottom.

California Code of Regulations (CCR), Title 24 - also known as the California Building Standards Code, is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes
- Building standards that have been adopted and adapted from the national model code standards to meet California conditions
- Building standards, authorized by the California legislature, that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns

Card Reader, A device that reads information encoded to a Seos chip on a card. The card reader type is HID Seos with Bluetooth.

- Seos: A "Smart Card" read write capable card and reader designation that has unique properties (keys) for Stanford University

Coordinator - A device used on a pair of doors to ensure that the inactive leaf closes first, before the active leaf. This is necessary when an overlapping astragal is present, with certain exit hardware device combinations and when automatic or self-latching bolts are used. Both door leaves must have closers.

Cylindrical Lock – This is a type of bored lock. The locking mechanism is usually contained within a cylindrical case and actuated by a cylinder and/or a button in the knob. The term ‘Bored’ or ‘Bored-In’ describes how the device fits into round holes that are bored or drilled into the face and edge of a door. Door preparation is simple, but the device is limited in some functions when compared to a mortise lock.

Dogging - Term used with exit hardware devices (crash-bars). A mechanism that allows the latch bolt to remain in a retracted position thus permitting free push-pull operation of the door from either side. Dogging shall not be used on fire exit hardware devices.

Door Closer (or Door Check) - A device attached at the top of the door, either on the surface or mortised, to regulate and control the operation of the door.

Door Handing - Door handing is typically described from the lock side of the door. The side of the door with the door key determines the door handing. A door swinging in is regular bevel and a door swinging out is reverse bevel, hence the LHR and RHR. Otherwise the handing is LH or RH. Hinges on the right make it a right hand (RH) door. Hinges on the left will make it a left hand (LH) door. See illustration below for details.
Door Management Alarm (DMA) – A door status monitoring and alarm device that provides door management alarms for local and remote monitoring and annunciation of the status of the doors (door held open, door propped open, door intrusion, door forced open, or door secure). The DMA is capable of operating in a “stand-alone” configuration or with an Access Control Enterprise Systems utilizing a variety of reader technologies: i.e. proximity, Weygand, magnetic stripe, bar code or biometrics. A local speaker is used to indicate both door prop/door held and intrusion/door forced conditions after a user selectable quiet, or access, time has expired. A speech processor holds a Stanford provided WAV file that is activated by one of the above door alarm conditions and plays the recorded message/sound through the DMA speaker.

Door Operator (Powered) - A door operator (or door opener or automatic door operator) is a device that operates a door for ADA assistance. It opens or helps open the door automatically, waits, then closes it. There are 3 basic types of swing door operators:

- **Full Energy** - It opens and closes the door at full speed.
- **Low Energy** - It opens and closes the door at reduced speed, in order to limit the kinetic energy of the moving door to levels deemed safe for disabled users.
- **Power Assist** - This is a version of the Low Energy operator. It doesn't open the door; instead, it lets the user open the door manually at a reduced force, compared to opening against a standard door closer. It closes the door with the same speed limitations as a Low Energy operator.

A door operator may be triggered in various ways:

- **Approach Sensor (radar sensor or RX)** - the door opens when a user approaches it.
- **Pushbutton** - the door opens when a user presses a button.
- **Push-&-Go** - the door opens fully when the user begins opening it.
- **Access control** - the door opens when the Access Control Enterprise System determines the user is authorized to go through.
- **Blow-Open (Smoke Evacuations Systems)** - An auxiliary "blow-open" box, controlled by the building smoke evacuation system, to open and hold the door open to allow fresh air into the building.
**Double-Acting Door** - A door equipped with hardware that permits it to swing to either side of the plane of its frame.

**Electric Locksets** - Similar to a standard lock, these access locks have a solenoid built in that causes the unit to lock or unlock when power is applied from a remote location or by special equipment used on the access door.

- Electric locksets are typically cylindrical lever sets or mortise locksets.
- Egress at the door is the same as a standard lockset.
- Low-voltage power is provided to the solenoid on the door inside the lock body. A power transfer device from the frame of the door to the lockset is necessary.

**Electromagnetic Door Closers** - are electro-magnetically controlled overhead door closers, fitted to the door. The unit can be selected to provide a 'hold open' facility whereby the door is held in the open position, or a 'swing free' operation, where the door is able to swing freely as if no door closer was fitted. On operation of the fire alarm or smoke detector, the electromagnet is deactivated, and the door will close automatically under conventional spring action. The door may be pulled closed at any time.

