OCC – Interdisciplinary Complex
Addendum Two

REVISED BID INFORMATION FOR ALL BID PACKAGES

Document date: July 17, 2013

1. A MANDATORY pre-bid job-walk will be held at 8:00 am. June 12, 2013, June 18, 2013, July 2, 2013, July 18, 2013, and July 23, 2013 at 2701 Fairview Road Costa Mesa CA 29626. All Contractors are required to attend ONE of the job-walks.

2. See attached Pre-Construction Request for Information Responses:
   a. No. P0001 - Repairs to damaged utilities
   b. No. P0002 – Simplex Motor Control Panel
   c. No. P0003 – Site Utilities Scope
   d. No. P0004 – Site Utilities Schedule Activities
   e. No. P0005 – Catch Basin Grates
   f. No. P0006 – OCIP Insurance
   g. No. P0007 – Tel/Data Questions
   h. No. P0008 – Substitutions
   i. No. P0009 – 312300 Earthwork Survey Scope
   j. No. P0010 – BP 1, 2.18 Site Trash Containers
   k. No. P0011 – Grading Plan/Earthwork Spec/Geotech Report clarification
   l. No. P0012 – Lecture Rooms Doors Windows

3. Exhibit U – Trade Specific Instruction – Bid Package 03 Demo and Earthwork
   a. Eliminate item 4.7.8 Excavate for elevator pit.

4. Exhibit U – Trade Specific Instructions – Bid package 20 – Electrical
   a. Add to Exclusions – 3.3 Concrete light pole bases and concrete electrical pads. (by Concrete contractors)

5. See also enclosed LPA Bid Addendum No. 02 revisions to Plans and Specifications dated July 17, 2013.

Enclosed: (105) 8 ½” x 11” Sheets and (8) Revised Plan Sheets
**REQUEST FOR INFORMATION NO. P0001**

**Date Required By:** 7/17/2013

**RFI Date:** 6/27/2013

**Importance:**

---

**Orange Coast College - Interdisciplinary Complex**

2701 Fairview Rd.
Costa Mesa, CA 92626

**Contract No. PO329592**

Project No. 131344

Job Tel.:  
Job Fax:

---

**SUBMITTED TO:**  
Stephen Tiner  
LPA Inc.

5161 California Avenue, Suite 100
Irvine, CA 92617
Tel: 949-701-4126
Fax: 949-701-4326

**SUBMITTED BY:**  
Pamela Hermosillo

Sundt Construction, Inc (SD)

1660 Hotel Circle North, Suite 400
San Diego, CA 92108
Tel: 619-321-4827
Fax: 619-321-4901

---

**CC:**

**Company:**

**Contact:**

**Telephone / Fax:**

---

**DETAILS:**

**Subject:** Repairs to damaged utilities

**Discipline:** Civil

**Documents:**

**Drawings:** Yes

**IMPACT:**

**Cost:** Not Sure

**Schedule:** Not Sure

---

**INFORMATION REQUESTED:**

Exhibit U, Bid Package 4 states:

2.19 Repair existing piping damaged during excavation/backfill for new utilities, regardless of whether or not such lines are shown on record drawings, even if damage and work involves repair outside the Limits of Construction.

This is in direct conflict with Government Code Section 4215 as discussed in Article 37 of General Conditions. Please remove 2.19 or clarify the intent of said section.

---

**SUGGESTION:**

Revise Exhibit U, Bid Package 4 item 2.19 to read as follows:

2.19 Repair existing piping damaged during excavation/backfill for new utilities, if identified during utility mark-out and/or shown on record drawings, even if damage and work involves repair outside the Limits of Construction.

---

**RESPONSE:**

Answered by: Pamela Hermosillo  
Answered Date: 07/16/2013

---

**ATTENTION:**

Enclosed, and/or as shown above, is the Architect’s response to the above referenced Request for Information (RFI) drafted by Sundt Construction, Inc (SD) or one of its Subcontractors.

RF02v6.rpt
Detail 31 on C5.1, note 2 requires Site Utility contractor to "supply" the Simplex Motor Control panel for the sump pump. Where is the panel to be mounted & will the electrician package do the wiring? This pump is not indicated on E1.01.

**SUGGESTION:**

This panel should be supplied by site utility contractor and installed by electrical contractor.

**RESPONSE:** Sump Pump Control Panel added to Main Electrical Transformer Room 165 per plan note 14 on sheet E1.02 in upcoming Bid Addendum 02.
## EXHIBIT U - TRADE SPECIFIC INSTRUCTION - BID PACKAGE 04 - UNDERGROUND UTILITIES

### REQUESTED INFORMATION:

Section 2.6.5 refers to the "P" sheets for complete scope. What is it on the "P" Sheets we are to do?

### SUGGESTION:

Please see the Trade Specific Instructions. Some utilities are to be installed under this bid package to within 5 ft. of the building foundation penetration, or to 6" above finished floor. Civil drawings may not reflect this scope therefore plumbing drawings would need to be referenced for the designed continuation of these lines, in order to satisfy these bid instructions.

Answered by: Pamela Hermosillo  
Answered Date: 07/16/2013

### ATTENTION:

Enclosed, and/or as shown above, is the Architect’s response to the above referenced Request for Information (RFI) drafted by Sundt Construction, Inc (SD) or one of its Subcontractors.

Please review the response and determine if there is any cost or time impact by 7/30/2013.

If there is a time or cost impact, you must submit a change quotation immediately to Sundt Construction, Inc (SD) for approval. Do not proceed until you receive written approval from Sundt in regards to your change quotation! Failure to respond by this date signifies there is no adjustment to your subcontract terms in time and direct or indirect costs. If responding with a Change Order Request, please reference the RFI number on your itemized quotation.
REQUEST FOR INFORMATION NO. P0004
RFI Date: 6/27/2013
Date Required By: 7/17/2013
Importance:

Orange Coast College - Interdisciplinary Complex  
Project No. 131344  
Total Pages Sent: 1

2701 Fairview Rd.  
Costa Mesa, CA 92626

SUBMITTED TO:  SUBMITTED BY:
Stephen Tiner  Pamela Hermosillo
LPA Inc.  Sundt Construction, Inc (SD)
5161 California Avenue, Suite 100  1660 Hotel Circle North, Suite 400
Irvine, CA  92617  San Diego, CA  92108
Tel: 949-701-4126  Tel: 619-321-4827
Fax: 949-701-4326  Fax: 619-321-4901

DETAILS:  IMPACT:
Subject: Site Utilities Schedule Activities  Cost: Not Sure
Discipline: Civil  Schedule: Not Sure
Documents: Drawings: Yes

INFORMATION REQUESTED:
Section 04- Site Utilities of the schedule doesn't indicate any actual construction. Where is all the work on sheet C3.1 in the schedule?

SUGGESTION:
'Section 04-Site Utilities' is a subheading under 'Job Start-Up by Bid Package'. Please review the entire schedule, activities for utilities are reflected within, and reflect phased installations.

RESPONSE:
Answered by: Pamela Hermosillo
Answered Date:
INFORMATION REQUESTED:

Do the 18" x 18" & 12" x 12" catch basins require "heel proof" grates?

SUGGESTION:

9/C5.1 provides catch basin grate requirements. Heel proof is not a requirement.

RESPONSE:

Answered by: S. Tiner, LPA
Answered Date: 7/10/13

The term "heel proof" is not used in the CBC. Catch basin grates are specified with a 1/2 inch maximum openings per 09/C5.1 and are code compliant.

Per CBC 1124B.4 GRATINGS:

If gratings are located in walking surfaces, then they shall have spaces no greater than 1/2 inch (12.7 mm) wide in one direction (see Figure 11B-7E). If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel (see Figure 11B-7E).
REQUEST FOR INFORMATION NO. P0006

RFI Date: 6/27/2013
Date Required By: 7/17/2013
Importance:

Orange Coast College - Interdisciplinary Complex
2701 Fairview Rd.
Costa Mesa, CA 92626

Contract No. PO329592
Project No. 131344
Total Pages Sent: 1

SUBMITTED TO: Stephen Tiner
LPA Inc.
5161 California Avenue, Suite 100
Irvine, CA 92617
Tel: 949-701-4126
Fax: 949-701-4326

SUBMITTED BY: Pamela Hermosillo
Sundt Construction, Inc (SD)
1660 Hotel Circle North, Suite 400
San Diego, CA 92108
Tel: 619-321-4827
Fax: 619-321-4901

SUBMITTED TO:
SUBMITTED BY:

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<thead>
<tr>
<th>DETAILS:</th>
<th>IMPACT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject: OCIP Insurance</td>
<td>Cost: Not Sure</td>
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<tr>
<td>Discipline: Civil</td>
<td>Schedule: Not Sure</td>
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<tr>
<td>Documents:</td>
<td>Drawings: Yes</td>
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INFORMATION REQUESTED:

Article 73 of the General Conditions says "the owner may elect to implement OCIP." Are we to assume that is the case.

SUGGESTION:

RESPONSE:

See Section 10. in Special Conditions and the Owner Control Insurance Program (OCIP) - Contractual Provisions section of the bid documents which reflect Owner Control Insurance Program Requirements applicable to this project.

Answered by: Pamela Hermosillo  Answered Date: 07/10/2013

ATTENTION:
Enclosed, and/or as shown above, is the Architect's response to the above referenced Request for Information (RFI) drafted by Sundt Construction, Inc (SD) or one of its Subcontractors.

Please review the response and determine if there is any cost or time impact by 7/24/2013.

If there is a time or cost impact, you must submit a change quotation immediately to Sundt Construction, Inc (SD) for approval. Do not proceed until you receive written approval from Sundt in regards to your change quotation. Failure to respond by this date signifies there is no adjustment to your subcontract terms in time and direct or indirect costs. If responding with a Change Order Request, please reference the RFI number on your itemized quotation.

RFI-XI.rpt rev’d 1/6/12
REQUEST FOR INFORMATION NO. P0007

RFI Date: 6/27/2013
Date Required By: 7/17/2013
Importance:

Orange Coast College - Interdisciplinary Complex
2701 Fairview Rd.
Costa Mesa, CA 92626

Contract No. PO329592
Project No. 131344
Total Pages Sent: 1

SUBMITTED TO:
Stephen Tiner
LPA Inc.
5161 California Avenue, Suite 100
Irvine, CA 92617
Tel: 949-701-4126
Fax: 949-701-4326

SUBMITTED BY:
Pamela Hermosillo
Sundt Construction, Inc (SD)
1660 Hotel Circle North, Suite 400
San Diego, CA 92108
Tel: 619-321-4827
Fax: 619-321-4901

CC: Company Contact: Telephone / Fax

DETAILS:
Subject: Tel/Data Questions
Discipline: Electrical
Documents:

IMPACT:
Cost: Not Sure
Schedule: Not Sure
Drawings: Yes

INFORMATION REQUESTED:

1. Where are the wireless locations on the drawings?
2. On the Plans page E3.1.1 Lab 123 are we to provide the number of Cat 6 drops to match the seat count. As an example one row has (7) seats are we to provide (7) Cat 6 cables?
3. Please tell us what the standard drop is for OCC. Is it (4) Cat 6 cables based on the SCS4.01 detail 3? Also, on an open triangle it shows (4) Cat 6 cables and on the Plans E3.1.1 there is one symbol that has WP-A which we would imagine would get (1) Cat 6 cable. Then there is (1) open triangle in Lounge Workroom 120 that we would imagine would get (1) Cat 6 cable. Please clarify.
4. On the Plan page E3.1.2 Computing Center are we to provide (1) Cat 6 for every seat?
5. On the Plans page E3.2.1 Lab 202 are we to provide (1) Cat 6 for every seat?
6. On the Plans page SCS.01 talks about installing (3) OSP RG-11 cables and on the floor plans we don't see any TV outlets. Are we to provide the RG-11 cabling?
7. On the Plans page SCS.01 is IDF 1.2 the Server Room?
8. On the Plans page SCS.03-03 Sheet Note B has Leviton when it looks like the Campus Standard is Panduit.
9. On the Plans page SCS.01 Riser Diagram Riser Notes 2 has a 24-strand 50 micron OM3 and a 12-strand singlenode fiber from the MDF to each of the IDF's to be terminated with SC connectors and on the Plans EP-3 Installation Note 2 has a 12-strand 62.5 micron and 12-strand singlenode to be terminated with ST connectors. Which one is correct?

SUGGESTION:

RESPONSE:

See responses below.
1. See sheets SCS2.01 and SCS2.02 for WAP locations.
2. Yes. Per detail #1 on Sheet SCS4-01 and illustration example detail #5. Install (1) Category 6 cable per chair.
3. Install cables per details on sheet SCS4.01. All open triangles get (4) Category 6 (data) cables.
4. Yes.
5. Yes.
6. Yes. Also, correct there are no “TV” drops on the floorplans.
7. Yes. Room designations on sheet SCS1.01 correspond to enlarged floor plans on sheets SCS3.01, SCS3.02 and SCS3.03.
8. Reference to Leviton strain relief bar was removed on Addendum B - 5/20/2013. Make sure you have current drawings.
9. SCS1.01 note refers to LC connectors (Addendum B - 5/20/2013). Terminate INTER building fiber on ST connectors and INTRA building fiber on LC connectors per plans.
REQUEST FOR INFORMATION NO. P0008

RFI Date: 6/27/2013
Date Required By: 7/17/2013

Orange Coast College -Interdisciplinary Complex
2701 Fairview Rd.
Costa Mesa, CA 92626

Contract No. PO329592
Project No. 131344

SUBMITTED TO: Stephen Tiner
LPA Inc.
5161 California Avenue, Suite 100
Irvine, CA  92617
Tel: 949-701-4126
Fax: 949-701-4326

SUBMITTED BY: Pamela Hermosillo
Sundt Construction, Inc (SD)
1660 Hotel Circle North, Suite 400
San Diego, CA  92108
Tel: 619-321-4827
Fax: 619-321-4901

DETAILS:

Subject: Substitutions
Discipline: General
Documents: 

IMPACT:

Cost: Not Sure
Schedule: Not Sure
Drawings: Yes

INFORMATION REQUESTED:

Per specification 012500 Substitution Procedures section 1.03.B, a substitution request can be submitted as an attachment to the trade subcontractors bid documents. However, per Exhibit S section 2.9.2, substitution requests must be submitted during the bid period no later than 10 working days prior to bid date.

SUGGESTION:

The most stringent applies, substitution requests must be submitted during the bid period no later than 10 working days prior to bid date.

Answered by: Pamela Hermosillo
Answered Date: 07/10/2013

ATTENTION:

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Please review the response and determine if there is any cost or time impact by 7/24/2013.

If there is a time or cost impact, you must submit a change quotation immediately to Sundt Construction, Inc (SD) for approval. Do not proceed until you receive written approval from Sundt in regards to your change quotation. Failure to respond by this date signifies there is no adjustment to your subcontract terms in time and direct or indirect costs. If responding with a Change Order Request, please reference the RFI number on your itemized quotation.

RFI-XL.rpt rev'd 1/6/12
The Earthwork Specification 312300-3 section 1.05.B.3 says we need to provide survey for water, storm and sanitary sewer pipes. Underground work is not a part the Demo/Earthwork bid package scope. Please clarify if this bid package is to provide survey staking for other bid packages?

**SUGGESTION:**

Yes, Bid Package 03 should include this scope of work as outlined in specifications.

Answered by: Pamela Hermosillo
Answered Date: 07/17/2013

**ATTENTION:**

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Please review the response and determine if there is any cost or time impact by 7/31/2013.

If there is a time or cost impact, you must submit a change quotation immediately to Sundt Construction, Inc (SD) for approval. Do not proceed until you receive written approval from Sundt in regards to your change quotation! Failure to respond by this date signifies there is no adjustment to your subcontract terms in time and direct or indirect costs. If responding with a Change Order Request, please reference the RFI number on your itemized quotation.

RFI02v6.rpt
REQUEST FOR INFORMATION NO. P0010

RFI Date: 7/8/2013
Date Required By: 7/17/2013
Importance:

Orange Coast College - Interdisciplinary Complex
2701 Fairview Rd.
Costa Mesa, CA 92626

Contract No. PO329592
Project No. 131344
Total Pages Sent: 1

SUBMITTED TO: SUBMITTED BY:
Stephen Tiner Pamela Hermosillo
LPA Inc. Sundt Construction, Inc (SD)
5161 California Avenue, Suite 100 1660 Hotel Circle North, Suite 400
Irvine, CA 92617 San Diego, CA 92108
Tel: 949-701-4126 Tel: 619-321-4827
Fax: 949-701-4326 Fax: 619-321-4901

CC: Company: Contact: Telephone / Fax

DETAILS: IMPACT:
Subject: BP1 - 2.18 Site Trash Containers Cost: Not Sure
Discipline: General Schedule: Not Sure
Documents: Drawings: Yes

INFORMATION REQUESTED:
Please clarify: Trade Specific Inclusion- Bid Package #1 - section 2.18
Please provide container size and how often you need service.

SUGGESTION:

RESPONSE:
These trash cans are for general trash within the building and site areas for common use. Composite clean up crews and trades utilizing these cans will be responsible for consolidating the trash in these cans to the appropriate dumpsters on a daily basis as part of their progress cleaning per Specification 017413. Trash cans should be industrial strength 44 gallon plastic containers.

Answered by: Pamela Hermosillo
Answered Date: 07/10/2013

ATTENTION:
Enclosed, and/or as shown above, is the Architect’s response to the above referenced Request for Information (RFI) drafted by Sundt Construction, Inc (SD) or one of its Subcontractors.

Please review the response and determine if there is any cost or time impact by 7/24/2013.

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RFI-XL.rpt rev'd 1/6/12
REQUEST FOR INFORMATION NO. P0011

RFI Date: 7/8/2013
Date Required By: 7/17/2013
Importance:

Orange Coast College - Interdisciplinary Complex
2701 Fairview Rd.
Costa Mesa, CA 92626

Contract No. PO329592
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SUBMITTED TO:
Stephen Tiner  
LPA Inc.
5161 California Avenue, Suite 100
Irvine, CA 92617
Tel: 949-701-4126
Fax: 949-701-4326

SUBMITTED BY:
Pamela Hermosillo  
Sundt Construction, Inc (SD)
1660 Hotel Circle North, Suite 400
San Diego, CA 92108
Tel: 619-321-4827
Fax: 619-321-4901

CC:  Company
Contact:
Telephone / Fax

DETAILS:  IMPACT:

Subject:  Grading Plan/Earthwork Spec/Geotech  Cost:  Not Sure
Report
Discipline:  Civil  Schedule:  Not Sure
Documents:  Drawings:  Yes

INFORMATION REQUESTED:

There are two discrepancies between the Grading Plan, Geotechnical Investigation and the Earthwork Specifications that we need clarified.

1 - FILL MATERIAL

Geotechnical Investigation page 10, section 7.4.2 states "The existing fill and alluvial soils encountered are suitable for re-use as engineered fill ...".

Specification 312300-6, section 2.04.2.b states "Soils that have an expansion index greater than 20 should not be used within the upper 4 feet of finish building pad or within the upper 2 feet of finish hardscaping subgrade."

Due to the immense cost difference between these two specifications we need a clarification as to what will be required by the Soils Engineer in the field.

2 - OVER EXCAVATION

Grading Plan sheet C2.1 Over Excavation Notes 1 and 2 states "1. Areas to receive flatwork should be scarified 12 inches deep, moisture conditioned and compacted to 92 percent or more relative compaction.".  "2. Below the building footprint a minimum of 3' be excavated, blended and recompacted for foundation support.".

Geotechnical Investigation page 8, section 7.1.5 states "As a minimum it is recommended that the upper three feet of the existing site soils in the building footprint areas be excavated, blended and compacted for foundation/slab support.".  Section 7.1.8 states "Where new paving is being placed, it is

RFI-XL.rpt  rev'd 1/6/12
recommended that all existing fill and soft alluvial soils be removed and properly recompacted for paving support."

Specification 312300-10, section E.1 states "The proposed building pads shall be excavated to at least 3 feet below the lowest footing bottom or 5 feet below the existing site grade, whichever is greater.".

The Grading Plan and the Geotechnical Investigation requirement for the building footprint are both 3' deep. The Earthwork Specification requirement is 5' deep or 3' below footing (maybe even deeper than the 5' requirement). Due to the cost difference between these three specifications we need a clarification as to what will be required by the Soils Engineer in the field.

**SUGGESTION:**

Per the General Conditions Article 25, the soils investigation report is for information only, and is not a part of the agreement. Also, General Conditions Article 20 (d) outlines the order of precedence. The most stringent requirements shall prevail at no additional cost. In both of these instances the specification is most stringent.

**RESPONSE:**

Answered by: S. Tiner, LPA                                  Answered Date: 7/17/13

Refer to the attached updated specification Section 312300 being issued in Bid Addendum 02.
**REQUEST FOR INFORMATION NO. P0012**

**RFI Date:** 7/11/2013  
**Date Required By:** 7/17/2013

**Importance:**

<table>
<thead>
<tr>
<th>Orange Coast College -Interdisciplinary Complex</th>
<th>Contract No. PO329592</th>
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</table>
| 2701 Fairview Rd.  
Costa Mesa, CA 92626 | Project No. 131344  
Total Pages Sent: 1 |

**SUBMITTED TO:**  
Stephen Tiner  
LPA Inc.  
5161 California Avenue, Suite 100  
Irvine, CA 92617  
Tel: 949-701-4126  
Fax: 949-701-4326

**SUBMITTED BY:**  
Pamela Hermosillo  
Sundt Construction, Inc (SD)  
1660 Hotel Circle North, Suite 400  
San Diego, CA 92108  
Tel: 619-321-4827  
Fax: 619-321-4901

**CC:**  
Company  
Contact:  
Telephone / Fax

**DETAILS:**  
| Subject: | Lecture Rooms Doors/Windows 218-221 |
| Discipline: | Architectural |
| Documents: | |

**IMPACT:**  
| Cost: | Not Sure |
| Schedule: | Not Sure |
| Drawings: | Yes |

**INFORMATION REQUESTED:**

There is a large discrepancy between floor plans and elevations, for the room entry doors and corridor windows, at the Lecture Rooms 218-221.

Sheet A2.0.1 First Floor/Second Floor Key Plan  
Sheet A3.8.1 Ext. Classroom Corridor Elevations_Detail 03: West Elevation @ Classroom Corridor (unfolded)

Please clarify which scope is correctly drawn: Floor plan or Elevations.

**SUGGESTION:**

**RESPONSE:**

Answered by: S. Tiner, LPA  
Answered Date: 7/11/13

Please refer to A2.2.2 for the accurate floor plan configuration that matches the elevations on 03/A3.8.1. Key plan A2.0.1 will be updated to match A2.2.2 in a future Addendum.
REQUEST FOR INFORMATION NO. P0013

RFI Date: 7/16/2013
Date Required By: 7/23/2013

Importance:

Orange Coast College - Interdisciplinary Complex

2701 Fairview Rd.
Costa Mesa, CA 92626

Contract No. PO329592

Project No. 131344

Job Tel.:
Job Fax:

Total Pages Sent: 1

SUBMITTED TO: SUBMITTED BY:

Stephen Tiner Pamela Hermosillo
LPA Inc. Sundt Construction, Inc (SD)
5161 California Avenue, Suite 100 1660 Hotel Circle North, Suite 400
Irvine, CA 92617 San Diego, CA 92108
Tel: 949-701-4126 Tel: 619-321-4827
Fax: 949-701-4326 Fax: 619-321-4901

CC: Company: Contact: Telephone / Fax

DETAILS: IMPACT:

Subject: Extension to District wide Security Cost: Not Sure
Alarm/Access Control
Discipline: Electrical Schedule: Not Sure
Documents: Drawings: Yes

INFORMATION REQUESTED:

Per Specification 281000-2 1.03 D "The extension to the District wide Security Alarm/Access Control System shall be furnished and installed by the District approved manufacturer's representative, Western Power Systems, 930 N. Amelia Ave., San Dimas, CA 91773, (909) 394-0850, Fax (909) 394-0871, contact Clint Kearns, clint@spsems.com."

This contact has indicated that they will not be bidding this project. Please advise who will be allowed to perform this scope.

SUGGESTION:

RESPONSE: Refer to attached updated section 281000 being issued in Bid Addendum 02.

Answered by: S. Tiner, LPA Answered Date: 7/17/13
ADDENDUM NO. 02

July 17, 2013

TO THE CONTRACT DOCUMENTS FOR
ORANGE COAST COLLEGE
FOR THE
INTERDISCIPLINARY COMPLEX BUILDING
2701 Fairview Road, Costa Mesa, CA 92626

NOTICE TO BIDDERS

This Addendum forms a part of the Contract and modifies the original bidding documents dated April 24, 2013. It is intended that all work affected by the following modifications shall conform to related provisions and general conditions of the Contract of the original drawings and specifications. Modify the following items wherever appearing in any drawings or sections of the specifications. Acknowledge receipt of Addendum No. 02 in the space provided on the Bid Form. Failure to do so may subject to disqualification.

CHANGES TO SPECIFICATIONS

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<tr>
<th>ITEM NO.</th>
<th>Code</th>
<th>Description</th>
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<td>281000</td>
<td>Revised section.</td>
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<tr>
<td>2</td>
<td>283000</td>
<td>Revised paragraphs 1.02, 2.18, 3.04, 5.03, 6.02.</td>
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<tr>
<td>3</td>
<td>312300</td>
<td>Revised section.</td>
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CHANGES TO DRAWINGS

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<th>Code</th>
<th>Description</th>
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<tbody>
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<td>1</td>
<td>E1.02</td>
<td>Added sump pump control panel.</td>
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<td>2</td>
<td>E2.3.1</td>
<td>Deleted one row of lights at room 301.</td>
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<td>3</td>
<td>E3.1.2</td>
<td>Connected power for automatic doors to battery inverter.</td>
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<td>4</td>
<td>SE1.0.1</td>
<td>Added details for door type 5.</td>
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<td>5</td>
<td>SE2.1.1</td>
<td>Modified door detail callouts.</td>
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<tr>
<td></td>
<td></td>
<td>Added card readers to several doors.</td>
</tr>
<tr>
<td>6</td>
<td>SE2.1.2</td>
<td>Modified door detail callouts.</td>
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<td>Added card readers to several doors.</td>
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<td>Modified door detail callouts.</td>
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END OF ADDENDUM NO. 02
- SECTION 281000 -

ACCESS CONTROL SYSTEM

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. The work under this section includes all final design, all labor, material, equipment, supplies, labor, testing, and accessories required to furnish and install a complete Intrusion Alarm System as indicated on the drawings and as specified herein.

B. It is the intent of the Drawings and Specifications for the Contractor to provide and install a complete, fully operational, and tested system.

C. All miscellaneous system components including, but not limited to, cables, termination equipment, punch blocks, patch panels, backboards, and any other related items shall be furnished and installed complete under this section, such that the system shall perform all functions listed herein in compliance with all of the specified requirements.

D. The Access Control System shall include, but not limited to, the following subsystems / products:
   1. See Products Section.

1.02 RELATED WORK

A. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and sections of Divisions 1 and 26 of these specifications.

B. All applicable portions of Section 260000 shall apply to this section as though written herein completely.

C. Coordinate with Finished Hardware/Electrified Locking Hardware contractor for proper configuration of power supplies.

D. Reference Appendix A for campus SMS software requirements.
1.03 GENERAL REQUIREMENTS

A. The contractor shall hold a current State of California C-7, and C10 Low-Voltage licenses, shall have completed at least 20 projects of equal scope, shall have been in business of furnishing and installing systems of this scope and magnitude for at least five years, and capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.

B. The contractor shall hold all other licenses required by the legally constituted authorities having jurisdiction over the work.

C. All work shall be performed under the supervision of a company accredited by the basic equipment manufacturer and such accreditation must be presented.

D. The installing contractor shall be a factory authorized distributor and warrantee station for the brand of equipment offered and shall maintain a fully equipped service organization capable of furnishing adequate repair service to the equipment. The installing contractor shall maintain a spare set of all major parts for the system at all times. All circuit boards, amplifiers and control sub systems shall be 100% backed up with stock at contractors shop.

E. All of the equipment in this specification shall be furnished and installed by the Authorized Factory Distributor of the equipment. The Contractor shall furnish a letter from the manufacturer of all major equipment, which certifies that the installing contractor is the Authorized Distributor and that the equipment has been installed according to factory intended practices. The Contractor shall also furnish a written guarantee from the manufacturer that they will have a service representative assigned to this area for the life of the equipment.

F. All communication systems supplied shall be listed by Underwriter's Laboratories under UL Standard 1459. A copy of the UL listing card for the proposed system shall be included with the contractor's submittal.

G. All of the equipment in this specification shall be furnished and installed by the Authorized Factory Distributor of the equipment with the most current software package available at the time of installation. At the time of Owner Acceptance of the installation, all equipment shall include any and all updated software revisions. In addition, when the software is available in disk format, a backup copy of the most up to date revision, in disk format, shall be handed to the Owner at the completion of the project.

H. The contractor shall pay all charges (including travel, lodging, meals, etc...) required to provide factory certification, equal to that of a Factory Authorized Distributor of the substituted item, for two (2) selected Owners representatives. This training shall occur at the primary factory of the substituted item in question and shall allow
the selected Owners representatives to provide any and all Factory / Manufacturer Approved repairs, services, software upgrades, etc... without affecting any available or applicable Manufacturer Warranties.

1.04 QUALITY ASSURANCE

A. In order to maintain a high degree of quality assurance, the Contractor shall, without exception, use the parts and supplies as specified on the drawings and in this specification.

B. For any proposed product substitution or when the Contractor intends to include an “or equal” product in the bid pricing, provide a substitution request submittal to the Owner’s Project Manager for review no later than fifteen (15) calendar days prior to Bid submittal. This report shall include:
   1. Description of how the proposed product(s) will impact meeting the project completion date, indicate item(s) with lead times and expected delivery date(s).
   2. Itemized cost comparisons between the proposed product(s) and the listed product(s).
   3. Detailed technical analysis of the electrical and mechanical specification differences between the proposed product(s) and the listed product(s).
   4. ETL “Verified” or UL “Verified” test lab documentation for the proposed product(s), component(s) and assemblies.
   5. Proposed product identification, manufacturer literature (specifications and cut sheets).
   6. Name, address and contact information of the proposed product(s) manufacturer’s local representative.
   7. Sample proposed product(s) manufacturer’s warranty.

C. The Owner’s Design Team/Project Manager must approve any proposed product(s) substitution item in writing. The Owner’s Design Team/Project Manager reserves the right to require a complete sample of any proposed product(s) and may request a sample tested by an independent testing consultant to prove equality. The decision of the Owner’s Design Team/Project Manager regarding equality of proposed product(s) items will be final.

D. If a proposed product(s) is given final acceptance by the Owner’s Project Manager, the Contractor shall reimburse the Owner’s Design Team/Project Manager for the costs to review the proposed product(s) substitution(s), and for any additional engineering charges, and shall pay all charges of other trades resulting from this product(s) use, at no cost to the Owner.

E. It is a mandatory requirement that a single Contractor perform the work described in this specification.

1.05 SUBMITTAL AND MANUAL
A. Comply with all requirements of the General Conditions, Supplementary Conditions and applicable sections of Divisions 1 and 16 of these specifications.

B. Additional requirements of this section are:
   1. Within twenty (20) calendar days after the date of award of the Contract, the Contractor shall submit required copies of the complete submission to the Architect for review.
   2. The submission shall be formatted per Division 1 section 013300.

C. Failure to comply with all of the requirements listed above will result in the rejection of the entire submittal package.

D. The Contractor shall provide required copies of an "Operating and Servicing Manual" for the system. The manuals shall be formatted per Division 1 section 017839.

1.06 GENERAL SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY

A. Prior to Owner acceptance, the contractor shall provide to Owner, a manufacturers product and performance warranty. This will require a submittal of the required pre-job certification registration forms as well as the required project closing information. The Owner will only acknowledge acceptance upon submittal of a valid manufacturers warranty.

B. The warranty shall commence from the date of final written acceptance by the Owner.

C. All conditions for obtaining the manufacturers warranty shall be the sole responsibility of the contractor.

D. The contractor shall maintain a competent service organization and shall, if requested, submit a service maintenance agreement to the owner after the end of the guarantee period.

E. A typewritten notice shall be posted at the equipment rack that shall indicate the firm, address and telephone number to call when service is necessary. The notice shall be mounted in a neatly finished metal frame with a clear plastic window and securely attached to the inside of the door.

1.07 SPECIFIC SYSTEM PRODUCT, INSTALLATION AND OVERALL SYSTEM WARRANTY

A. The entire system shall be warranted free of mechanical or electrical defects for a period of three (3) years after final acceptance of the installation. Any material showing mechanical or electrical defects shall be replaced promptly at no expense to the Owner.
PART 2 – SYSTEM EQUIPMENT

2.01 Security Management System (SMS)

A. See Appendix A – Security Management System (SMS)

2.02 COMPONENTS

The Access Control System shall provide the necessary hardware to monitor alarms and manage access granted/denied decisions. The system shall include the following components:

A. Controller
   1. Honeywell STAR II Controller with MIRO Options
   2. The following communication protocols shall be supported:
      a. Wiegand Interface
      b. RS485 Host: Phoenix type
      c. TCP/IP at speeds of up to 100 Mbps.
   3. Each input point shall be individually programmable for 2-, 3-, or 4-state supervision and shall incorporate extensive transient voltage protection on the board. Each input point shall differentiate between Normal, Alarm, Short (tamper), and/or Open (trouble) conditions. Systems that require an additional input point to produce 4-state alarm reporting are unacceptable.
   4. Each output point shall be a Form C type relay with outputs rated at 1 amp at 24VDC each with its own individual status indicator LED and shall incorporate extensive transient voltage protection on the board.
   5. The Controller power supply shall be provided with LED indicators for normal operating condition and loss of AC and/or DC output and stand-by battery supplying power. Battery leads, built in charger for sealed lead acid or gel type battery and automatic switchover to stand-by battery if AC fails are to be provided as standard.
   6. The Controllers must utilize an advanced auto-recognition and auto-configuration mode for automatically detecting, programming and downloading required data to each module. Auto-recognition and configuration information shall include: communication type, Module type, address, baud rate, memory size, and all required operational data. Systems that require manual entry of module configuration and data shall be unacceptable.
   7. The Controllers shall incorporate FLASH memory technology for remote upgrades to all module firmware. Systems that require field technicians to upgrade by replacing EPROMs are unacceptable. Firmware must be capable of being downloaded to all IMs simultaneously. Systems that allow only individual downloading of firmware to field devices are not acceptable.
   8. Up to (8) doors per Controller
   9. Each Controller shall be capable of storing over 100,000 card records locally.
10. Buffer capacities shall be user-definable on a per module basis, dynamically adjusting the number of alarms, transactions and
commands stored in memory while waiting to be transferred to the SMS. Systems using either a static allocation of this memory or a non-user selectable dynamic method are not acceptable.

11. All communication between the module and the SMS shall be supervised and allow user-defined alarm generation in the event of communication failure. The module shall buffer all activity that occurs during a loss of communication. Once re-established, the module will automatically upload all buffered activity, alarm and command data to the SMS.

12. In the event that a module’s data tables are damaged or destroyed, the module shall automatically request a download of all necessary data, without requiring any operator intervention.

13. Each Controller shall contain rechargeable batteries which will retain the on-board data for at least two months if there is no external power source.

14. Upon loss of AC power, each Controller shall have a battery backup that provides for 8 to 12 hours of continuous operation. [It shall be possible to generate and report an alarm in the event of loss of AC or low battery conditions.]

C. Readers

Mullion mounted reader shall be Honeywell OmniClass OM30BHON. Single gang switchplate mounted readers shall be OmniClass OM40BHON. Switchplate mounted readers with keypad shall be OmniClass OM55BHON.

Clock& Data and Wiegand type reader protocols may be mixed in the system. However, they may not be mixed on a single controller.

D. Inputs

The system shall support any industry-standard dry contact type input devices including, but not limited to, magnetic door contact switches, request to exit devices and tamper switches.

E. Output Relays

The system shall support any industry-standard output devices including, but not limited to, electric door locks, annunciators and area lighting. Output relay contacts shall be Form C type and rated at 1A, 24VDC.

H. Security contractor to furnish and install all door positions switches/contacts as required and as specified below.

Non-rated hollow metal and storefront doors: Sentrol #1076C-W series shall be recessed in top of door and within doorframe.

Non-rated wood faced doors: Sentrol #1277-W series shall be recessed in top of door and within doorframe.

Fire rated hollow metal and storefront doors: Sentrol #1078CW series, UL listed for use within fire doors (3-hr rating) shall be recessed in top of door and within doorframe.
Fire rated wood door with hollow metal frame: Sentrol #1078CW series with Sentrol Model 1835 Mini-max Wide Gap magnet, UL listed for use within fire doors (3-hr rating) shall be recessed in top of door and within doorframe.

Any door type used on the project and not listed above shall be provided with the appropriate recessed Sentrol sensor for that application.

I. Power supplies for alarm devices and electrified locks shall supply 125% of required load of both locks and devices and be Altronix AL400ULX, quantity as required. Power supplies shall be equipped with 7ah 12V backup batteries, as required for up to 8 hours of operation in case of power failure.

M. Provide and connect RJ-31X jacks for both access control and security systems and connect to 110 connection block pairs as directed by the Owner.

O. Provide 100 programmable PVC ID cards.

P. Provide (1) 2-sided card printer with magnetic stripe encoder and laminator (Honeywell Tango® PBVP35DM with Sicura® Laminator).

Q. It is the responsibility of the bidder to insure that the proposed product meets or exceeds every standard set forth in these specifications and the equipment's technical data sheets.

R. The functions and features specified are vital to the operation of this facility. Therefore, inclusion of a component's manufacturer in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

S. All basic electronic equipment (with exception of cable, and field devices) specified herein shall be produced by a single manufacturer of established reputation and experience who shall have produced similar apparatus for at least five years and shall be able to refer to similar installations rendering satisfactory service.

PART 3 – EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. The wiring of the system shall be executed in accordance with the drawings and the equipment manufacturer's wiring diagrams. Should any variations in these requirements occur, the contractor shall notify the architect before making any changes. It shall be the responsibility of the factory-authorized distributor of the approved equipment to install the equipment and guarantee the system to operate as per plans and specifications.
B. Furnish all conduit, junction boxes, conductors, equipment plugs, terminal strips, etc., and labor to install a complete and operable system.

C. The cables within the rack or cabinets shall be carefully cabled and laced with Velcro. All cables shall be numbered for identification.

D. Splices of conductors in underground pull boxes are not permitted.

E. The labor employed by the contractor shall be regularly employed in the installation and repair of communication systems and shall be acceptable to the owner and architect to engage in the installation and service of this system.

F. The contractor shall thoroughly clean all equipment and materials. All exposed parts of the equipment, cabinets, and other equipment shall be left in a clean condition, unblemished and free of all dirt, dust, smudges, spots, fingerprints, etc., The contractor shall remove all debris and rubbish occasioned by the electronic systems work from the site. The contractor shall thoroughly clean all buildings of any dirt, debris, rubbish, marks, etc., Caused by the performance of this work.

G. The system must meet all local and other prevailing codes.

H. All cabling installations shall be performed by qualified technicians.

I. All cabling shall up to 1,000’ be splice free. Any cable requiring field splices must be secured in a lockable NEMA4 (indoor), or NEMA 3 (outdoor) enclosure.

J. In order to ensure the least amount of cable untwisting, it is required that all cables shall be stripped using a special tool.

K. The use of lubricants (i.e. Yellow 77) to facilitate the installation of cables in conduits is highly discouraged. If such a lubricant must be used, the contractor shall verify the acceptability of the lubricant to be used with the cable manufacturer, prior to using such a lubricant.

L. Under no circumstance are "channel locks" or other pliers to be used.

M. All cable shall be run in conduit.

N. All firewalls penetrated by security cabling shall be sealed by use a non-permanent fire blanket or other method in compliance with the current edition of National Fire Protection Association (NFPA) and the National Electric Code (NEC) or other prevailing code and must be a system listed by Underwriter’s Laboratory (U.L.). The contractor must not use concrete or other non-removable substance for fire stopping on cable trays, raceways or conduits. Contractors who use this method will be required to replace all cables affected and provide the original specified access to each effected area.
O. Equipment racks shall be bolted to the floor by the contractor once the Owner determines the exact location for each rack. The earthquake mounting brackets that come with each relay rack kit shall be screwed to studs, not drywall. All equipment shall be serviceable in the racks final location – the need to unbolt racking equipment to access or service equipment is not acceptable.

3.02 SPECIFIC SYSTEM INSTALLATION REQUIREMENTS

A. The installer shall, upon completion of the system installation, adjust all controls, etc., to provide a system operating at maximum capability.

B. Submit block diagram and shop drawing of equipment.

C. The system shall be programmed to annunciate, in alphanumeric format, the device type and device location (in room name format) for all alarm, trouble, service, and faulted conditions.