**Electromagnetic Door Holders** - either floor or wall mounted they will hold the door in the open position. Under fire alarm conditions the device is deactivated, and the door will close automatically under the action of a conventional overhead door closer or floor spring.

**Electromagnetic Hold Open Stay** - is a door/ frame mounted device that is used in conjunction with a floor spring or overhead door closer. As with the other devices, an electromagnet allows the door to be held in the open position and is released on activation of the fire alarm, allowing the door to close under the action of the door closer or floor spring.

**Electromagnetic Locks** - Also called mag locks, this type lock only functions when power is on. The unit typically mounts to the frame header. A metal plate bolts to the door so the energized magnet can hold the plate in place. This locks the door. Mag locks come in all sizes and are usually rated by holding force in lbs. Lower end locks start with about 600 lbs. holding force. Mag locks may not be used with access-controlled doors.

**Electric Power Transfer device:** provides a means of transferring electrical power from a doorframe to the edge of a swinging door. Some units are completely concealed when the door is in the closed position and are ideally suited for installations involving abuse or heavy traffic.
Exit hardware device – Exit hardware, sometimes called a crash-bar, is designed to be operable in the direction of egress travel. If tested and approved, exit hardware can bear a fire rating label certifying its suitability for use on fire emergency doors. An exit hardware device must always release the door, allowing exit without prior knowledge of operation. Any horizontal force on the cross bar or push rail will release the door.

Where a door is required to be equipped with panic hardware or fire exit hardware, such releasing device shall:

(a) Consist of bars or panels, the activating portion of which shall extend across not less than one-half of the width of the door leaf, not less than 30" nor more than 44" above the floor, and

(b) Cause the door latch to release when a force not to exceed 15 lb. is applied.

Exit hardware devices are divided into two categories, namely, "Panic Exit Hardware" and "Fire Exit Hardware."

- **Panic exit Hardware:** is one that always allows fast and easy exit with no knowledge of the operation needed. In high frequency use doors, the actuating bar may be locked in the depressed position with an Allen wrench type key, a mechanical cylinder key or an electrical method. The locking down of the actuating bar is referred to as dogging. Dogging the actuating bar down during periods of high frequency converts door to a push/pull type of operation, reduces operation noise and wear on the exit hardware device.

- **Fire Exit Hardware:** is a panic exit hardware device designed in such a way that it is suitable for use on a fire door. Latching devices or locks on fire doors must be self latching. The actuating bar does not have a dogging feature. The latch bolts must always be operative. The latch bolts must be able to hold the door closed at temperatures reaching up to 1800°F, for a period of three hours. The other major requirement for fire doors is that they be self-closing, which requires a door closer. Wall magnets or hold-open door closers can be used to keep fire doors in the open position but close them automatically in case of fire. Electric latch retraction devices can be used, again only when tied into the fire control system.

- **Exit hardware device Types:**

  - **Rim Exit hardware device:** A “Rim Exit hardware device” is an exit hardware device applied to the surface of the door. This makes the application very simple. The latch bolt projects from the center case. This device is well suited to a single door or pairs of doors with a removable mullion.

  ![Rim Exit hardware device](image)

  - **Mortise Lock Exit hardware device:** A “Mortise Lock Exit hardware device” can be used on a single door but is normally used on the active leaf of a pair of doors.
- **Surface Vertical Rod Exit hardware device:** A “Surface” (or concealed) Vertical Rod Exit hardware device is normally used on the inactive leaf of a pair of doors. The active door would have a mortise lock type exit hardware device on it. Two doors or a pair of doors cannot be locked to each other. One door - called the inactive leaf - must be locked to the door frame. A mortise lock exit hardware device, used with a vertical rod exit hardware device on a pair of doors, allows a full double-door opening. (Two rim-type exit hardware devices used with a removable mullion cause the mullion to obstruct the full opening, unless it is removed.)

![Top vertical rod](image)

![Lower vertical rod](image)

**Fail Secure Lock** - If electric power goes out, the door remains locked from the outside.

**Fail Safe Lock** – If the electric power goes out, the door will unlock completely. In a power failure, security doors must allow anyone inside to exit.

**Fire Door:** A fire-resistant door between two parts of a building to prevent the spread of fire within the building, which should remain closed when not in use. A door leading out of a building which can be easily opened from the inside is used as an emergency exit.