3.03 GENERAL TESTING REQUIREMENTS

A. Provide all instruments for testing and demonstrating in the presence of the owner's inspector that the frequency response is as stated in the factory data sheets. Check all circuits and wiring to verify they are free of shorts and grounds.

3.04 SPECIFIC SYSTEM TESTING AND VERIFICATION REQUIREMENTS

A. System shall be complete and properly operating prior to calling for the test. The inspector, contractor and engineer shall walk test system at District's option and contractor shall make minor satisfactory adjustments to the system in the presence of the inspector. Contractor shall coordinate the time of test with the City's inspector. This test shall be performed during a time when there are no other persons on the site.

B. Tests:
   1. Notify architect and owners representative in writing, in advance of testing, at least ten (10) working days in advance of testing to prevent delays in construction schedules.
   2. Test all systems and place in proper and specified working order prior to demonstration of the system.
   3. Test system grounds to demonstrate that the ground resistance does not exceed the requirements of the Transient Voltage Surge Suppression (TVSS) or the National Electric Codes (NEC).
   4. Perform tests as required by authorities having jurisdiction over the site.
   5. Testing shall be in the presence of the owner's representative, contractor, architect, construction manager and representatives of the authorities having jurisdiction.
C. Verification of Performance:

1. Prior to acceptance of the work, the security system integrator/installer shall demonstrate to the owner, contractor, architect, construction manager, and representatives of the authorities having jurisdiction, all subsystems, features and functions of the system, and shall instruct the owner in the proper operation and event sequences of the system.

2. Test each system and subsystem. The demonstration is to consist of not less than the following:
   a. Designate actual location of each component of a system or subsystem and demonstrate its function and its relationship to other components within the system.
   b. Test the system and subsystems operations by actual Start-Stop/On-Off, Open/Closing, Arming/Disarming cycling, showing how to work controls, how to reset devices and how to conduct emergency operating/operations procedures.
   c. Test communication, signaling and intrusion detection equipment/devices by actual operation of such devices.

3. Systems to be tested are to include, but are not limited to the following:
   a. UPS or battery power and distribution system for standby operation during primary power failure
   b. Motion detection equipment and access control panels
   c. Door monitoring system
   d. Access control system
   e. Situation/panic alarms
   f. ID Badging system (if installed)
   g. CCTV integration
   h. Data Import utility (if installed)
   i. ASCII interface

4. Furnish the necessary trained personnel to perform the testing and provide instructions. Allow 1 week of time for performing the prescribed testing.

5. Arrange with the owners designated representative the date and times for performing the testing. The owner will select date and time for demonstration and test.

6. The contractor and a factory-trained technical representative shall test the completed system for proper operation. Testing of major equipment shall be done in accordance with manufacturer’s instructions and the contractor’s documented, and approved testing procedures. All equipment and power shall be operated and checked to ensure that operation conforms to the contractor’s elementary diagrams, wiring diagrams, and specifications. The system shall be demonstrated to perform all the functions specified. Any system, equipment or wiring failures discovered during this test shall be repaired or replaced before scheduling the final test. All failures discovered during this test shall be reported to the construction manager/architect in writing. The report shall state the reason for the failure and the corrective action taken.

7. The system shall be tested for final acceptance in the presence of the construction manager’s and owner’s representative, architect’s representative and contractor’s representative. The
contractor shall record and submit the test results to the construction manager and owner's representatives.

8. Upon successful completion of all final tests and before formal system acceptance, the contractor’s representative and security system integrator/installer shall each author and sign a letter confirming the successful completion of the testing. Two (2) copies of each letter shall be forwarded to the owner’s representative and the architect’s representative. One copy of the test date shall be forwarded to the architect’s representative.

9. Test equipment: Provide two portable radio transceivers to be used when walk testing the security detection system. The transceivers shall be capable of communication throughout the entire site.

3.05 FINAL ACCEPTANCE

A. The Owner or Owner’s representative may visit the site during the installation of the system to ensure that correct installation practices are being followed.

B. The Owner or Owner’s representative will conduct a final job review once the contractor has finished the job. This review will take place within one week after the contractor notifies the owner.

C. Two copies of all certification data and drawings for all identifications shall be provided to the Owner before the owner's review.

D. The Owner or Owner's representative will review the installation and certification data prior to the system acceptance.

E. The Owner or Owner's representative may test some of the systems features to ensure that the certification data is correct. If a substantial discrepancy is found, the Owner reserves the right to have an independent consultant perform a certification of the entire system. If such a procedure is undertaken, the cost of the testing will be billed back to the contractor.

F. In the event that repairs or adjustments are necessary, the contractor shall make these repairs at his own expense. All repairs shall be completed within 10 days from the time they are discovered.

G. The contractor shall provide not less than three (3) hours for site instruction of personnel in the operation and maintenance of the installed systems. This instruction time shall be divided as directed by the Owner.

H. The contractor shall hand to the owner a copy of any applicable installation specific software configurations in disk format.

I. The contractor shall provide formal owner training at the new facility consisting of a one (1) hour class for 15 people. The training shall cover use of security and alarm systems including such items as;
alarm zone arming/de-arming, false alarm response procedures, programming, and local alarm sounder silencing.

END OF SECTION
- Appendix A -

Security Monitoring System (SMS)

General Specification

System Architecture

General – Basis of Design

It is the main purpose of this specification to state general and detail requirements of the Security Management System (SMS). The SMS shall be part of a global Facility Management System (FMS) with the capability of covering other management functions such as HVAC, Safety, Asset Localization, Digital video, etc. The SMS will use a Client Server architecture based around a modular PC network, utilizing industry standard operating systems, networks and protocols. The basis for design of this specification is the Honeywell Enterprise Building Integrator (EBI) Rev 310, integrated with Honeywell TemaLine Access Control and Digital Video Manager Rev 200.

Acceptable Bidders Are:

- Honeywell (Branch Only)
- Invensys
- Siemens

The first section of this specification details the architecture and the main functions of the SMS that shall be applicable to all management systems of the FMS.

Main application areas covered by the SMS shall include:

- Access Control (including Visitors management, Reception management, Guard Tour management, Risky Area Access Control management).
- Time & Attendance (including Canteen management and interface to SAP/3).
- Security Management for intruder detection.
- Digital Video recording and display.
- Asset Control.
- Ancillary Control Systems (elevators, etc.).

The general architecture will support distributed servers in a Distributed Server Architecture (DSA) to allow multiple and independent systems to communicate together for data exchange in order to provide an easy management and avoid duplicate engineering.

The system shall allow the distribution of system functions such as monitoring and control and graphical user interface across the entire network to allow maximum flexibility and performance.

The architecture shall include support of various Local and Wide Area Networks using standard hardware and software to link nodes into a single integrated system. The network protocol used shall be industry standard TCP/IP. The system shall also support remote configuration and operation using standard dial-up modems and other Wide Area Network techniques.
Access Control and Time & Attendance will be based upon personal identification of employees and visitors using personal identification cards supplemented by additional personal data (PIN, biometric, etc.) should the need arise.

Selection of technology for personal ID cards shall not be limited. Different technologies must be available and switching to a more secure technology shall be implemented, should the need arise, with a minimum of hardware/software implementation and reduced impact on database and cardholders.

The architecture shall provide three levels of processing and control:

- **Supervisory level**: The level of presentation (status and alarms), human-system interaction (application parameters, system configuration, system control) and historical data management (events, values and transits).

- **Peripheral level**: The level of decision and feedback; to be composed of controller devices specialized in the managing of specific applications. Each controller device shall have its own database and shall be able to communicate to each other in a peer-to-peer way allowing the interactions inter/intra subsystems at the peripheral level without affecting or being affected by the status or availability of the supervision level.

- **Field level**: The level where the system interacts with the “external world” (tenants, employees, visitors, gates, detectors, ...). To be composed of readers, displays, keypads, actuators, digital sensors, etc.

The SMS shall allow communications with a wide variety of proprietary and third party control devices utilizing off the shelf driver packages. It shall support LON®, BACnet®, Modbus® and OPC standards for open system communications. Proprietary field level equipment shall communicate using Echelon LON®.

High availability configurations shall be integrated in the system design in order to ensure operation in critical environments. Redundancy shall apply to both servers and communication links.

**HOT BACKUP Server**

This facility shall enable the system server to operate in high availability architecture with no single point of failure. To achieve this, the facility must provide specific features.

The system must be capable of running a pair of similarly configured computers in a hot backup configuration where at any point in time, one is acting as Primary computer and the other as the Hot Backup computer. An on-line database duplication mechanism must be supported in order to ensure perfect synchronization of recorded data.

The database duplication must be performed on a per-transaction basis for two reasons:

- To ensure that the duplicated Backup database is consistent at all times with the Primary database.
- To avoid unnecessary overloading of field devices and network communications caused by duplicate polling.

It must be possible to remove one of the redundant systems for maintenance without interrupting operation, and upon its reinstatement, re-synchronize the databases, again without interruption to system operation. A method of manually initiating a fail over must be provided to assist maintenance operations to a specific computer.
Failure of either system must be announced via the standard alarming features of the system. To accommodate recoverable faults, the failed system must be able to reboot automatically after non-fatal errors and automatically assume the role of acting as Hot Backup. Fail over switching from the failed Primary computer to the Hot Backup unit shall be accomplished in a totally bump less mode.

Duplicating interfaces of field devices (such as card readers, I/O interfaces, etc.) to two different and independent systems will not be accepted as a valid solution.

**Communications Redundancy**

The system must be capable of supporting fully duplicated communications links to Operator Workstations and Peripheral Level Controllers. At least redundancy based upon a main network (Ethernet LAN) and a duplicated network (PSTN links) shall be provided in order to overcome the effects of communication failures.

Operator Workstations and Peripheral Level Controllers must be capable of switching automatically between the two server computers in the event of a fail over (if server system is backed up) and switch to PSTN links automatically in the event of an Ethernet failure.

Using PSTN the connection shall be established by any networked element (Operator Workstation, Peripheral Level Controller, Supervisory System) depending upon specific needs.

**Distributed System Servers**

A method shall be provided for monitoring and control based upon several servers connected to the same Local Area Network or Wide Area Network. The need of a distributed server configuration can arise from servers devoted to remote sites of the same organization, attended by the same cardholders. Specifically, real-time and history data in any server must be available to any other server for monitoring and control. Features supported must include:

- **Access**: Access to data shall be global, such that users at Operator Workstations on one server can access data on any other server. It shall not be necessary to configure more than a single entry in the data base for an employee or a visitor or an alarm signal, regardless of the number of servers accessing the data.

- **Alarms/Messages**: Operators and workstations at any server must be able to see alarms from any other server. It shall not be necessary to configure alarms more than once, regardless of the number of servers accessing the data.

- **Cardholders**: All cardholders in the system shall be distributed to all servers so that cardholders need only be enrolled into one server and will automatically then have access to all other servers if desired. Access requirements for all servers will be set up at the time of enrolment in one server.

- **Graphics/Reports/Applications**: All graphics, reports, and applications at a server shall have the same distributed access to data on other servers as described above for operators and workstations. It shall not be necessary to configure more than one point for each data value or signal, regardless of the number of servers accessing the data.

The engineering effort to configure points in a distributed server system shall be the same as for a single server system.

Connections between servers can be made through local Ethernet connections, the plant’s LAN, or the corporate WAN. Connections must be optionally redundant. Both redundant and non-redundant servers must be supported, and the same engineering effort (i.e., none) must be required to connect both kinds of servers.
Network
The Server Computer and Operator Workstation hardware shall be capable of interfacing to an IEEE 802.3 Standard Local Area Network (LAN).

The LAN shall use standard network cables. Acceptable cable types are:

- Thin Ethernet
- Thick Ethernet
- Fiber Optics

PERIPHERAL LEVEL CONTROLLERS
Peripheral Level Controllers shall be of the "intelligent" type, microprocessor based, with native interface to the same Local Area Network connecting Server Computer(s) and Operator Workstation(s).

For remotely controlled premises, the Peripheral Level Controllers shall have standard communication interfaces to the corporate WAN or to the PSTN.

Peripheral Level Controllers shall manage the Field Level through readers, displays, keypad, actuators, digital sensors, etc. Connection of Peripheral Level Controllers to Field Level devices shall be based on Echelon LON®, either in a free topology configuration or in a bus configuration. Such devices shall be fully managed by the relevant Peripheral Level Controller, without the need to access any Server(s) resources.

Communication between Peripheral Level Controllers shall be based upon peer-to-peer communication and be fully independent from the Server(s) resources. Only switches, routers and hubs are acceptable. Any solution based upon a centralized gateway function embedded in the server(s) shall not be acceptable.

DOWNLOADING
All Peripheral Level Controllers shall have the facility to download software, firmware and data updates. The download shall be possible from a central location.

Any downloading facility that requires field operation or specialized engineering skills or physically handling each Peripheral Level Controllers shall not be acceptable.

Internationalization
The Operator Interface shall be fully translatable into the local language. This includes Oriental languages.

The process of translating a system shall be done uniquely by editing messages from English to the local language.

Switching from the native English language to the personalized translated language must be straightforward (setting an option).

Up to three different languages (plus English) must be supported on all units of the Supervisory Level. At the Peripheral Level at least a single selectable language must be supported. Peripheral Level devices are acceptable even if they do not support Oriental languages.
HARDWARE

Server Computer
Each system server computer shall comprise of the following minimum hardware:

- A Pentium® IV or Xeon® running at a minimum of 3 GHz.
- Min 1 GB of RAM (2 GB if redundant configuration is selected).
- A Super VGA graphics card capable of 1024x768 pixel resolution and 65K colors, non-interlaced (70 Hz or better vertical refresh rate).
- A 102 key standard keyboard.
- Mouse pointing device.
- A 40 GB Hard disk drive.
- A CD-ROM/DVD reader/burner for system loading and backup.
- An Adapter for Ethernet Networking compatible with TCP/IP network protocols.
- Microsoft SQL Server® 2003 operating system.

Operator Workstation
The system shall be capable of supporting up to 40 simultaneous Operator Workstation connections using a TCP/IP Local Area Network (LAN) subject to hardware capacity on the server computer. The Network connection must allow an unlimited number of casual users access to the 40 connections on a first-come-first-served basis.

The Operator Workstation shall comprise the following minimum hardware:

- A Pentium® IV running at a minimum of 2 GHz.
- Min 1 GB RAM.
- A Super VGA graphics card capable of 1024x768 pixel resolution and 65K colors, non-interlaced (70 Hz or better vertical refresh rate).
- A 20 GB Hard disk drive.
- A 102 key standard keyboard
- Mouse pointing device.
- An Adapter for Ethernet Networking compatible with TCP/IP network protocols.
- Microsoft Windows® XP Pro SP2 operating system.

Printers
Printers shall be available for printing either reports or online alarms. Report printers shall be any Windows compatible printer such as a laser or ink-jet printer. Alarm printers shall be 132 column dot-matrix printers to allow alarms to be printed in real time as they occur.

Communications
The SMS system shall provide communications over a variety of physical media topologies as follows:

- Ethernet
- RS-232
- RS-422

Peripheral Level Controllers for Security, Access Control and Time & Attendance, Digital Video and Asset Control shall be interfaced using Ethernet (LAN or WAN) only, in order to guarantee maximum throughput and standardization. Digital Video requires high speed Ethernet, either at 100 or 1000 Mbps.

RS-232 and RS-422 will be used to interface existing third party equipment only, should the need arise.
Given the sufficient level of system privilege, it shall be possible to view, manipulate and analyze all data in the system from any Operator Workstation in the system, including those operating remotely via dial-up modem links.

Once a Peripheral Level Controller is configured and placed in service, the system shall automatically begin background diagnostic scanning of the device to ensure that communications are monitored independently of any other system related polling.

The system shall perform checks on data integrity of all data acquired from the device. If an invalid or time out response is received, the data shall be ignored and the system will record the transaction as an error. Statistics shall be kept and displayed by the system on errors encountered in communication by means of a communications barometer. The barometer shall increment for every failed call and decrement for each successful call. In addition, the system shall alarm separate marginal and failure conditions based on user-defined limits to advise the operator of the device and link that has failed. Communications statistics shall be displayed as standard on the system and shall also be available as part of the reporting system.

**System Software**

The SMS system server shall be based around the Microsoft Windows® 32 bit multi-tasking environment, Windows® 2003 Server. The system shall be a true 32-bit application to take advantage of Microsoft Windows® 2003’s enabling technologies. Any 16-bit system running on the Microsoft platform (such as those originally based on MS-DOS and Microsoft Windows® 3.x) shall not be acceptable.

Standard services supported by the server computer operating system will include the following:

- Multi-tasking Multi-user support
- TCP/IP Network Support
- Graphic Display Building Editor
- Data Base services (Microsoft SQL Server® 2000 or higher)
- Application software

Software at the Operator Workstation shall comprise of:

- Windows® XP Pro SP2
- TCP/IP Networking
- Graphic Display Building Editor
- Application software

The networking software shall use the industry standard TCP/IP LAN protocol.

The server computer or an alternative network connected computer shall be capable of acting as a File Server for graphic displays, cardholder photo images, recorded video images, etc. All LAN connected Operator Workstations shall be able to view custom displays and photo/video images from the server computer.

All system peripherals shall be capable of being connected to the server computer via the LAN.
OPERATOR INTERFACE

General
The operator interface provided by the system shall allow for efficient communication of operational data and abnormal conditions. It shall provide a consistent framework for viewing of information. Critical areas (such as alarm icons) shall be visible at all times. A predefined area on the screen shall provide operator messaging, and this area shall also be visible at all times. A set of standard displays for configuration, and navigation around the system are to be provided with every system and shall not require any additional engineering. The system shall also provide an unlimited number of custom (facility specific) displays created to meet the needs of the specific facility.

The operator interface software shall be capable of running in the Windows® XP Pro environment. The operator interface shall be interactive and totally graphics and/or icon based. Graphics shall be capable of supporting at least 65,000 colors at a minimum 1024 x 768 pixel resolution. The operator interface shall also be compatible with Windows Terminal Services allowing remote PDA devices to be used as mobile operator interfaces.

The operator interface shall employ standard Windowing conventions so as to reduce required Operator training. In particular, standard tool bar icons and drop-down menus shall be available on all standard and custom displays to allow easy access to common functions. The tool bar and pull down menus shall be fully configurable. Similarly, such functions shall also be available via a standard set of Function-Key based pushbuttons without requiring configuration.

The operator interface shall support the ability to “full screen lock” the window so users cannot access other applications. If “full screen lock” is not enabled, support for copy and paste facilities shall be provided between the operator window and other Microsoft® applications.

Web Browser Operator Interface
At least advanced registration of visitors shall be available through a standard web browser. From a standard browser such as Microsoft’s Internet Explorer®, any employee of the organization shall be enabled to register the visitors he is awaiting for in order to speed up operations at the reception.

The browser interface shall provide security authentication in order to ensure that access is limited to authorized personnel only.

Operator Interface Connection
The operator interface shall be flexible in its connection to the system server(s). An Ethernet LAN connection shall be used between the Server and the Operator Workstations. The operator interface shall provide standard dial-up modem support using Microsoft Remote Access Service (RAS).

Using other packages such as Microsoft Terminal to make the modem connection shall not be acceptable.

The operator interface LAN connection shall also be flexible to support both permanent and casual access to the system server either through the standard operator interface or through a browser (for limited functions, such as visitors’ registration).

The operator interface shall support connection over poor quality, low bandwidth channels. This support shall include radio links, microwave and VSAT communications.

To minimize bandwidth on both serial and LAN links, it shall be possible for the operator interface to only require updated dynamic information from the server. All static information (such as display backgrounds) shall be stored locally.
Operator Interface Characteristics
The system shall provide a Windows® operator interface with the following minimum capabilities as standard. No custom programming or scripting shall be necessary to produce these:

- Window re-size, Zoom in, Zoom out
- Dedicated icons and Pull Down Menus to perform the following:
  - Associated Alarm Display
  - Alarm Summary
  - Alarm Acknowledgement
  - Display Sequence Forward/Backward
  - Previous Display Recall (minimum of 8 displays)
  - Cardholder Detail
  - Pop up face plates
  - Alarm Banner showing highest priority, most recent (or oldest) unacknowledged alarm
  - System Date and Time Zone
  - Current security Level
  - Workstation connection number
  - Alarm Annunciation
  - Communications Fail Annunciation
  - Operator Message Zone

Pointing and Input Devices
The operator interface shall be capable of being mouse driven and simultaneously support keyboard data input. Both fixed menus and configurable function keys shall be supported to aid novice and experienced operator respectively. The interface shall also be capable of supporting a touch-screen for pointing and command input.

The operator interface shall use a Tool Bar for common operator commands. The operator shall be able to request display of commonly used displays and activate system functions via Drop-Down menus.

All operator interface input shall be possible using only the pointing device and QWERTY section of the keyboard.

Operator Functions
The following functions shall be performed through the operator interface:

- Display and control of field equipment
- Acknowledge alarms on a priority basis
- Initiate printing of reports
- Archive and retrieve event logs
- View Intranet or information from the Internet in a secure environment
- View ActiveX documents
- Use ActiveX controls
- Change own password
- Monitor data communications channels
- Configure system parameters
OPERATOR SECURITY AND SIGN-ON

Security
If necessary, each operator may be assigned a user profile that defines the following:

- Security and/or Control Level
- Operator Identifier
- Unique Password
- Area Assignment/Area Profile
- Start display for that operator
- Timeout Value for that operator

Any actions initiated by the operator shall be logged in the Event database by operator identifier. In addition, any control actions shall only be allowed if the control level configured in the operator's profile exceeds the level assigned to the controlled point.

Utilities shall be provided to allow administration of the operator passwords.

Security Levels
The system shall support at least six levels of operator security. The functions allowed from each security level shall be as follows:

- **Level 1**: Signed Off mode - View start-up display only.
- **Level 2**: View only - The operator shall be able to view displays. Typically used for an inexperienced operator.
- **Level 3**: Permit all Level 1 and 2 functions and in addition the operator shall be permitted to control points such as start/stop functions, disable/enable security points or access control cards, etc. and acknowledge alarms as they occur.
- **Level 4**: Permit all Level 1 through Level 3 functions in addition to accessing master time schedules, system peripherals allocation, change parameters, build reports and use most standard system configuration displays. This level shall typically be reserved for the system supervisor.
- **Level 5**: Permit all Level 1 through Level 4 functions in addition to accessing the engineering functions such as building and linking displays, allocating keyboard push button assignments, etc. (Reserved for the system engineer).
- **Level 6**: This is the highest level of station security and shall allow the user unlimited access to all station functions (Typically reserved for the system manager).

Security levels and segregation features must be freely configurable by the system manager (level 6).

Sign-On/Sign-Off
The operator shall be permitted to sign on to the system if the correct Operator Identity and the Operator Password have been entered. This password shall be encrypted in the database. It shall also be possible to have the system linked to MS Windows® such that the operator uses their Windows Account Name and password to sign on to the system. This ensures that operators only need to remember one set of credentials.
After a series of three (3) unsuccessful attempts to sign-on, the Operator Workstation interface shall be locked for a configurable period of time. The lockout period shall be set via system configuration displays. During Operator Workstation lockout the other Windows functions of the computer running the Operator Workstation software shall not be affected.

It shall be possible to assign operators either single or multi-user passwords. Single user passwords enable the operator to sign-on to only a single Operator Workstation thus preventing simultaneous sign-on by the same operator. Operators with the highest sign-on security level who may require simultaneous access to more than one Operator Workstation would typically use the multi-user password.

Each operator shall be assigned a password and a set of authorized areas. The operator may sign-off at any time by issuing a sign-off command.

A keyboard time-out feature shall be provided such that the operator shall be automatically signed off after a defined period of keyboard inactivity. It shall optionally be possible to configure automatic call-up of a "logged-out" display when this occurs to hide previously displayed restricted information.

**Area Assignment / Area Profile**

Each operator shall be assigned one or more specific areas of the premises with the appropriate monitoring and control responsibility (no view, view only, alarm acknowledge only or full control). An area shall be defined in this context as a logical entity comprising of a set of "points" in the system. Points refer to both Security system I/O, Access control/Time and Attendance badge readers and associated I/O, Digital video cameras.

In turn an area may represent a physical space in the building. Areas shall be used to partition the database in such a way as to assign operators control over certain areas and prevent unauthorized access to other areas.

It shall be possible to define individual tenant access by means of area assignment. Likewise, an operator's ability to control or monitor certain parts of a facility can be controlled by means of area assignment.

The system shall provide the facility to create Area Profiles, which combine areas and time periods, and which can be assigned to operators with the same area access requirements. By using area profiles in this way, area access can be specified to apply during certain time periods, allowing different areas of access at different times of the day or week.

**Command Partitioning**

It shall be possible to assign to each operator a set of allowed commands for each assigned area, where an area is a group of points. These commands can be mapped against the output state of any given digital point in the respective area to determine whether a control command is allowed for the particular operator.

With this feature, it shall for example be possible to configure an operator to set a digital point to ON, but to disallow the same operator from setting the same digital point to OFF.

**Standard System Displays**

The following displays shall be included as part of the SMS system:

- Alarm Summary Display
- Event Summary Display
• Point Detail Template Displays (for each point in the database)
• Communications Status Displays
• System Status Displays
• Operator Scratch-pad Display
• Face Plates for all common point types
• Configuration Displays

The Alarm Summary, Event Summary, Point Detail, Communications Status, System Status shall not require any configuration.

Systems where standard graphical displays, showing all parameters for each system Point, do not exist shall not be acceptable.

Administration Displays
The system shall provide the following full screen displays:

• Master system menu
• Report summary
• Alarm summary
• Event summary
• Display summary
• System parameters configuration
• Operator Workstation configuration
• Area assignment
• Time Schedule assignment
• Holiday assignment
• History assignment
• Push-button assignment
• Operator definition
• Operator message board
• Events archive and retrieval
• Time Period summary and configuration
• Point Detail for every configured Point

Live Video
The Operator Interface shall have built in support for the creation and display of live video objects without the need for programming. The size and position of the video object shall be configured on a per display basis.

Systems, which show the live video object in a separate window from the operator interface, or on a separate monitor screen, shall not be acceptable.

Launching External Applications
It shall be possible to launch applications (such as Microsoft Word, Excel, custom help files or any third party applications) from a custom display. If supported by the application, it shall be possible to launch the application with a specified file opened within the launched application. Launching of such applications shall also be possible from the Operator Workstation pull down menus or from a push button on a custom display.
Help and Documentation
The Operator interface shall also have access to online help and full system documentation. Online help shall be fully searchable and cross referenced to all relevant sections of the documentation. It shall be possible to browse the online help and set “favorites” which link to commonly used sections of the help information. All manuals shall be available online.

Access Points
Access points represent card readers when using Access Control with the system. The point represents the state of the card reader and whether access was granted to a cardholder or whether access was denied.

Grouping of Points
The system shall provide a means by which a number of alarm inputs, outputs and other related points can be grouped together for more convenient monitoring and control without the need for custom graphics.

History Management
Collection of historical point data shall be configurable as part of the point definition. Once configured, this data shall be collected automatically. Historical data collection shall be provided for both snapshots and averages (when applicable) with intervals ranging from 1 second to 24 hours. The graphical operator interface, report generation and application interfaces shall be able to access historical data.

Modifications to the history collection of a point shall be possible on-line without the loss of previously collected data for the point being changed or any other points in the system currently being historized.

History shall be able to be archived to an alternative file system or offline media. Different archive settings shall be available for different history types.

Event Management
It shall be possible to log an event such that it shall be journalized in the event file and optionally printed on the event printer. The journal shall contain the following event information:

- Alarms
- Alarm Acknowledgements
- Return to Normal
- Operator Control Actions
- Operator Login & Security Level Changes
- On-line database Modifications
- Communications Alarms
- System Restart Messages
- Database changes

Standard Displays shall be provided to show the current journal file with the most recent event at the top of the display (LIFO). Subsequent page forward actions shall allow display of progressively older events. Sorting and filtering of the journal shall be possible directly on screen. Filters shall be able to be saved for future use. Filtered events shall be able to be printed as an event report directly from the Event display.
The event database entries shall contain the following information as a minimum:

- Time & Date Stamp
- Database partition code
- Source
- Operator
- Event Type
- Condition
- Action
- Alarm Priority
- Description
- Value or status
- Engineering Units (if applicable)
- Comments

Events may be sorted by time and date, database partition or source of the event. It shall be possible to apply filters to the list of events to limit the view of events to those which match the filter. Filters may include multiple dimensions and wildcards and shall also be able to be saved and restored for reuse.

There may be additional fields which are relevant for different types of events. It shall be possible to enter comments on all events so that operators can annotate an event with relevant information.

It shall be possible to manually create an event if the operator wishes to record an incident on the site which is unrelated to system equipment.

The event database must also be accessible from other sub-systems such as the Operator Interface, Report Generation and Application Programmers Interface.

It shall be possible to have an on-line event file as large as the disk capacity can accommodate. For example, given the appropriate disk space it shall be capable of storing more than 1,000,000 (one million) events on-line.

The event file shall store events online. The system shall be able to automatically or manually archive these online events periodically, at a time period specified by the user. Operators shall be notified by an alarm that event archiving is required if manual operation is chosen. Events may be archived to tape, or to other media such as CD, DVD, Zip drive or to another file systems. If archiving does not take place, the event system shall continue to collect events until it reaches a nominated disk space limit. It shall then overwrite the oldest events until archiving takes place or more disk space is made available.

Archived events may be restored to the system at a later time if required for reporting purposes. Multiple archives shall be able to be restored at any one time. The system shall indicate to the operator the range of events in a particular archive file.

The event management system shall be fully integrated with the standard reporting system. The system shall automatically reference the restored archive file if a report is requested containing a time search window covered by the current archive file.

The operator shall be able to restore previously archived files and review or print them from the Operator Workstations. However, it shall be possible to directly generate a report from the event database filtered online without necessarily using the reporting system.
Alarm Management

Alarm management shall be part of the Facility Management System and based upon common facilities and procedures for all systems, SMS included.

Alarm Priorities

Each monitored point in the system shall be able to be assigned one of four alarm priorities (Journal, Low, High, Urgent) to individual states. The lowest priority changes of status shall only be journalized and optionally printed on the Alarm/Event printer. Higher priority changes of status will appear in the Alarm Summary and optionally printed on the Alarm/Event printer.

Within each of the four alarm types there shall be 15 sub-priorities available. Each alarm priority shall have a configurable color.

It shall be possible to configure a time such that if an alarm is not acknowledged within this time the alarm’s priority is elevated to the next level.

For each alarm priority, it shall be possible to configure a point such that if any alarms of this priority occur, the point is controlled to the configured state. This could be used to drive external enunciators such as sirens or lights.

When an alarm is acknowledged, it shall be possible to automatically issue a reset to a Peripheral Level controller to indicate the alarm is acknowledged and to attempt to reset the alarm point.

Alarm Enunciation

Alarms shall be enunciated by:

- Most recent, highest priority alarm message appearing on dedicated alarm banner on the operator interface.
- Alarm message appearing on alarm summary display.
- Available Tone - based on a “*.wav” or other sound file for each alarm priority
- Alarm message printed on the alarm printer
- Alarm indicator flashing on the operator interface

Alarms shall be enunciated at the Operator Workstation even if there is no operator currently signed-on. This feature shall be available on network connected Operator Workstations as long as the computer running the Operator Workstation software remains logically connected to the network. If the Operator Workstation is minimized in the Windows environment, then the Operator Workstation icon will indicate an alarm. An audible tone shall be able to be generated and this tone shall be specified by a “*.wav” or other sound file for each alarm priority.

Points shall be enunciated while in alarm. If a point is set to alarm inhibited, the point shall no longer cause annunciation. If a point goes into an alarm state whilst inhibited and then is still in the alarm state when the point is set to alarm enabled, the point shall immediately cause annunciation.

Alarm Processing

Assigning an alarm to the point shall automatically cause the system to perform the following actions when an alarm occurs:

- The alarm shall be time stamped to the nearest second and logged in the Event database with the Point Name (source), Alarm type, Alarm Priority, Point Description, New value/status and Engineering Units (if applicable).
- The point value which is in alarm shall turn red (or other configurable color) and flash on any standard or custom display which uses that point.
- An Unacknowledged alarm entry shall be made in the system alarm summary for Low, High and Urgent Alarms.
- The audible alarm shall sound (if configured).
- The alarm annunciation indicator shall flash.

In addition, the alarm banner of the Operator Interface must show the most recent (or optionally oldest), highest priority, unacknowledged alarm in the system.

**Alarm Summary**

Alarms shall be able to be viewed in a consolidated alarm summary which shows all current or pending alarms on the system. This summary may be sorted by time and date, database partition or source of the alarm. The fields shown on the alarm summary must be configurable and it shall be easy to move or change the alarms fields displayed. It shall be possible to apply filters to the list of alarms to limit the view of alarms to those which match the filter. Filters may include multiple dimensions and wildcards and shall also be able to be saved and restored for reuse. More detail about an alarm shall be obtained from a configurable details screen which shows all fields associated with that alarm. It shall be possible for the operators to add comments to the alarm and these comments shall be stored with the alarm.

**Dedicated Alarm Banner and Alarm Indicator**

A dedicated alarm banner shall appear on all displays showing either the most recent or oldest (configurable), highest priority, unacknowledged alarm in the system. This banner shall be clear when there are no unacknowledged alarms for the operator to process.

An alarm indicator shall also appear on all displays. This indicator will flash red (or another configured color) when there are any unacknowledged alarms pending in the system. This indicator will remain solid red if there are alarms, which have not returned to normal but which have all been acknowledged. The indicator will be clear if there are no points in an alarm condition.

**Alarm Logging**

As well as being logged on the printer, alarms shall be logged to an event file for future retrieval in alarm reports or archived to removable media.

**Alarm Response Function Keys**

The following dedicated function keys shall be provided on the keyboard for alarm action:

**ACKNOWLEDGE**

After moving the cursor to the point in alarm on the screen and selecting the point, the operator shall be able to acknowledge an alarm by pressing this key. This action shall be logged in the event file and on the printer showing the operator ID with the alarm.

**ALARM SUMMARY**

By pressing a dedicated key at any time, the operator shall be able to view a display showing all currently active alarms. The alarm messages shall be color-coded showing priorities. The operator shall be able to view the alarms according to priority or sorted based on other fields. It shall be possible to acknowledge alarms from this display and also go to the associated display defined for the point.
ASSOCIATED DISPLAY
After moving the cursor to the point in alarm on the screen and selecting the point the operator shall be able to bring up the display applicable to that alarm by pressing this key. Just selecting the associated display key directly will bring up the associated display for the point currently on the alarm banner. This is generally a custom graphic showing the location of the alarm in the facility.

Alarm Acknowledgement
The system shall provide for efficient alarm acknowledgement in a number of ways as follows:

- Selection of the alarmed point from a custom graphic and pressing the dedicated acknowledge push-button
- Selection of the alarm banner and pressing the dedicated acknowledge button
- Selection of the alarm in the alarm summary display and pressing the dedicated acknowledge button
- By performing a page acknowledge from the alarm summary display

On acknowledgement by the operator, the flashing indicator shall turn steady, and the point value shall remain red on any system or custom graphic. The acknowledgement shall also be logged in the Event database identifying the operator or station that acknowledged the alarm. If the point goes out of alarm before being acknowledged by the operator, the alarm shall be shown by a different indication and remain in the list until specifically acknowledged by the operator. If a point is not acknowledged within a configurable period of time, then an additional area based alarm can be generated.

Alarm Filtering
The Alarm Summary shall be able to filter the alarms displayed to the operator. All columns on the alarm summary shall be able to be used as part of a filter allowing sophisticated filters to be configured e.g. all alarms from this particular point, with this value/status, during this period. Filters shall be able to be saved and restored so that previously configured filters can be reused. It should also be obvious to operators when a filter has been applied to the Alarm Summary.

Alarm Link to Digital Video Recordings
The system shall allow the linking and display of digital video recordings pertaining to alarms. If there is any video footage in digital format which is relevant to an alarm, then the alarm summary shall indicate this by the use of a special icon on the alarm. By selecting the icon, the operator can then replay the relevant digital video footage of the alarm incident.

Print Alarms as a Report
The filtered alarm summary should be able to be printed directly as a report. From the alarm summary page, it shall be possible to view the current filtered list of alarms via a print preview button. This shows what the alarms will look like when printed to the configured report printer. From the alarm summary, it shall be possible to print the alarms directly using the print button.

Additional Alarm Information
The system shall provide support for an additional message to be tagged to the alarm. This message shall provide the operator with additional information on the alarm but shall not clutter the alarm summary. It shall appear in a separate message summary at the same time as the alarm appears in the alarm summary. The messages can be pre-configured and then simply attached to individual points by means of a message ID.
Advanced Alarm Management

The system shall be capable of advanced alarm management, which includes set stages of alarm handling. The stages shall be:

- Silence alarm condition
- Acknowledge and action alarm condition
- Respond to alarm condition by using pre-defined responses
- Optionally reset alarm

All actions shall be recorded in the event file for retrieval and auditing purposes. When an alarm is silenced, an instruction page for the alarm will be displayed. The alarm may then be acknowledged from this page and alarm handling action completed.

Once the alarm is acknowledged and appropriate action has been taken, the operator may move to the response page to select from up to 100 user-defined responses to be logged in the event file. Alternatively, the operator shall be able to enter his or her own response, which will also be logged in the event file. At the same time the alarm is removed from the alarm file. Optionally, the point shall remain on the alarm summary until a manual reset operation is performed.

It shall be possible to enable/disable this feature on a point-by-point basis given the appropriate system privilege level.

Reporting

Reporting shall be part of the Facility Management System and based upon common facilities and procedures for all systems, SMS included.

The system shall support a flexible reporting package to allow easy generation of report data. The reports provided shall include pre-configured standard reports for common requirements such as Alarm Event reports and custom report generation facilities that are configurable by the user.

Standard Reports

The following pre-formatted general purpose reports shall be available on the system:

- Alarm/Event Report
- Operator Trail Report
- Point Trail Report
- Alarm Duration Report
- All Point Report
- After Hours Alarm Report
- Point Attribute Report
- Generic or Custom Report

(Note: these are the FMS standard “general purpose” reports, additional SMS specific reports shall be described later in this document)

Configuration of these reports shall only require entry of the schedule information, and other parameters such as Point Name or wildcard, filter information, time interval for search and destination printer to fully configure the report. Specifically, no programming or scripting shall be required.

Alarm/Event Report

A report shall be provided to produce a summary of all events of a specified type for nominated points occurring in a time period. The time period may be specified as an absolute start and end date and time,
or as a period relative to the current time. This report shall also be able to produce a summary of all changes made by a specific operator.

**Operator Trail Report**
A report shall be provided to produce a summary of all operator actions relating to a specific operator in a specified period.

**Point Trail Report**
A report shall be provided to produce a summary of all events of a specified type occurring in a period on nominated points.

**Alarm Duration Report**
A report shall be provided which calculates the total amount of time a nominated point or group of points has been in an alarm condition over a given time period. The time period may be specified as an absolute start and end date and time, or as a period relative to the current time.

**All Point Report**
A report shall be provided to produce a list of point information, including point name, description, point type, engineering units, and current values. Report configuration shall allow filtering based on a wide variety of criteria.

**After Hours Alarms Report**
A report shall be provided to produce a summary of all Alarms occurring during the period specified by the operator as “After Hours”

**Point Attribute Report**
A report shall be provided to points selected by one of the following attribute criteria:

- Out-of-service
- Alarm suppressed
- Abnormal input levels
- In Manual mode

**Additional Generic or Custom Reports**
In addition, configurable report generation facilities must be provided to allow custom reports to be produced. They shall be able to be configured at any time with the system online, and shall be able to access any database values. At least two methods of custom report generation shall be available, including the following:

**Microsoft Excel®**
The SMS shall provide the facility for the use of Microsoft Excel® as a reporting tool – allowing calculations such as summations, maximal, minimal and standard deviations, and the production of graphs, charts and tables. Systems that do not provide support for Microsoft Excel® 2003 in this respect shall not be acceptable.

Data accessible for Excel® reporting shall include alarms, events, and point parameter values.

**ODBC**
The SMS shall be capable of providing selected data in an ODBC format for the purpose of extracting data and creating custom reports. It shall be possible to access tables of data from the SMS through an ODBC compliant tool such as Crystal Reports®.
It shall be possible to incorporate the activation of custom reports created through the ODBC compliant tool through the standard SMS report subsystem. Example reports shall be provided to illustrate how to access the ODBC data in the SMS.

A report detail display shall allow naming of reports, scheduling information and the destination of the report. The report destination shall be a printer, operator interface or internal file. The report output format shall be HTML (Hypertext Mark-up Language), Microsoft Word® or RTF format.