**Hardware Sets** - A group of hardware listed in the specification, under execution, for a specific opening.

**Inactive Door** - That leaf of a pair of doors that is manually bolted when closed and to which the lock strike is fastened to receive the latch of the active door.

**Jamb** - The vertical member forming the side of a door, window or wall opening frame. The hinge jamb is the jamb at which the hinges or pivots are installed. The strike jamb is the jamb in which a strike may be installed and away from which the door or window swings. A blank jamb is one that has not been prepared to receive hardware.
Labeled Door (or Frame) - A door or frame that conforms to all the applicable requirements in respect to fire resistance of a nationally recognized testing authority and bears a label designating that fire rating.

Latch bolt - A lock component having a beveled end that projects from the lock front but may be forced back into the lock case by end pressure or drawn back by action of the lock mechanism. When the door is closed, the latch bolt projects into a hole provided in the strike, holding the door in a closed position.

Leaf (of a pair of doors) - One of the two doors forming a pair or a double door.

Lenel Access Control:
- **LNL-4420 Network Controller**: Provides direct Ethernet connection to Lenel On Guard software application. These units do not control doors without a connector unit but do contain all the intelligence necessary to manage access control and alarms for up to 16 connector units. Each unit can connect up to 16 doors in a typical Stanford installation.
- **LNL-1300S Single Reader Interface**: Provides a single reader interface at the security junction box adjacent to the card reader and controlled door and allows input from the RX, door contact, and electric lock. The module communicates via RS485 to the LNL-4420 controller.
- **LNL-8000 RS485 Communication Interface**: Provides star communication with multiple RS485 terminated interface modules.
- **LNL-1100S Input Interface**: The Lenel input control module provides monitoring of 16 input points not associated with a card reader door. The module communicates with the LNL-3300 controller.
- **LNL-1200S Output Interface**: The Lenel output control module provides 16 relay form “C” contacts for activation of devices, including the DMA speech processor. The module communicates with the LNL-3300 controller.
- **LNL-1320 Dual Reader Interface**: Provides a dual reader interface at the access control panel and can only be used with elevators.

Lockset - A complete lock or latch is an assembly that includes the lock or latch mechanism and trim (knobs, levers, handles, roses and escutcheons).

Mortise Lock - A lock assembly designed to be mortised into the edge cut out in a door. The term ‘Mortise Lock’ describes how the lock case fits into a rectangular shaped cavity in the edge of a door.

Mullion - A fixed or movable vertical member dividing a door opening.
- **Removable Mullion**: A mullion separating doors vertically within a doorframe. Required for the normal operation of doors but designed to permit its temporary removal so the entire width of the opening can be utilized.
NFPA - The National Fire Protection Association (NFPA) is an international nonprofit organization. Its mission is to reduce the burden of fire on the quality of life by advocating scientifically based consensus codes and standards, research, and education for fire and related safety issues. Three of the many NFPA standards that have achieved worldwide recognition, adoption, and enforcement are:

- NFPA 70 - addresses proper electrical systems and equipment installation to protect people and property from hazards arising from the use of electricity in buildings and structures.
- NFPA 80 – addresses the installation and maintenance of assemblies and devices used to protect openings in walls, floors, and ceilings against the spread of fire and smoke within, into, or out of buildings.
- NFPA 101 - provides requirements for building design, construction, operation, and maintenance to protect occupants from fire, smoke, and fumes or similar emergencies.

Power Supply Unit (PSU): An electrical device that both transforms and rectifies mains voltage to provide power to a system. The most commonly used power supply is 24 or 12 volts. Normally rated in amps, e.g. 12V 3A.
Request to Exit (RX): A motion sensor device located above a door or in an exit hardware device crash-bar. When a building is locked the doors will be alarmed to prevent entry by unauthorized persons. All doors with alarms or on an Access Control Enterprise System will have a “Request to exit device” (RX). The RX device will temporarily disable the alarm when a person approaches the door from the inside and will permit that person to exit without an alarm sounding. The RX device does not unlock the door.

Sargent Assa Abloy: The University has standardized on the Aperio Wireless Access Control solution from Sargent. The product line consists of the following:

Aperio IN100 10 Line Series Cylindrical Locksets
Aperio IN100 7900 Series Mortise Locksets
Aperio IN100 80 Series Exit Devices
Aperio IN100 Hub AH30R12

Cabling for each Hub shall be configured with a communication cable, Belden 6541FE, a power cable Belden 6300UE and a category 6 FEP cable for IP communication. These cables shall originate from the access control panel (ACP).

END OF DOCUMENT