**Report Activation**

Reports shall be activated in one or more of the following ways:

- Periodic activation at user specified intervals
- Operator Demanded
- Event Initiated e.g. Change in point value
- Application Initiated
- Printed directly from the alarm/event summary

**User Definable database**

In order to support other types of data such as user entered or calculated data from application programs, the system shall also provide a User Definable database area that can be fully integrated into the system. Data contained in this database must be accessible by:

- Custom Graphics
- Custom Reports
- Application Programs
- Network Applications using a Network API

**Historical Data Archiving**

The system shall support archiving of historical data to allow a continuous record of history to be built up over a period of time. Archived data may be stored on the hard disk of the system or a remote network drive or moved off-line to removable media such as floppy disk, cartridge tape, DAT tape, CD or DVD. The number of archives maintained on the system before transferal to off-line media shall only be limited by the size of the hard disk or remote network drive.

**Time Schedules**

It shall be possible to specify time schedules for the control of all points. A large number of individual points shall be controlled by a single time schedule. A single time schedule shall define the control to any combination of day and time e.g. Mon-Fri 7:00 to 18:00, Thursday 7:00 to 22:00 and Saturday-Sunday 9:00 to 14:00. The SMS time schedule must also provide the ability to override the normal schedule for holidays or special occasions.

Configuring time schedules must be done through a graphical user interface whereby the operator selects the appropriate time span from a calendar. Systems where times and days must be manually entered are not acceptable.

Where the control device supports an internal time schedule program, the SMS shall be able to upload, display, modify and download the control device time schedules. Support for the control device time schedules shall be in addition to the SMS time schedules.
Open Integration
Any of the following Open Protocol Standards shall be used for integration of 3rd party devices or systems.

OLE for Process Control (OPC)
The SMS server shall provide an integrated OPC Client and integrated OPC Server.
- The OPC Client shall support the mandatory OPC Release2.0 Data Access as a minimum.
- The OPC Server shall support OPC Release1.0A and OPC Release 2.0 Data Access OPC interfaces as a minimum.

AdvanceDDE
The SMS server shall provide an AdvanceDDE® Client to allow connection to any AdvanceDDE® servers as specified by the AdvanceDDE® standard from Rockwell Software.

Data Exchange
The SMS system shall have the capability to interface to the point database of other similar SMS systems (i.e. nodes) on a TCP/IP network. This shall enable both the acquiring of point data and issuing control outputs to other SMS systems.

Data Exchange with Microsoft Excel
The system must be capable of exporting bulk data to Microsoft Excel®. As a minimum the following shall be supported:
- Allow retrieval of data either periodically or snapshot
- Allow retrieval of data via POINT.PARAMETER requests
- Allow retrieval of tag names, descriptions, etc.
- Allow retrieval historical data
- Writing of values from Excel® back to the supervisory system

Accessing the SMS from third party web pages
Web-page controls and a web server interface to the SMS shall be optionally provided, which allow tenants or other users to monitor & control a variety of SMS -supervised functions via their own Web pages created for their own Intranet or Internet and viewed from a standard web-browser. For example, it shall be possible for building tenants to be able to view floor graphics via a dedicated or existing building Intranet, and to be able to monitor and control security information.

It shall be possible to limit web browser access to SMS facilities by means of standard web and networking techniques.

Paging and external annunciation of System Alarms
The SMS shall optionally provide a facility for sending alarm text from configured points to the following external systems:
- Alphanumeric pagers
- Digital mobile phones with text message (Short Message) support
- E-mail
- SNMP message.

Each point’s paging priority threshold shall be individually configurable, and individually enabled or disabled. Each external device configured in the system shall have individually selectable times and days
of operation, an alarm priority threshold, and an alternative device for use in escalation of unacknowledged alarms.

**Database Configuration Tool**

A database configuration tool shall be provided with the SMS system that shall allow configuration of all point records, printers, controllers, and Operator Workstation connections. This utility shall be in the form of a relational database and operate in a true 32 bit graphical environment such as Windows 2003®. The utility shall also have the ability to export information to and import information from Microsoft applications such as Microsoft Excel®.

Systems that do not provide support for Microsoft Excel® 2003 in this respect shall not be acceptable

Users with sufficient security access shall be able to configure the database while the system is on-line. Configuration shall not require the need for any programming, compiling or linking and shall not require shutting down or restarting of the system. In addition, historical data collection shall not be interrupted for points not affected by configuration changes.

It shall be possible to launch the database configuration tool from the operator workstation interface. The utility shall have the ability to configure database changes and download them either from the SMS server directly or remotely via the network. The remote download is to provide password protection.

It shall be possible to modify a range of communications and other parameters for each device. The parameters of a particular device made available for modification shall be specific to the device or hardware item being configured – for example baud rate, parity, data and stop bit information in the case of serial devices. Hardware configuration utilities that rely solely on text-based configuration files shall not be acceptable.

All documentation for the configuration utility shall be provided on-line. The help facility shall operate using standard Microsoft features such as context sensitive help using the F1 function key.

The utility shall provide features that reduce configuration time of the SMS system. These features shall include adding multiple points, controllers etc. at once. The utility shall automatically increment names or numbers of any information that is required to be unique by the SMS system (such as point names). The user shall be able to select multiple items (such as points) and then edit fields that are common to all selected items to assist in global changes. Standard copy and paste facilities are to be provided by the utility.

The utility shall also support free format text fields, which the user can use for additional information such as cabinet or wire numbers. These additional fields shall be simple extensions to existing items in the database such as SMS points.

A filtering mechanism shall be provided with the utility so that the user need view only relevant information. The filter shall provide standard choices for the user to select, and also provide user defined filtering.

Database management reports shall be provided by the utility as standard. The utility shall also provide support for ad-hoc reporting facilities for engineering use.

**Application Programming Interface**

Two types of application programming interface (API) are required, the first is for applications written on the SMS server and the second is for applications that are required to run on network based clients (that are not necessarily Operator Workstations).
The SMS system API’s must have support for either Visual Basic or C++ or both. Proprietary programming languages are not acceptable.

The API on the SMS server requires the following functions as a minimum:

- Read and write to points in the database
- Access to historical data
- Initiate supervisory control actions
- Access to the alarm/event subsystem
- Access to user-defined database
- Provide a prompt for operator input.

The API on the network-based clients requires the following functions as a minimum:

- Read and write to points in the database
- Access to historical data
- Initiate supervisory control actions
- Access to user-defined database

**Server Scripting Engine**

The SMS system must have the ability to extend its functionality easily by the addition of small script code to certain server functions. This will enable additional customer specific functionality to be easily added to point, report and server processing. For example, a script shall enable a calculation to be performed and a number of points to be controlled based on another point going into alarm state. Scripts shall be able to be attached to point processing, report generation, server startup and shutdown, or executed on a periodic basis.

The scripting engine must support a standard scripting language such as Microsoft’s VBScript®. Access to the scripts shall be through an inbuilt scripting editor which provides key work support and syntax checking as well as an extensive range of online help including a large number of worked examples. Proprietary scripting languages shall not be acceptable.

**Diagnostic Capture Tool**

The SMS system must enable easy diagnostics of the health of the system. All diagnostic information shall be viewable through an easy to use user interface and shall be able to be easily exported as a stand alone collection of material for later analysis. This information shall include the following:

- Communications traces to selected controllers
- All system log files
- Details on system software installation
- Application status information

It shall not be necessary to be an expert user in the system to gather diagnostic information.

**SECURITY Management Specification**

**General**

The SMS shall be part of the Facility Management System and shall have the capability to control the following subsystems:

- Intrusion Detection System
- Access Control System
- Time & Attendance Data Collection System
- Digital Video System
- Asset Management
- Ancillary Control System

The SMS shall include:

- Operator Workstations for operators.
- Peripheral Level Controllers:
  - Intrusion Detection panels managing security sensors and actuators, such as passive infrared detectors, perimeter protection systems, sirens and the like.
  - Access Control and Time & Attendance panels managing card readers, turnstiles, electric strikes, door contacts, drop in bolts and the like.
  - Digital Video Cameras and Streamers for Analog Cameras.
  - Asset Management handling system for the connection and handling of transmitters and receivers for the detection and localization of personnel and assets.
  - Ancillary Control devices such as intelligent elevator controllers and the like.
- Field Level Devices such as badge readers and I/O Modules interfacing and relevant sensors and actuators.

INTERFACE AND INTEGRATION

General
The server computer shall be capable of interfacing to various Peripheral Level Controllers, each managing several specialized field equipments. The interface shall conform to Ethernet Local Area Network and to TCP-IP protocol. Digital video cameras and streamers can be considered as being Peripheral Level Controller since they connect to the Ethernet. There is no Field Level Device for the Digital Video subsystem. The structure of Ancillary Systems depends on the architectural choices of the suppliers and could differ from the general structure depicted above.

Connection of Peripheral Level Controllers to Remote Terminal Units shall conform to Lon Works® (Free Topology or Bus configurations).

The following characteristics shall apply to:

- Security Peripheral Level Controllers
- Access Peripheral Level Controllers
- Time & Attendance Peripheral Level Controllers
- Digital Video Cameras and Streamers shall be connected directly to the Ethernet LAN.
- Asset Management units shall be connected to a handling unit connected to the Ethernet LAN.

PERIPHERAL LEVEL CONTROLLER Local Databases
All Peripheral Level Controllers shall have distributed intelligence. Normal access control decisions shall be made at the Peripheral Level Controller level without reference to the server(s).

If data collected by one controller requires additional information from another controller it shall be accomplished via peer-to-peer communications between Peripheral Level Controllers without accessing any centralized function in the server. Systems that do not provide direct peer-to-peer communication between Peripheral Level Controllers without affecting or being affected by the system Server(s) shall not be acceptable.
In the event of failure in the communication link between a Peripheral Level Controller and the server computer, the sub-system shall be capable of complete control based upon its local database (e.g. the cardholder profiles for Access Control). In the same event the Peripheral Level Controller shall ensure local buffering of a minimum of events (and even transactions for Access Control) and alarms until normal communication is re-established with the server computer(s). An option shall be available to extend the buffering capacity simply selecting a larger amount of memory storage. For Access Control that is the most memory demanding application, this will result in a basic capacity of 2,500 access transactions and events and local 10,000 cardholders database, and an extended capacity of 60,000 cardholders and 40,000 transactions.

Should the main communication link fail, than a the system shall have the capacity for backup communication path should be established via PSTN.

Changes in the server system database shall be capable of being downloaded to the relevant controllers and the local databases of the connected sub-systems via the same physical communication links. Such downloading of data shall not disrupt normal data communications over the same links and must be performed automatically without the need for any action of the Workstation operators.

**Peripheral Level Controllers Hardware**

Peripheral Level Controllers shall be 16 bit microprocessor based hardware, equipped with RAM and Flash memory (or other equivalent non-volatile memory) in order to maintain application program, configuration data, resident data base, events log and transactions. All Peripheral Level Controllers shall be able to interface a local printer for logging, reporting and maintenance purposes. Local database shall be stored in removable static memory in order to easily restart system operation (simply moving the memory cartridge to the new unit) should the need arise for a new Controller to be installed in lieu of a failed unit. Solutions that require downloading of data stored in a failed equipment using special tools only available at central maintenance premises shall no be accepted.

**Intrusion Detection Controllers**

Intrusion Detection Peripheral Level Controllers shall be capable of connecting and managing I/O Interfaces providing security input and output to detectors and actuators. Security inputs shall be able to detect normal and alarm conditions as reported by security detectors, but also check connection lines for short circuit and open conditions. The intrusion detection panel shall have the capability to receive arm / disarm signals from the card access system via the peer to peer communication.

**Access Controllers**

Access Control Peripheral Level Controllers shall be capable of connecting and managing access control terminals providing personal card reading as well as input of additional data (PIN codes, biometric parameters, etc.) and output of messages and other information to the user. The memory storage shall be sizeable in order to reach an overall capacity of not less than 60,000 cardholders’ data and 40,000 transit transactions. Overall memory shall be configurable in its use in order to privilege the cardholder’s number against transactions storage or vice versa.

**Time & Attendance Controllers**

Time & Attendance Controllers shall be basically the same as Control Access Controllers, being able to provide additional functions such as personal card reading as well as input of additional data (PIN codes, reasons, etc.) and output of messages via an integral display and other information to the user (either upon request or unsolicited). The memory storage shall be sizeable in order to reach an overall capacity of not less than 60,000 cardholders’ data and 40,000 transit transactions. Overall memory shall be configurable in its use in order to privilege
the cardholder's number against transactions storage or vice versa and even to store information to be displayed to users upon specific enquiries.

Digital Video Controllers
Since Digital Video cameras and Streamers directly connect to the Ethernet LAN, the Controller functions are embedded in these devices that do not require for field devices and have the capabilities to record, analyze, store images for transmission to the Server(s). Local processing shall provide at least for multi-window Motion Detection.

Asset Management Controllers
Asset and personnel localization devices are managed by a specialized Controller based on a Personal Computer platform that interfaces to the Ethernet LAN.

Peripheral Level Controllers Common Characteristics
The following applies to Intrusion, Access Control and Time & Attendance Peripheral Level Controllers. They shall ensure communication on LAN and WAN networks as well as point-to-point communication on a dedicated or dial-up PSTN. The latter shall be configurable as an alternative to LAN or a backup transmission media in the event of a failure of the LAN communication.

Connection shall be established either manually (upon request of a supervisory control center operator) or automatically (at scheduled times or upon detection of a given event). Server level communication shall provide multi-line capabilities in order to manage a pool of communication links and enable simultaneous communication with different remote Peripheral Level Controllers (at least 4 lines shall be managed by the system). The Peripheral Level Controller shall be configurable in order to send recorded events establishing a communication at specific scheduled times or to record events and send them only when a communication in established.

Peripheral Level Controllers will store alarms, events and transit transactions and send them either establishing a connection when the buffer memory has reached a given level or at scheduled times.

In order to optimize engineering and simplify maintenance, all Peripheral Level Controllers shall be the same hardware unit and will differ in configuration parameters only. This means that a unique Peripheral Level Controller hardware shall be used for Intrusion, Access Control and Time & Attendance. Units will differ in database, application software, configuration and connected Terminals.

Solutions using specialized Peripheral Level Controllers for the above mentioned applications shall not be acceptable.

Redundant "Shared Load” Controller/s Common Characteristics
Where specified a redundant or "shared load” operational feature is required in order to increase system availability in the event of a controller catastrophic failure. Where the “shared load feature is employed: as a consequence of a catastrophic controller failure, all Terminals handled by a Peripheral Level Controller “A” should be taken in charge from another pre-defined Peripheral Level Controller “B” connected to the same LON network and acting as a backup. No hardware switching should be performed and all the management should be based upon software functionalities only. This feature shall be embedded in the Peripheral Level Controller and selected simply setting proper parameters during system configuration. Backup solutions requiring additional hardware (switches, etc.) or cabling will not be acceptable. Solutions that do
not provide for a backup of Peripheral Level Controller at the Terminal level shall not be acceptable.

PERIPHERAL LEVEL CONTROLLERS SOFTWARE

Intrusion

The Peripheral Level Controller shall be capable of detecting alarms, processing and combining different alarm sources and then activating control reactions. Inputs and Outputs shall be provided by I/O Terminals (Remote Terminal Units) or shall be based, without any additional engineering, upon unused I/O of Access Control Terminals. The logic shall be capable to detect alarm conditions connected to the status of a sensor or a combination of sensors. In addition it shall be able to detect sensor cabling shorts and cuts or tampering of detectors. Based upon local programming and data base, the Peripheral Controller shall be able to react to events and alarms activating actuators such as sirens, telephone dial up systems, etc.

Time programming shall be foreseen to differentiate alarm processing based upon different profiles connected to work days, holidays and special days.

Access Control

The Peripheral Level Controller shall be capable of the following controls in order to enable transit through a controlled gate:

- Media check: the identification media (generally a card) is checked for consistency with the physical and logical standards defined for that media. In addition the adherence of media to the configuration in checked.
- Permission check: the media code is checked against a white list. The check is performed on a per code basis or using code ranges, if applicable. Then, a behavior check is performed to verify if that card is permitted on that gate in that specific time and date.
- Depending on access procedure applicable to the gate, based upon a time schedule, an additional PIN keying shall be required and checked. PIN code shall be required, depending on schedule, for any access at any time, or in given time periods only (i.e. during night shifts).
- Additional checks are:
  - Anti-passback control: this check requires that a cardholder cannot leave a zone in which he/she has not entered and/or cannot try to reach a zone in which he already is present.
  - Coupled control: this control grants access only when two specific transactions are performed in strict sequence with two different cards. Typical applications are access to a garage and escorted visitors.
  - Single shot transit: this check will enable access only once. Typical application is a visitor card for a supplier accessing the warehouse.
  - Maximum number of cardholders in a given zone. Should the zone be already “full” no further entry is granted. Typical application is a garage or a dangerous area where the security devices are designed for a maximum number of persons.
  - Minimum number of cardholders in a given zone. Should the zone be already at the minimum, no exit is granted. Typical application is a supervisory center where a minimum staff must be present at any time.
  - Maximum stay time in a given zone. Should a cardholder stay in a given zone for more than the allotted time, an alarm is given (also a pre-alarm capability shall be provided). The presence timer associated to the card is reset upon exit.
Path control: this additional control shall manage a compulsory path and associated timing barriers. Typical application is external maintenance personnel accessing plants.

- Once the transit enabled, the Remote Terminal Unit shall control the gate, issuing an unblocking command and checking the status of the detectors installed on the gate itself. Result of performed checks shall be reported to the Peripheral Level Controller. In order to ensure these capabilities, the Access Control Terminal shall be equipped with digital I/O to interface the controlled gate and check both authorized transits and unauthorized transit attempts. The logic shall be selectable in order to be applicable to almost any type of gate, including doors, interlocked doors, turnstiles, sliding doors, leaf doors, man-trap gates, etc. Terminal equipped with less than 1 input and 1 output shall not be acceptable. Whenever physically possible, a single two-direction reader shall be employed on a bidirectional gate (ex. turnstile). In order to optimize hardware configuration, I/O signals shall be derivable also from Security I/O Terminals or Access Control Terminals even if connected to and managed by a different Peripheral Level Controller (peer-to-peer communication).

At least all the above mentioned checks shall be foreseen in the Peripheral Level Controllers and be carried out in a totally stand-alone mode, without access to the database Server. Should the need arise for data stored in a different Peripheral Level Controller, a peer-to-peer communication shall be established between Peripheral Level Controllers to provide such data.

Systems that require access to the database Server(s) or require a gateway function at the Server(s) level shall not be accepted as a valid solution to perform checks or establish communication between Peripheral Level Controllers.

The above listed checks are to be considered a minimum functional level. Solutions that do not provide at least the listed functions shall not be acceptable.

The Peripheral Level Controller shall be capable to issue feedback commands as a consequence to events detected by the system. A feedback command consists of sequence of commands to be executed on system objects. A cardholder shall be able to initiate a feedback command selecting a specific reason on the Terminal. Feedback commands shall be programmable on a timed basis too.

**Time & Attendance**

Time & Attendance transits shall be detected on Access Control Terminals or specific Time & Attendance Terminals. Programming facilities shall be provided in the system in order to define the usage of Terminals Access Control only, Time & Attendance only or both Access Control and Time & Attendance.

A specific programming shall be available for Terminals installed in Cafeterias.

Transactions for Time & Attendance shall provide a reason to be applied at the integral video screen in order to identify transactions referring to exceptions and unusual transits to be justified. A given Access Control and/or Time & Attendance Terminal shall be configurable to automatically manage a reasoned transit or transit category or specific enquiry without requiring any input of the cardholder.

A SAP certified interface shall be available for Time & Attendance transactions. It shall be possible to perform both SAP transactions (for employees) and non-SAP transactions (for visitors and third company employees) on any personal badge reading Terminal.
Digital Video

Digital video is considered as part of the SMS as it strictly interacts with the Security and Access Control functions. It shall be possible to manage alarms generated by digital cameras, such as the Motion Detection alarms following the same procedure already stated for alarms. Upon a Motion Detection alarm trigger the images stored locally in the camera and relevant to the period of time preceding the event and those recorded after the event are to be stored in the database. A specific video server can be assigned to Digital Video requirements, or the common server can be used to store the video images.

In addition, an event or alarm recorded by any other subsystem shall trigger the images recording and, if required, also the live video. As an example is shall be possible to recall the video image captured at an access controlled gate when specific cardholders enter or exit a given area.

It shall be possible to view live video and recorded images through a video object on any screen. The system shall be fully integrated in the FMS as part of it.

Solutions that are based on specific Digital Video software, even if interfaced to the FMS, but requiring a separate window or a separate sign-on, shall not be acceptable.

Asset Management

A specific function shall be available for personnel carrying company assets such as laptops, computers, or valuable tools. When the person carrying the device records his exit at the exit gate (Access Control), the Asset Management application will recognize the asset and enable or not the exit depending on permissions given to the user.

Terminals

Specialized Terminals shall be available for different applications such as:

- Interfacing security (intrusion, etc.) detectors and actuators.
- Access control to premises and reserved zones.
- Time & Attendance recording (including Canteen usage).
- Supply power to field devices.

Intrusion

Terminals for intrusion detection and the like shall be Lon Work® compatible units. They shall provide controlled inputs for security sensors (intruder, door, etc.) and outputs. Controlled input shall be able to interface voltage free contacts and detect also cabling short circuit and open circuit conditions.

Terminal shall be modular and provide at least 4 inputs and 4 outputs per module. They must be easily mounted in protected housings (with tamper monitoring). A DIN-rail mounting version shall be available for mounting in existing protected housings.

All Terminals shall be low-voltage powered from intelligent Power Supplies. Also Power Supply shall be Lon Work® native units in order to provide detailed information relevant to their operational status, battery charge level, etc. Several intelligent Power Supplies shall be capable to operate connected together in order to overcome the effects of a single device failure.

A large choice of sensors and actuators shall be available in order to cover all needs relevant to intrusion detection security:

- Passive IR (PIR) detectors-
- Double technology (Passive IR and Microwave) short range and long range detectors.
- Active IR barrier detectors for short range applications.
- Microwave barrier detectors for long range applications.
- Perimeter detection system for fences and buildings based upon micro phonic cable.
- Glass breaking detectors.
- Seismic detectors.
- Magnetic contacts for indoor and outdoor applications.
- Indoor and outdoor sirens and active signs for emergency exits.
- Anti panic pushbuttons.

Access Control
Access Control Terminals shall be Lon Work® compatible units. They shall be able to read and check personal ID cards belonging to different technologies. At least the following card technologies shall be available:

- Wiegand.
- Magnetic Stripe.
- Smart card (contact ISO 7816).
- Proximity e.g. HID.
- “Legic” (Kaba Benzing)
- Mifare contactless (ISO 14443A).
- ST Micro (ISO 14443B)

When using Mifare, it shall be possible to either use as ID the card serial number or to store specific ID information in a given memory sector or application in order to allow multi-application use of the card.

SMS shall be able to manage cards of different technologies in the same site. Multiple technologies allow usage of the best of each technology characteristics and assign to users either a single-technology ID card or a multi-technology ID card. Additional biometric checks shall be available for high security area access.

Access Control Terminals shall be modular in design in order to choose the best suited configuration for a given usage in terms of user interface, reading technology(ies) and mounting constrains. The Terminals listed below shall be available. Whenever not specified I/Os are managed by I/O terminals connected to the Access Control Peripheral Level Controller.

- Compact Terminal: it has the ability to read the card, acquire additional data (i.e. a PIN) from a keyboard and provide information to the user (small alphanumeric display, LEDs, audible tone). The Compact Terminal is managed by an Access Control Peripheral Level Controller.
- Basic Terminal: it has the ability to read the card, acquire simple data from a simplified functional keyboard and provide information to the user (small alphanumeric display, LEDs, audible tone). The Basic Terminal is managed by an Access Control Peripheral Level Controller.
- Interactive Terminal: it has the ability to read the card, acquire additional data (i.e. a PIN) from a keyboard and provide full information to the user (large graphic display, LEDs, audible tone). The Interactive Terminal is managed by an Access Control Peripheral Level Controller.
- Interactive with keyboard: it is basically an Interactive Terminal with an additional keyboard for extended interaction.
- Dual Technology Terminal: an Interactive Terminal with two readers for two different card technologies.
- Terminal with keyboard: it is basically a Basic Terminal with an additional keyboard for data entry (PIN, reason, etc.).
Simple keyboard: a keyboard for entering data without reading a badge. The Simple Keyboard Terminal is managed by an Access Control Peripheral Level Controller.

Simple badge reader: a reader without any display or key. The Simple badge reader Terminal is managed by an Access Control Peripheral Level Controller.

Slim mullion mount readers (for proxy and contactless cards); this is a very compact and stylish unit, providing simple operation based upon contactless card reading, a single multicolored LED and differentiated acoustic tones. It includes inputs and outputs to drive the gate opening and check its status.

Biometric terminal: allows for a combination of controls. First a personal card (Mifare® technology) is read to load the fingerprint template of the user in the terminal storage. As a second step the user fingerprint is read using a capacitive sensor and the read information compared with the template. Access is granted only if the two templates coincide.

Information shown on displays during idle time shall be easily configurable (ex. date/time format, welcome message, etc.).

A Terminal with integrated Peripheral Level Controller functions and hardware shall be available for direct connection to the Ethernet LAN. Such terminal shall be similar to the Interactive with keyboard unit from a functional point of view and provide it own I/O to interface the gate. This terminal shall have its own mains power supply.

All Terminals shall be low-voltage powered from an intelligent Power Supply.

**Time & Attendance**

Time & Attendance Terminals Units are basically the same units used for Access Control. They will act as Time & Attendance if configured as such during programming.

Information shown on displays at access time shall be easily configurable and provide specific messages addressed to a single cardholder (ex. name and family name) or group of cardholders (ex. recall for medical examination), or associated to the terminal.

When used in bi-directional access (entry and exit), single direction terminals should be equipped with a function key that enables direction change, and a display that shows the current direction.

Time & Attendance Terminals shall provide data entry capabilities in order to specify information relevant to cost center codes, project numbers, etc. Such data shall be recorded together with the associated transaction data. Data entry shall be enabled when a specific reason is selected.

Time & Attendance Terminals shall provide data enquiry capabilities in order to allow a cardholder to examine some data contained in the data base (ex. previously recorder transactions). Transactions shown are those collected by SMS and do not take into account any subsequent operation performed by the HR department. This capability shall be easily configurable in order to define the data items that can be recalled on the display (minimum 10 different selectable items).

An enquiry capability based on data stored in the Peripheral Level Controller(s) and that does not require access to systems server(s) shall be appreciated.

All Terminals shall be low-voltage powered from an intelligent Power Supply.

**Power Supplies**

Power supply units are intended as field devices supplying low voltage to Terminals, detectors and actuators.
They shall derive power from the mains and shall be equipped with back-up batteries in order to ensure full operation even in the event of a mains power failure. Power supplies shall be “intelligent” Echelon devices interfaced to the Lon Works® network in order to report their operation and battery status to the relevant Peripheral Level Controller and Server.

In order to recover existing power supplies, a special Intelligent Controller shall be provided to network external power supplies and ensure the same monitoring capabilities of the newly installed units.

At least two differently sized intelligent power supplies shall be available in order to adapt to different needs without over sizing installed units.

Power supplies shall provide a “power bus” facility in order to allow for paralleling several power supplies in a highly available configuration that can withstand single or multiple failures of power supplies units (depending on the overall number of redundant units).

Battery capacity shall ensure at least 4 hours of full operation under nominal load.

**DISTRIBUTED SYSTEM SERVERS**

**Cardholder Management System**

A method shall be provided to allow geographically separate servers to manage their own locally connected Peripheral Level Controllers while sharing and interchanging data with other servers that are connected via a Local Area Network and/or a Wide Area Network.

Specifically, it shall be possible, within the limits of the configured operator permissions, to view, edit, and download card and cardholder information across a network of geographically distributed servers.

Card and cardholder access details specified from one server shall be available to other local or remote servers to allow cardholders appropriate access to buildings and facilities whose access control is managed by the servers.

The Distributed Servers shall allow management of multi-site premises.

**Downloading**

A download of newly entered card or cardholder information shall automatically be initiated on each remote server when manually initiated on any local server. Such downloads may include multiple sets of cards or cardholders.

A method shall be provided for reporting of any failed remote download back to the requesting server.

There shall be an Operator Workstation display containing a list of all outstanding local downloads and outstanding locally initiated individual card downloads to remote sites. This display shall be restricted to viewing by operators with appropriate authorization.

Information on the download status of each item shall be available as part of the standard display for each card or cardholder.

**Remote Server Availability**

Failure of software or hardware in any one server, or loss of communications to any one geographic location, shall not cause loss of supervisory operations of the system as a whole. Loss of communications
to any one geographic location shall not impede supervisory operations to the controllers at the unreachable site if communications are still available locally.

It shall be possible to enter access cardholder details at any of the geographically separate servers, and have that information automatically copied to each other remote site where the cardholder requires access. If access is removed from a site, the local record shall be deleted from that site’s server.

The local time of last modification, as well as the site of modification, shall be stored on each card and cardholder.

A flexible and consistent scheme shall be provided for restricting operator permissions to access card and cardholder information at remote sites.

Cardholder Management System

The SMS shall store security related cardholder/passholder information in a relational database such as Microsoft SQL Server®.

The cardholder database shall support at least 1,000,000 cardholders. The cardholder database shall be delivered with at least 40 user definable fields for storing data specific to the requirements of different SMS systems. It shall be possible to increase or decrease this number of user definable fields. Systems without the ability to increase the number of user definable fields shall not be acceptable.

Cardholder Database

It shall be possible to define labels and field types for each of the user definable fields. It shall be possible to define lists of choices for certain user fields to avoid unnecessary typing, for example, defining a list of department names. It shall also be possible to modify the layout of cardholder fields on the display screen to alter the look to particular user’s requirements. It shall also be possible to create more complicated calculations between user fields. For example, creating the value of one user field based on the value of two others. It shall be possible to define default values for all user fields, which shall be applied when the cardholder is first added to the system.

Searching and Sorting

It shall be possible to define which user fields in the cardholder database are searchable fields. All searchable fields shall be able to be used to call up a list of cardholders who match a certain criteria. In addition, it shall be possible to search on multiple cardholder characteristics at one time, for example, all cardholders in department “X” who have a supervisor of “Y”. A list of matching cardholders shall be displayed and an appropriate choice may be made.

Multi-Selection

It shall be possible for multiple cardholders to be selected and a single edit to be performed on all of these cardholders selected. For example, it shall be possible to select all cardholders in department “X” and change their address to “Z” in a single operation.

Templates

The system shall define templates in order to add groups of cardholders with predefined characteristics. A template shall contain all the relevant details for a particular group of cardholders such as all their user fields and access levels. When adding a new cardholder to this group using the template, the cardholder shall be added with the same characteristics as defined in the template.
MULTI SITE FUNCTIONALITY

It shall be possible to manage different sites, up to 255. Each site shall have assigned its specific terminals, behavior models, calendars and zones. Employees, visitors, vehicles and available cards should be enabled to have single-site or multi-site capabilities. Multi site functionality shall optimize information distribution to applicable sites only.

Cardholders and Cards

It shall be possible to assign a single cardholder multiple cards for use in the SMS. Multiple cards assigned to a single cardholder shall be able to be in different states. For example, it shall be possible for a single cardholder to have both an “active” card assigned and an “inactive”, “lost” or “stolen” card assigned.

It shall also be possible to support different technologies of access control cards in the one system. For example, a single cardholder may have a proximity card, a magnetic stripe card and a biometric template assigned to them.

Cards may be created and assigned to cardholders separately. It shall be possible to “return” a card when a cardholder no longer requires it, and then reassign it to another cardholder without having to delete and recreate the card.

When cardholders or cards are deleted or expired, or when a card is returned from use by a cardholder, the system shall automatically download this to the Peripheral Level Controllers so that these cards no longer provide access.

Photo

Photographic pictures of cardholders will be stored in the database and shall be recalled for personal cards issuing and for cardholder identification at a highly secure premise access point.

The system shall integrate the photo capture devices (photo camera and scanner) and the thermal transfer card printing device.

Access Permissions, Time Periods and Zones

Time Zones

The system shall support a minimum of 16 time zones.

The operator shall be able to access a summary display listing all time zones and their descriptions. From this display the operator shall, if the operator is configured for the time zone’s area code, be able to go to a time period detail display showing the time zones configurable parameters.

Once the changes have been saved the operator will be required to download the new data before it is enabled in the Access Control System. This shall allow operators to make a number of changes but only be required to download once a fully consistent new data version.

Each time zone detail display containing changed data that has not been downloaded shall clearly indicate this to the operator via a flashing warning message. Download of this data shall cause the warning message to disappear.

Geographical Zones

The system shall support up to 64 geographical zones. Each zone shall consist of the following:
- Description
- Area code.
- Up to min. 64 card readers or floor points.

The operator shall be able to access a summary display listing all zones and their descriptions. From this display the operator shall, if the operator is configured for the zones area code, be able to go to a zone detail display showing the zone configurable parameters.

Zones shall be automatically created when card readers are configured in the system. Zones are defined by the card readers, which allow entry to the physical space, which the zone represents. One reader may only be defined as entering one zone. Each reader will indicate the zone it allows entry to and optionally the zone from which one has exited.

**Access Permissions**

The system shall support up to min. 256 access permissions. Each access permission shall consist of the following:

- Description
- Area code.
- Up to min. 64 zone and time period pairs.

The operator shall be able to access a summary display listing all access permissions and their descriptions. From this display the operator shall, if the operator is configured for the access permission's area code, be able to go to an access permission detail display showing the access permission's configurable parameters.

Once the changes have been saved the operator will be required to download the new data before it is enabled in the Access Control System. This shall allow operators to make a number of changes but only be required to download once.

Each access permission detail display containing changed data that has not been downloaded shall clearly indicate this to the operator via a flashing warning message. Download of this data shall cause the warning message to disappear.

**Security**

Managing cardholders shall only be available to operators who are at a certain security level. Both cardholders and cards shall also conform to standard SMS Operator Security features such as area assignment.

It shall be possible to define an operator as only a cardholder administrator. All other functions in the system will be restricted to this operator except for cardholder administration functions.

**Assigning Access to Cardholders**

Cardholders may have up to min. 8 different access levels assigned to them. Each of these access levels may define a separate set of readers and times that will allow the cardholder access. Operators shall be presented with a list of all access levels already assigned to the cardholder and all access levels that are currently unassigned.

**Deleting Cardholders**

Cardholders may be deleted but retained in the database for future reference if required. It shall then be possible to “undelete” the cardholder should this be required. It shall also be possible to
permanently delete the cardholder record in order to prevent unnecessarily large databases from developing.

**Card/Cardholder Expiry**

Cardholder and card expiry dates may be defined down to a resolution of date and time in minutes.

It shall be possible to assign cardholders and cards separate expiry dates, enabling a card assigned to a cardholder to expire before the cardholder expires. However, it shall not be possible for the card expiry date to exceed the cardholder expiry date of the cardholder to which a card is assigned.

Expiry dates may be set up by default to be a particular given date, or a relative period from the time the cardholder was created (e.g. 1 year).

It shall be possible to assign a cardholder a commencement date and have their assigned cards automatically become active on this commencement date.

**Cardholder Alarms**

It shall be possible to specify that the cardholders generate an alarm when they use their card. This setting may override the alarm setting of the reader to which a cardholder may be presenting their card.

**Cardholder Events**

All changes to cardholders in the system shall be logged in the event summary and shall list the new value of the cardholder field. Similarly, any time a cardholder accesses a card reader; an event will be listed in the event summary. It shall be possible to automatically view all the events generated for a particular cardholder directly from the cardholder displays without having to run a separate report.

**User Tracing**

It shall be possible to enable a “trace” facility for a given cardholder transit through a given gate. This facility shall issue an alarm to the system every time the “trace” detects a transit.

**Uses Before Expiry**

It shall be possible to define the number of times that a cardholder may use their cards. This number shall be decremented every time the cardholder uses their card at a reader until the number is 0, when the cardholder shall no longer have access.

**Photo Identification Badges**

It shall be possible to capture portraits and signatures for all cardholders and then create photo identification badges using these images.

Image capture and printing of photo identification badges must be fully integrated into the system and must use the same database. Any system, which uses a separate photo badging system or separate database, will not be acceptable.

Capture devices must include Video Capture cards, Digital Cameras, scanners and signature tablets and capture facilities must support the MCI, TWAIN or WinTab standards for image capture. Devices may be connected directly via PC boards or through serial or USB ports. If using a Video Capture card for image capture, a live preview facility must be provided. Import and export facilities for images shall also be available.
The SMS system must provide a tool for the creation of photo badging card layouts. This must allow the incorporation of standard display creation facilities such as image import, a variety of fonts and text effects, a variety of tools for drawing objects and a facility for linking to the cardholder database and any user fields within this. This tool shall be the same tool as used for the creation of custom graphics in the SMS system so as to reduce training and maintenance requirements for the system.

In addition, it shall also be possible to incorporate bar codes and automatic magnetic stripe encoding facilities into the photo badging system.

**Visitor Management System**

The SMS shall provide a facility to manage and track visitors to the facility. This shall include both visitors who are given access control cards and visitors who are merely escorted by employees. It shall be possible to store information that defines who the visitor is, what company they represented and whom they were visiting in the facility. This information shall be displayed on a different display to that of a standard cardholder so that operators can enter visitor information easily and without the distraction of all the standard cardholder user fields.

Employees expecting visitors shall have the ability to be able pre-register visitors arrival in advance in order to speed up reception tasks, a Web based application for recording shall be available as part of the visitor management system. It shall be used from any workstation equipped with a standard Browser, provided that the user has the access rights for the advanced registration.

All information relevant to visitors shall be recorded in the system data base and the events generated when a visitor arrived and when a visitor departed shall be recorded in the standard SMS event summary.

In addition it will also be possible for the operator of the reception management system to be able to capture: e.g. Visitor photographs and with the use of a scanner documents such as ID cards, Passports or Driving Licenses

For visitors who are assigned access control cards, it shall be possible to automatically expire their cards after 1 day to prevent visitors from removing valid cards from the facility.

Based upon the visitor access rights is shall be possible to assign a visitor to an escort and require that access will be granted only when both the personal cards of the visitor and of the escort have been successfully been controlled.

Systems that do not provide a visitor pre-recording facility Web application shall not be acceptable.

**Muster Station**

The SMS shall provide a Muster Point function. This function shall be based on a display that will show, in case of emergency, the number and list of cardholders present in a given zone. An interactive terminal shall be used as local Muster Station to help managing personnel check the occupancy status of areas in emergency conditions.

**Special Access Control Criteria**

In addition to standard access control based upon personal card and data, two additional special access controls must be provided within the SMS for high security areas:
- Double transit access: transit acknowledge requires that two cards are authorized in order to obtain access authorization for both cardholders.
- Escort transit: escort transit will acknowledge a user access only if a user with “escort rights” obtained an access authorization just before the escorted user.

**Cardholder Application Programming Interface**

It shall be possible to provide an Application Programming Interface (API) to allow controlled access to the cardholder database. The purpose of this is to allow third party applications to be able to read and write to the cardholder database in a secure and controlled way.

**Cardholder Management Subsystems**

**Data Exchange with Enterprise Management Systems**

The SMS shall be capable of exchanging cardholder information with Human Resources modules of Enterprise Management Systems such as SAP/3®. Cardholder information shall be sent from the EMS to the SMS on a regular basis and automatically imported into the SMS in order to ensure that the Human Resources module and the SMS cardholder database have the same information. Transit information complemented by entry/exit reasons shall be sent from the SMS to the EMS on a regular basis in order to provide information for payroll processing.

Time & Attendance software in the SMS that is not certified by SAP® shall not be accepted.

**ELEVATOR CONTROL**

**General**

The FMS shall be capable of controlling access to different floors of a building by interfacing to an elevator controller. The elevator controller shall be capable of operating standalone in a separate hardware processor, and of supporting both low-level controls and high-level industry proprietary control protocols.

The elevator controller shall be capable of supporting up to a maximum of 64 high level and/or low-level elevators, 256 access groups and a maximum of 128 landings per elevator.

**Scheduler**

The scheduling of floor access shall be done at the server SMS computer and downloaded initially to the elevator controller.

The elevator controller independently of the server computer shall then maintain the schedule. In the event of communication link failure between the elevator controller and the server computer, floor access schedule shall continue unaffected.

**SOFTWARE FUNCTIONS**

**Event Initiated Programs**

Any event recorded in the system shall be able to initiate a predefined feedback program.

Physical and software outputs or groups of outputs shall be assignable through to an input point. When an input changes state the outputs assigned shall be activated as specified.
When alarm events of individual or groups of points are suppressed by event initiated programs, any occurrence of such alarm events during the suppress mode shall not be enunciated, reported or journalized.

Event Management

Events shall consist of alarms, changes of state in a monitored status point, cardholder movements, changes in system status and operator actions.

All journal events shall be recorded as necessary to include event description, condition, message, time of occurrence, operator responsible and any other information or tags.

Report Management

In addition to standard reports, SMS makes additional standard reports available.

Standard Reports

The following pre-formatted reports shall be available on the system:

- Door History
- Group Card Trail
- Cardholder List
- Occupancy Report
- Access Data Import/Export
- Access Permissions
- Time Period Information
- Zone Information
- Cardholder Details
- Cardholder Zone Information Report

Door History Report

A report shall be provided to list all cardholders who presented a card at any specified door or group of doors monitored by the SMS within a specified time period. The time period may be specified as an absolute start and end date and time, or as a period relative to the current time. The report shall contain the time and date and card number for each card presentation.

Group Card Trail Report

A report shall be provided so that when requested, the report shall search the database for cards corresponding to specified search criteria based on any card presentation data field. It shall then show all doors accessed by these cardholders in a specified time period. The time period may be specified as an absolute start and end time, or as a period previous to the current time. The report shall contain the date and time of access and the point identifier of each door accessed.

Cardholder List Report

A report shall be provided to produce a comprehensive listing of cards and cardholders.

It shall be possible to provide searching and filtering criteria based on most cardholder field. The cardholder details on which the report is based shall allow details to be specified as a range, or as matching or partially matching as applicable.

Occupancy Report

A report shall be provided so that when requested, the report shall determine which cardholders are in a specified zone at current time. Listing the Doors accessing the area for both the IN and
OUT directions shall specify the area. It shall be possible to include only certain cardholders in this report, as defined by the specified search criteria based on most cardholder fields.

**Access Data Import/Export Report**

A report shall be provided to create a file containing cardholder related details in an ASCII format ready to be exported from the system into a third party database package. It shall also be possible to import Cardholder Details ASCII files into the system to update the system from information from other third party database systems.

**Access Permissions, Zone, and Time Period Information Reports**

A number of reports shall be provided which lists configuration information for access permissions, zones and time periods. These reports shall allow the system administrator to check and confirm the configuration of the access control parts of the system.

**Cardholder Details Report**

A report shall be provided to produce a comprehensive listing of cardholders that match a set of search criteria.

It shall be possible to provide searching and filtering criteria based on most cardholder fields. The cardholder details on which the report is based shall allow details to be specified as a range, or as matching or partially matching as applicable.

**Cardholder Zone Information Report**

A report shall be provided which lists card readers in the facility to which a given cardholders have access. It is also possible to list all cardholders that have access to a given card reader.

**Guard Tour**

A guard tour facility shall be provided whereby the security administrator shall have flexibility in programming guard tours, utilizing any logical combination of card readers and input points in the system as tour check points.

For each tour it shall be possible for the operator to enter up to min. 75 tour positions (made up of card readers or digital inputs). For every tour position the operator shall be able to enter a time allowance for the guard to get to that position and up to 16 door points or digital inputs requiring alarm inhibit.

For each tour that is programmed the operator shall be able to enter a Guard ID (equivalent to the guards’ card key number), the first tour position and the time allowance to reach the first position. If these conditions are not satisfied or the tour is already active, then a message shall be sent to the operator message zone of the Operator Workstation. Activation of a tour is always initiated at an Operator Workstation.

Once a tour has been activated, at each step of the tour, a series of points may be controlled. If a particular step is not reached or the next tour point is reached either too early or too late, alarms will be generated.

It shall be possible for operators to manually de-activate a tour via the tour detail display. When de-activating a tour the operator shall be prompted to enter a reason consisting of up to 30 characters. Upon activation, deactivation and successful completion of a tour an event shall be logged to the event file and sent to the printer. The event message shall include date and time, Guard ID, tour number and the reason message (in the case of de-activation). For each tour the latest reason for de-activating the tour shall be viewed from the tour overview display.
The Guard Tour facility shall include an overview display listing the current status of each tour and detail displays showing the configuration details for each tour.

**EXCLUDE ALARM DETECTORS**
This functionality enables an Operator to manually exclude alarm generation for security detectors that are subject to maintenance or that are located in rooms or space that must be exceptionally occupied by personnel or maintenance staff. The exclusion functionality cannot degrade the security level over a given threshold. This means that only a maximum given number of security detectors can be excluded in a given area. An automatic exclusion function shall be provided to automatically exclude (within the same threshold limits) a detector that has been reported as out-of-service in order to avoid generation of false alarms. Any exclusion must be reported on the operator workstation and on local handling terminals.

**ALARM SYSTEM ARMING**
Alarm systems are organized in zones that are individually armed and unarmed automatically at given times based upon a time program and/or manually using an operator workstation or a local handling terminal. The latter can act only on zones that are assigned to the terminal. It shall be possible to postpone automatic arming in case of overtime work, within given limits, or to anticipate automatic arming in case of strike or other special events. Arming shall be performed per single zone, per groups of zones or for the entire security system handled by a single security panel.

**Deadman Timer**
The system shall provide a Deadman timer facility for continuous monitoring of each Operator Workstation to safeguard possible loss of guard operator.

The Deadman timer shall be able to function as follows:

1) If there is no operator activity for a configured period of time, then the operator will be signed off. If the operator does not sign back on to the system within the specified Deadman timer period, the system shall activate those output control points that are specifically configured for alerting external assistance. These special output points shall be referred to as Deadman points. A warning message can be configured to warn the operator before they are logged off.

2) It shall be possible for the Deadman timer to be configured such that if alarms are not acknowledged in a pre-configured period of time regardless of other activity on the system, then an alarm will be generated and a Deadman point controlled to a pre-configured alarm state. To facilitate the acknowledgement of these alarms, a special toolbar button is provided.

3) It shall also be possible to generate periodic Deadman alarms, which ensure that the operator has alarms to acknowledge regardless of the normal activity on the system.

**ASSET MANAGEMENT INTEGRATION**
Asset Location Management systems are intended to monitor people and mobile assets within the premises.

The Asset Location Management system shall be integrated with the Access Control system in order to:

- Continuously trace movements of personnel within the controlled premises. An Access Control system is able to trace people only when transiting through controlled gates.
- Check movements of high value mobile assets. An Asset Control reader installed in the vicinity of an Access Controlled gate, can check if a given asset that is transiting has been
authorized for exiting the premises and to check that the authorized personnel is checking out.

Data base of the Asset Location Management system shall be integrated within the SMS in order to avoid duplicated data entry or redundant information. The Asset Location system shall be part of the SMS and not a separate system interfaced to the SMS.

Control of the rights of a cardholder carrying a portable asset equipped with an identification tag (IF or IR) must be directly performed by the system. This feature is suited for control of high value assets that a cardholder can carry when exiting/entering the premises (test instruments, laptops, etc.).

**Reception Management**

Reception management shall provide all functions connected to efficiently manage visitors, avoiding unnecessary work and delays at the reception desk. Data relevant to visitors shall be entered only once and retained in the data base as long as necessary for multiple accesses of the visitor in the controlled facilities. A temporary card shall be assigned to each visitor in order to let him access the premises. Such card can be restricted in terms of accessible areas and access procedure (ex. escorted).

Reception management shall be allowed to access visitor recording data entered by the involved authorized personnel using Web services.

At least the following functions shall be provided by reception management:

- Checking in visitors on arrival.
- Checking out visitors on departure.
- Pre-registering visitors.
- Recalling pre-registered visitors.
- Keeping an index book of all contacts.
- Collecting and performing historical analysis of visitors’ related data.
- Assigning and collecting temporary cards.

**Time & Attendance**

**REASONS**

In Time and Attendance application, each transaction shall be tagged with a reason if applicable. Reasons shall be either entered using an Access Control or Time & Attendance Terminal (equipped with a keyboard) or be implicitly associated to a given terminal (entry or exit terminal) or terminal usage (magnetic card wiping direction). The transactions shall be recorded with the associated reason in order to provide information to the EMS (ex. SAP/3®).

**SAP/3® INTERFACE**

The Time & Attendance software shall have the capability of aSAP® Interface, basically oriented to the T&A that shall ensure data exchange in order to obtain personnel data from SAP/3® and provide back to SAP/3® all transactions with relevant reasons and time event codes as required by SAP/3®.

**CAFETERIA MANAGEMENT**

Cafeteria transits are special T&A transits recorder by a Control Access or Time & Attendance Terminal. The Terminal is installed in the Cafeteria and shall automatically tag the transactions as a Cafeteria usage. Use of the keyboard shall allow special cafeteria usage to be recorded (main course, beverages, etc.). The SMS shall be able to check the number of canteen transits per day, depending on the cardholder category, i.e.:

- Normal category: a single meal per day.
In addition, it shall be possible to print locally a cafeteria ticket and a log of transits on a double roll printer.

**ASSET AND PERSONNEL TRACING**

The Asset & personnel tracing function shall be fully integrated in the SMS. It shall be based upon a personal tags that must be carried on by employees and asset tags to be fixed to equipment and instruments that must be traced. Both RF and IR transmission must be established between the tags and receivers located in all rooms and zones that have to be controlled. Transmission should be mono-directional (from tag to receivers) and it frequency shall vary depending on the tag movement (i.e. a static tags shall transmit its presence with a low rate, while a moving tag shall transmit at a higher rate); this means that every tag shall contain a movement sensor. Low frequency (LF) short range fixed activators shall be used to obtain a better resolution. They shall transmit their unique code and make the tags that are within their reach to be activated to transmit (in IR and/or RF mode) their own code and that of the LF activator. Data received from RF and/or RF receivers will be then used by the system to better localize the tag position since the LF range is only 2-3 m. Solutions that do not provide a movement sensor in the tag in order to save battery life shall not be acceptable. Solutions that do not allow for battery substitution after the battery is discharged shall not be acceptable.

**RF READERS**

The RF Readers shall be able to be mounted either in the ceiling or on the walls. The RF readers shall have 360° coverage, with an effective read range of at least 60 feet (18 meters). If more that one RF reader detects the tag signal, it shall assign the tag to the reader with the highest signal strength. Using signal strength levels, multiple RF readers shall be able to be installed in a single room to narrow the location down to areas as small as a 10-foot radius. The RF readers shall operate at an unlicensed radio frequency, and have all necessary regulatory approvals.

**IR READERS**

The IR Readers shall be able to be mounted either in the ceiling or walls. The IR readers shall have 360° coverage, with an effective read range of at least 40 feet (12 meters). If more that one IR reader detects the tag signal, it shall assign the tag to the reader with the highest signal strength. Using signal strength levels, multiple IR readers shall be able to be installed in a single room to narrow the location down to areas as small as a 4-foot radius. The IR reader shall have horizontal accuracy of at least 3 inches, meaning that moving a tag 3 inches right or left can reproducibly result in a tag being sensed correctly by adjacent IR readers. The IR readers shall have all necessary regulatory approvals.

**LF ACTIVATORS**

The LF activators shall be mounted in the ceiling. They shall have an effective transmit range of 2-3 m. Should the need arise for a longer range, additional Slave activators shall be mounted that transmit the same identification code of the master unit. The LF activators shall have all necessary regulatory approvals.

**TAGS**

The tags shall be small, light in weight and embody digital electronics and miniature, battery-powered IR and RF transmitters that send a unique coded ID signals. These IR and RF signals are received by IR or
RF readers mounted throughout a facility, which then provide the real-time location and status of the tag. All tags shall use small batteries that can be easily replaced in the field.

All tags shall incorporate a motion sensor, which detect every occurrence of a tag in motion. The tags motion sensor shall be used to adjust the transmitting rate of the tag, such that the transmitting rate is faster when the tag is moving. The tags shall be configurable to have an “in-motion” transmitting rate as frequent as one transmit every 4 seconds. The "motionless" transmit rate shall also be configurable, and is typically set for one transmit every minute or every 10 minutes, which increases battery lifetime.

The onboard motion sensor shall also be monitored, to indicate if a tag is in motion or stationary. This function can also used to set an alarm for items that should not be moved, or inversely should not be stationary.

An LF receiver integrated in the tag shall receive codes from LF activators and initiate transmission when they enter in LF activator field. Transmitted message shall specify the LF activator code in order to let the system better localize the tag.

**Personal alarm IR/RF Tag (badge style)**

The personnel alarm IR/RF tags have a badge style and send the tag ID with a rate that depends on movement. They provide a large button that provides an alarm to the system when pressed.

**Personal alert IR/RF Tag**

The alert tags shall include one or two large on-board buttons that can be configured to initiate alarms/actions.

**Asset IR/RF Tag**

On-board contact-less tamper sensor, which detects tag removal and initiates tamper alarm. On-board temperature sensor with accuracy of at least +/- 2 °C. 2-wired input that can be connected to equipment to monitor and record time and duration of use, if a dry contact closure is provided which indicates when equipment is running.

Digital Video Management

The SMS shall integrated a Digital Video Management (DVM) system, as part of it or as a standard component of the SMS. The DVM allows viewing and digital recording of video from network connected cameras through the SMS user interface.

**Architecture**

The Digital Video Management system shall have an easily scalable architecture based on network connected cameras and transmission of video information across LAN or WAN.

Analog cameras shall be locally connected to the LAN using single channel or multi channel Video Streamer devices. Digital cameras shall be directly connected to the LAN. In both cases image compression shall be based upon standard algorithms such as Motion JPEG or MPEG4.

It shall easily be possible to move cameras to other locations in the facility by just disconnecting the camera from the network and reconnecting it to the network elsewhere.

Images recording shall occur on the system server or a given server in distributed server applications.

Systems requiring the cabling of analogue cameras back to a central PC, digital recorder or switching unit using analogue video cables shall not be acceptable.
Integration

Operator Interface
The Digital Video management system shall be fully integrated into the SMS. Operators using the standard Workstations of the system can also view live video from cameras, initiate recording of cameras, recall recorded images and configure different camera settings. All operator security criteria as described shall also apply to cameras and camera settings.

All operations to manage digital video shall be performed through the standard operator interface. Systems with a different operator interface for managing video shall not be acceptable. Systems requiring login of a different application for video management shall not be acceptable.

Event Based recording
Recording shall be able to be triggered by any alarm in the system. For any alarm that may occur, it shall be possible to specify which camera shall record, the frame rate for digital recording and the duration of the recording. This may be in addition to other recording schedules that are already assigned to the camera. Cameras must provide a pre-post alarm buffering.

Database Integration
All recorder images shall be fully integrated to the system database. It shall be possible to recall recordings connected to an event or a controlled point using standard displays of SMS.

SERVICES
The vendor should be capable of providing supporting services as detailed in the following sections.

Vendor Requirements – Acceptable Bidders and Bid Procedures.

The vendor shall be a recognized leader in facilities integration, security management, life safety management and building automation systems capable of supplying all necessary support services including hardware and software support, configuration services, system installation and commissioning and on-going service support.

A. Bids by Wholesalers, Contractors, Franchised Dealers, independent Honeywell Security Contractors or any firm whose principal business is not that of manufacturing and installing of security and digital video systems shall not be acceptable.

B. The system shall be engineered, programmed, and installed by personnel trained and regularly employed by the BMCS manufacturer local branch office.

C. Supplier shall have an in-place support facility within 20 miles of the site with technical staff, spare parts inventory and all necessary test and diagnostic equipment to service the installed systems with minimum qualifications including:
   1. Contractor shall have minimum of five- (5) factory-trained certified and authorized personnel with the ability to maintain, troubleshoot and provide training for Board personnel on the installed integrated security and digital video management system.
   2. Contractor must provide On-line communication Alert System with administrative and parental interface capability.
   3. On-line communication system must have unlimited ability for sub-grouping, telephone, email and text capability.
   4. On-line communication system must be accessible via an internet based personal computer and a standard telephone.
5. On-Line communication must have 24 / 7 service help desk.
6. On-Line communication system must have the ability to reach multiple phones, emails, text messages, and PDA’s simultaneously at a rate of 6400 text / per minute and 150,000 phone calls in a 15 Minute period.
7. Contractor will maintain complete and detailed service and maintenance records for each piece of equipment in a secure central database and provided upon request.
   • Such records must be made available in a paperless fashion, via e-mail notification or internet access at any time
   • Such records must be available through multiple sorting criteria including company wide, job site, contract, or individual piece of equipment.
   • Such records must be available to each and all technicians servicing any piece of equipment at any time
   • Such records must be secure and available to only authorized customer or service personnel
8. Contractor will have the ability to provide "real time" status of any current work order at anytime and make that status available via the internet
9. Contractor will have the ability to provide verification of completed work order or preventive maintenance form within one (1) hour of the completion of that service or maintenance action. A paperless version is preferred and may be required.
10. Contractor will have the ability to receive service requests via an Internet web site or a centralized call center. E-mail requests are not acceptable.
11. Contractor will have the ability to digitally capture customer signature for authorization of work and work completed; that signature is digitally recorded for verification reasons but will not be used again for any other purpose.
12. Contractor will provide work orders that are legible and contain sufficient information about the work performed.
13. Contractor must have certified quality processes (i.e., ISO 9002 certification) that ensure
   • Equipment is serviced and work actions recorded in a uniform manner every time, regardless of the assigned technician.
   • Service requests and preventive maintenance activities are tracked to completion in a timely manner
   • Information and data is properly and securely controlled

**Quality Assurance**
The software supplied, as part of this system shall be developed in an ISO 9001 compliant environment.

**Training**
The vendor either at vendor's premises or on site should provide standard training on all aspects of the system (operation, engineering, etc.).

**Configuration Services**
The vendor should be able to supply all necessary configuration services if required including Peripheral Level Controller configuration, database configuration, data entry, etc.

**Installation Services**
The vendor should be able to provide installation services for the system including validation services if necessary.
Hardware Maintenance
The vendor should be able to provide hardware maintenance and spare parts support if required. Spare parts shall be available for at least 10 years starting from system full operation start-up.

Alert Communications system
An integral part of this specification is the inclusion of an automated emergency call out system capable of notifying parents and first responders in the event of a security emergency in any one of the schools. The vendor must provide a Web Based service capable of being initiated via the SMS Server or workstation as part of this installation. The system must also be accessible via telephone or any web based PC. This system must have a Parental Interface to allow parents the ability to add or delete multiple phone numbers, email address’ or text devices. The system must have the capability to send out a minimum of 6400 text or email messages per minute and 150000 - 30 second telephone calls within 15 minutes. System should be a first party service. No subcontracting will be allowed with prior written authorization of the Bridgewater Board of Education. A minimum of 5 References must be provided for this service.

Software Enhancement & Software Support
The vendor should be able to provide a comprehensive software maintenance enhancement program for on-going support of the system.

END OF APPENDIX
PART 1 - GENERAL

1.01 SCOPE

1.02 SCOPE OF THIS DOCUMENT

This specification document provides the requirements for the installation, programming and configuration of a complete EST3 digital protocol analog addressable fire alarm system. This system shall include, but not be limited to, system cabinet, power supply, built in Signaling Line Circuit (SLC), 80 character LCD annunciator, built in dual line Digital Communicator associated peripheral devices, batteries, wiring, conduit and other relevant components and accessories required to furnish a complete and operational Life Safety System.

1.03 WORK INCLUDED

A. General Requirements

The contractor shall furnish and install a complete 24 VDC Addressable Analog, microprocessor-based fire alarm control panel as specified herein. The control panel shall include but not be limited to all control equipment, power supply, initiating devices, audible and visual indicating appliances as appropriate, conduit, wiring, fittings, and all other accessories necessary to provide a complete and operable system.

B. Labeling

All control panel equipment shall be labeled with the manufacturer's name and logotype to assure the integrity of the complete system. "Hybridized" systems (containing equipment from several different manufacturers) shall not be considered acceptable.

C. Agency Approvals

All equipment shall be listed by Underwriters Laboratories, Inc., approved by Factory Mutual or as accepted by the authority having jurisdiction (AHJ). The catalog numbers specified are those of EST.

The fire alarm system in its entirety shall be in compliance with all applicable fire and electrical codes and comply with the requirements of the local authority having jurisdiction over said
systems. Accessory components as required shall be catalogued by the manufacturer and U.L. Listed to operate with the manufacturer's control panel.

D. Specific U.L. Provisions

The system shall comply with the applicable provisions of the following U.L. Standards and Classifications:

UL#864, Control Units, Fire Protective Signaling Systems
UOJZ, Control Units, System
UOXX, Control Unit Accessories, System

E. Specific NFPA Standards

The system shall comply with the applicable provisions of the following current National Fire Protection Association (NFPA) standards:

NFPA 71, Installation, Maintenance, and Use of Signaling Systems for Central Stations
NFPA 72 Chapters 6, 7, 8, & 9 (formally NFPA 72A, B, C, & D), Installation, Maintenance, and Use of Protective Signaling Systems
NFPA 72 E, Automatic Fire Detectors
NFPA 90 A, Installation of Air Conditioning and Ventilating Systems
Life Safety Code #101, Safety to Life from Fire in Building and Structures

F. Wiring

For fire alarm use, wire and cable shall be U.L. Listed and a minimum of 18 AWG or as required by local codes and authority having jurisdiction. Raceways containing conductors identified as "Fire Protective Control Panel" conductors shall not contain any other conductors. No AC current carrying conductors shall be allowed in the same raceway with the DC fire alarm detection and signaling conductors.

1.04 SUBMITTALS

The owner or his designated representative shall approve all equipment submittal.

A. General Requirements

Manufacturers original catalog data and descriptive information shall be supplied for all major components of the equipment to
be supplied. Supplier’s qualifications shall indicate years in business, service policies, warranty definitions, and a list of similar installations. Contractor qualifications shall be supplied indicating years in business and prior experience with installations that include the type of equipment that is to be supplied. All pertinent information shall be supplied regarding the reliability and operation of the equipment to be supplied. Delivery dates of the equipment to be supplied shall be furnished. Installation and final test/acceptance dates of the equipment shall be supplied. Sufficient information shall be supplied so that the exact function of each installed device is known.

NOTE: DOCUMENTATION

Submittal of shop drawings shall contain at least one (1) booklet of original manufacturer specification and installation instruction sheets. Subsequent booklets may be copies. All equipment and devices on the shop drawings to be furnished under this contract shall be clearly marked in the specification sheets.

B. Equipment Qualification and Substitutions

The Fire Alarm System shall be EST AS PER DISTRICT STANDARDS. No substitutions will be approved.

The CONTRACTOR shall maintain a fully staffed service department located within 50 miles of the job site. The CONTRACTOR shall be a factory authorized distributor for EST during the bidding, construction and warranty phases of this project. In addition the CONTRACTOR shall employ a minimum of 7 FCI factory trained technicians and a 24 hour emergency service department.

The installation of the Fire Alarm System including all wiring, devices, control equipment, terminations and all programming shall be performed by factory trained and certificated technicians. These technicians must be certified by EST and employed by an authorized distributor during the entire course of the project. Certification of factory authorization must be included with the equipment submittals.

C. Satisfying the entire intent of these specifications

It is the contractor’s responsibility to meet the entire intent of these specifications. Deviations from the specified items shall be at the risk of the contractor until the date of final acceptance by the architect, engineer, and owner’s representative. All costs for removal, relocation, or replacement of a substituted item shall be at the risk of the electrical contractor.

1.05 CODES AND STANDARDS
The system shall comply with all local and state codes with no exceptions.

PART 2 – SYSTEM OPERATION

2.01 CONTROL PANEL

The fire alarm control panel (FACP) shall be the EST3 analog addressable control panel. The FACP must have a 5 amp power supply and be capable of expansion to a maximum of 45 total amps via bus connected expander modules that supervise low battery, loss off AC and loss of communication.

The FACP must have Day/Night sensitivity capabilities on detectors and be capable of supporting 127 analog addressable points and expandable to a maximum of 2500 analog addressable points. This shall be accomplished via eight signaling line circuits (SLC) capable of supporting a minimum of 250 devices each. The communication protocol on the SLC loop must be digital.

The FACP must support a minimum of six programmable I/O zones. The panel must have a built in 80 character LCD annunciator with the capability of having an additional eight supervised remote annunciators connected in the field.

The FACP must have a built in UL approved digital communicator. The communicator must allow local and remote up/downloading of system operating options, event history, and detector sensitivity data.

The FACP must automatically test the smoke detectors in compliance with NFPA standards to ensure that they are within listed sensitivity parameters and be listed with Underwriters Laboratories for this purpose.

The FACP must compensate for the accumulation of contaminants that affect detector sensitivity. The FACP must have day/night sensitivity adjustments, maintenance alert feature (differentiated from trouble condition), detector sensitivity selection, auto-programming mode (Jumpstart) and the ability to upgrade the core operating software on site or over the telephone.

The FACP shall have a Jumpstart feature that can automatically enroll all properly connected accessories into a functional system within 60 seconds of powering up the panel. Panels that do not have these capabilities will not be accepted.

The main communication bus (S-Bus RS485) shall be capable of class A or class B configuration with a total Bus length of 6,000 feet.

2.02 SYSTEM WIRING

The Signaling Line Circuit (SLC) and Data Communication Bus (S-BUS) shall be wired with standard NEC 760 compliant wiring, no twisted, shielded or mid capacitance wiring is required for standard installations.

All FACP screw terminals shall be capable of accepting 14-18 AWG wire.

All system wiring shall be in accordance with the requirements of NFPA 70, the California Electrical Code (CEC) and also comply with article 760 of the CEC.

2.03 SIGNALING LINE CIRCUITS
Each SLC shall be capable of a wiring distance of 10,000 feet from the SLC driver module (3-SSDC) and be capable of supporting 250 devices. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in under 3 seconds.

2.04 ANALOG DETECTOR FUNCTIONS

The products of combustion detectors must communicate analog values using a digital protocol to the control panel for the following functions:

- Automatic compliance with NFPA 72 standards for detector sensitivity testing
- Drift compensation to assure detector is operating correctly
- Maintenance alert when a detector nears the trouble condition
- Trouble alert when a detector is out of tolerance
- Alert control panel of analog values that indicate fire.

2.05 SENSITIVITY FUNCTION

The FACP shall have the ability to set three different sensitivity levels. A zone can be programmed to a day and a night sensitivity value. The day/night schedule shall allow for 16 holiday dates that are user programmable to allow the FACP to respond at the night level on those days.

2.06 PROGRAMMABLE I/O PORTS

The FACP shall support six programmable flexible circuits that are capable of being programmed as supervised reverse polarity notification circuits or supervised auxiliary power circuits that can be programmed as continuous, reset able or door holder power. The circuits shall also be programmable as input circuits in class A or B configurations to support dry contact or compatible two wire smoke detectors.

Addressable Notification Module

The contractor shall furnish and install where indicated on the plans, addressable notification modules, EST SIGA-CC1S. The modules shall be U.L. listed compatible with the EST3 fire alarm control panel. The notification module must provide one class A (Style Z) or class B (Style Y) notification output with one auxiliary power input. The notification module must be suitable for mounting in a standard 4 square electrical box and must include a plastic cover plate. The notification module must provide an LED that is visible from the outside of the cover plate. The notification module must be fully programmable for such applications as
required by the installation. The ANM shall reside on the SLC loop and can be placed up to 10,000 ft. from the control SLC loop module.

2.07 ANNUNCIATORS

The main control must have a built in annunciator with an 80-character LCD display and feature LED’s for General alarm, Supervisory, System trouble, System Silence and Power. When in the normal condition the LCD shall display time and date based on a 200 year clock which is capable of automatic daylight savings time adjustments. All controls and programming keys are silicone mechanical type with tactile and audible feedback. Keys have a travel of .040 in... No membrane style buttons will be permissible. The annunciator must be able to silence and reset alarms through the use of a keypad entered code, or by using a firefighter’s key. The annunciators must have twenty levels of user codes that will allow the limitation of operating system programming to authorized individuals.

2.08 REMOTE ANNUNCIATORS

The fire system shall be capable of supporting up to eight remote annunciators. LCD Remote annunciator model 3-LCDANN shall have the same control and display layout so that they match identically the built in annunciator. Remote annunciators shall be red in color. Remote annunciators shall have the same functionality and operation as the built in annunciator. All annunciators must have 80-character LCD displays and must feature five LED’s for general alarm, supervisory, system trouble, system silence, and system power. All controls and programming keys are silicone mechanical type with tactical and audible feedback. Keys shall have a travel of .040 inches. No membrane style buttons will be permitted.

The annunciator must be able to silence and reset alarms through the use of a code entered on the annunciator keypad or by using a firefighter key. The annunciator must have twenty levels of user codes that will limit the operating system programming to authorized individuals. The control panel must allow all annunciators to accommodate multiple users input simultaneously. Remote annunciators shall be capable of operating at a distance of 6000 feet from the main control panel on unshielded non-twisted cable.

The fire system shall be able to support up to eight I/O modules that shall be used to drive remote LED graphic style displays and accommodate up to eight dry contact type switch inputs. The I/O modules shall each drive up to 40 LEDs without requiring external power connections. The I/O module inputs shall be supervised and be suitable for alarm and trouble circuits as well as reset and silence switches. The system shall also support up to 40 LED drivers that reside on the two-wire SLC loop. These driver boards shall contain 80 LED outputs that are powered by an external power source.

2.09 SERIAL/PARALLEL INTERFACE
The fire system shall be capable of supporting up to two serial / parallel interfaces that are capable of driving standard computer style printers. The interface shall be programmable as to what information is sent to it and shall include the ability to print out Detector Status by point, Event History by point and System Programming.

2.10 DISTRIBUTED POWER MODULE

The contractor shall supply a power module SIGA-APS compatible with the EST3 fire alarm control panel. The power module must have 6.5 amps of output power, output circuits rated at 3amps each. The fire system shall be capable of supporting up to 125 power modules.

2.11 DIGITAL COMMUNICATOR

The digital communicator must be an integral part of the control panel and be capable of reporting all zones or points of alarm, supervisory, and trouble as well as all system status information such as loss of AC, low battery, ground fault, loss of supervision to any remote devices with individual and distinct messages to a central station or remote station. The communicator must also be capable of up/downloading of all system programming options, Event history and Sensitivity compliance information to a PC on site or at a remote location.

The communicator shall have an answering machine bypass feature that will allow the panel to respond to communication even on phone lines that have other communication equipment present. The communicator must be capable of reporting via SIA and Contact ID formats. The communicator shall have a delayed AC loss report function which will provide a programmable report delay plus a 10-25 min random component to help ease traffic to the central station during a power outage. No controls that use External modems for remote programming and diagnostics shall be accepted.

2.12 DRY CONTACTS

The FACP will have three form “C” dry contacts, one will be dedicated to trouble conditions, the other two will be programmable for alarm, trouble, sprinkler supervisory, notification, pre-alarm, waterflow, manual pull, aux. 1 or aux. 2. The trouble contact shall be normal in an electrically energized state so that any total power loss (AC and Backup) will cause a trouble condition. In the event that the Microprocessor on the FACP fails the trouble contacts shall also indicate a trouble condition.

2.13 GROUND FAULT DETECTION

A ground fault detection circuit, to detect positive and negative grounds on all field wiring. The ground fault detector shall operate the general trouble devices as specified but shall not cause an alarm to be sounded. Ground fault will not interfere with the normal operation, such as alarm, or other trouble conditions.

2.14 OVER CURRENT PROTECTION
All low voltage circuits will be protected by microprocessor controlled power limiting or have a self restoring polyswitches for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.

2.15 TEST FUNCTIONS

A “Lamp Test” mode shall be a standard feature of the fire alarm control panel and shall test all LED’s and the LCD display on the main panel and remote annunciators.

A “Walk Test” mode shall be a standard feature of the fire alarm control panel. The walk test feature shall function so that each alarm input tested will operate the associated notification appliance for two seconds. The FACP will then automatically perform a reset and confirm normal device operation. The event memory shall contain the information on the point tested. The zone tripped, the zone restore and the individual points return to normal.

A “Fire Drill” mode shall allow the manual testing of the fire alarm system notification circuits. The “Fire Drill” shall be capable of being controlled at the main annunciator, remote annunciators and via a remote contact input.

A “Bypass Mode” shall allow for any point or nac circuit to be bypassed without effecting the operation of the total fire system.

2.16 REMOTE INPUT CAPABILITIES

The control panel shall have provisions for supervised switch inputs for the purpose of Alarm reset and Alarm and trouble restore.

2.17 NOTIFICATION APPLIANCE MAPPING STRUCTURE

All notification circuits and modules shall be programmable via a mapping structure that allows for a maximum of 250 output groups. Each of these groups shall have the ability to be triggered by any of the panels 125 Zones. A zone may trigger from groups individually, or may contain a global trigger for manual pull stations, fire drills and two different system alarms. Additionally each Zone will individually control the cadence pattern of each of the Groups that it is “Mapped” to so that sounders can indicate a variety of conditions. The Zone shall be capable of issuing a different cadence pattern for each of the Groups under its control. The mapping structure must also allow a group to be designated to “ignore cadence” for use with strobes and other continuous input devices. Zones shall have eight different output categories; Detector alarm, Trouble, Supervisory, Pre-alarm, Waterflow, Manual pull, Zone auxiliary one and Zone Auxiliary two. Each of the categories shall have the ability to control from 1 to 8 output groups with a cadence pattern. The patterns are; March code, ANSI 3.41, Single Stroke Bell Temporal, California code, Zone 1 coded, Zone 2 coded, Zone 3 coded, Zone 4 coded, Zone 5 coded, Zone 6 coded, Zone 7 coded, Zone 8 coded, Custom output pattern 1, Custom output pattern 2, Custom output pattern 3, Custom output pattern 4, and Constant. This
2.18 **NETWORK CONNECTION**

The FACP shall have provisions for a connection to the owner’s network for communication to the Fireworks software. EST Netcomm-1S

2.19 **DOWNLOADING SOFTWARE**

The fire alarm control panel must support up/downloading of system programming from a PC under Windows XP. The FACP must also be able to download the detector sensitivity test results and a 1000 event system event buffer to the PC. Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built in digital communicator and shall not require an external modem to be connected to the panel. The downloading software shall contain a code that will block unauthorized persons from accessing the panel via direct connection or over the phone lines.

2.20 **FACILITY MANAGEMENT SOFTWARE**

The FACP must support facility management software capable of providing off site access to FACP data that is necessary to manage fire system operation. A software package capable of uploading the detector sensitivity test results and the 1000 event system event buffer to the PC shall be required as part of the bid package. Communication shall take place over a direct connection to the PC and/or via the same telephone lines as the built in digital communicator. The facility management package must be separate from the downloader package and must not be capable of affecting programmed system options. EST Fireworks

2.21 **SERVICE REMINDER**

The FACP shall be capable of automatically generating textual service reminder and the main and remote annunciator LCD’s to inform the user of required testing or service. The service reminder shall not interfere with the normal operation of the FACP.

2.22 **ENGLISH LANGUAGE DESCRIPTIONS**

The FACP shall provide the ability to have a text description of each system device, input zone and output group on the system. The use of individual lights to provide descriptions will not be acceptable.

2.23 **SYSTEM OPERATION**

Alarm

When a device indicates any alarm condition the control panel must respond within 3 seconds. The General Alarm or Supervisory Alarm LED on the annunciator(s) should light and the LCD should prompt the user as to the number of current events. The alarm information must be
stored in event memory for later review. Event memory must be available at the main and all remote annunciators. When the alarmed device is restored to normal, the control panel shall be required to be manually reset to clear the alarm condition, except that the alarms may be silenced as programmed. An alarm shall be silenced by a code or Firefighter key at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur (subsequent alarm feature). When alarms are silenced the silenced LED on the control panel, and on any remote annunciators shall remain lit, until the alarmed device is returned to normal.

2.24 TROUBLES

When a device indicates a trouble condition, the control panel System Trouble LED should light and the LCD should prompt the user as to the number of current events. The trouble information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. When the device in trouble is restored to normal, the control panel shall be automatically reset; the trouble restore information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. A trouble shall be silenced by a code or Firefighter key at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur.

2.25 SUPERVISION METHODS

Each SLC loop shall be electrically supervised for opens and ground faults in the circuit wiring, and shall be so arranged that a fault condition on any loop will not cause an alarm to sound. Additionally, every addressable device connected to the SLC will be supervised and individually identified if in a fault condition. The occurrence of any fault will light a trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition. Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder, but will not interfere with the proper operation of any circuit which does not have a fault condition.

PART 3 – SYSTEM COMPONENTS

3.01 CONTROL UNIT

System Cabinet

Mounting
The system cabinet shall be red and can be either surface or flush mounted. The cabinet door shall be easily removable to facilitate installation and service.

3.02 AUDIBLE SYSTEM TROUBLE SOUNDER

An audible system trouble sounder shall be an integral part of the control unit. Provisions shall also be provided for an optional supervised remote trouble signal.

3.03 POWER SUPPLY AND CHARGER:

The entire system shall operate on 24 VDC, filtered switch mode power supply with the rated current available of 5 Amps. The FACP must have a battery charging circuit capable of complying with the following requirements:

Twenty-four (24) hours of battery standby with five (5) minutes of alarm signaling at the end of this twenty-four (24) hour period (as required per NFPA 72 central station signaling requirements) using rechargeable batteries with automatic charger to maintain gel-cell batteries in a fully charged condition.

The power supply shall comply with U.L. Standard 864 for power limiting.

The FACP will indicate a trouble condition if there is a loss of AC power or if the batteries are missing or of insufficient capacity to support proper system operation in the event of AC failure. A “Battery Test” will be performed automatically every minute to check the integrity of the batteries. The test must disconnect the batteries from the charging circuit and place a load on the battery to verify the battery condition.

In the event that it is necessary to provide additional power one or more Distributed Power Modules shall be used to accomplish this purpose.

3.04 CONNECTIONS AND CIRCUITS

Connections to the light and power service shall be on a dedicated branch circuit in accordance with the National Fire Alarm Code NFPA 72, National Electrical Code (NEC) NFPA 70, and the local authority having jurisdiction (AHJ).

The circuit and connections shall be mechanically protected.

A circuit disconnecting means shall be accessible only to authorized personnel and shall be clearly marked “FIRE ALARM CIRCUIT CONTROL”.

In the event that the drawings include a remote LCD annunciator the CONTRACTOR must provide an additional CPU, FIBER CARD, and Components to the EST3 system to correctly supervise the LCD annunciator.

PART 4 – ACCESSORY COMPONENTS
The FACP shall support the following devices on the RS-485 data bus:

3-LCDANN  LCD Remote Annunciator

The FACP shall support the operation of 250 total devices per SLC loop without regard to device type. The following devices shall be supported:

- SIGA-PS  Analog Photoelectric Smoke detector
- SIGA-HRS  Analog Heat Sensor
- SIGA-CR  Addressable Relay Module
- SIGA-SD  Duct Detector Enclosure
- SIGA-CTI  Addressable Input Module (replaces the SD505-FRCM-4)
  Pull Station (with addressable input module)

Furnish and install, where shown on the drawings, the following devices

4.01 MANUAL FIRE ALARM STATIONS

Manual Fire Alarm Stations shall be non-coded, single action type that does not require tight grasping, pinching or twisting of the wrist. Pull station shall be key operated test-reset lock in order that they may be tested, and so designed that after actual Emergency Operation, they cannot be restored to normal except by use of a key. The reset key shall be so designed that it will reset Manual station and open FACP without use of another key.

An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of fifty feet, front or side. Manual Stations shall be constructed of die cast metal with clearly visible operating instructions on the front of the stations in raised letters.

Stations shall be suitable for surface mounting on matching backbox, or semi-flush mounting on a standard single-gang box, and shall be installed within the limits defined by the Americans with Disabilities Act (ADA) dependent on Manual Station accessibility or per local requirements. Manual Stations shall be installed in conjunction with an Addressable Input Module (AIM) or Mini Input Module (MIM). Manual Stations shall be Firelite BG-12 with SIGA-CTI addressable module mounted in backbox.

4.02 REMOTE POWER SUPPLIES

The Remote Power Supplies for Notification appliances shall be the SIGA-APS.

4.03 NOTIFICATION DEVICES
The visible and audible/visible signal shall be EST Genesis series signal devices and be listed by Underwriters Laboratories Inc. per UL 1971 and/or 1638 for the ST and also UL464 for the HS.

The notification appliance (combination audible/visible units only) shall produce a peak sound output of 90db or greater as measured in an anechoic chamber. The signaling appliance shall also have the capability to silence the audible signal while leaving the visible signal energized with the use of a single par of wires additionally, the user shall be able to select either continuous or temporal tone output with the temporal signal having the ability to be synchronized.

The visible signaling appliance shall maintain a minimum flash rate of 1Hz or greater regardless or power input voltage. The appliance shall also be capable of meeting the candela requirements of the blueprints presented by the Engineer and ADA.

The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with terminals with barriers for input/output wiring and be able to mount to a single gang or double gang box or double workbox with the use of an adapter plate. The unit shall have an input voltage range of 20-30 volts with either direct current or full wave rectified power.

4.04 SMOKE DETECTORS

Smoke detectors shall be EST SIGA-PS ceiling mounted, Analog/Addressable photoelectric smoke detectors. The combination detector head and twist lock base shall be U.L. listed compatible with the EST3 fire alarm control panel. The base shall be the appropriate twist lock base SIGA-SB.

The smoke detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel’s reset switch. The sensitivity of the detector shall be capable of being selected and measured by the control panel without the need for external test equipment.

The vandal security-locking feature shall be used in those areas as indicated on the drawing. The locking feature shall be field selectable when required. It shall be possible to perform a sensitivity test of the detector without the need of generating smoke. The test method shall simulate the effects of products of combustion in the chamber to ensure testing of the detector circuits.

Detectors shall have completely closed back to restrict entry of dust and air turbulence and have a 30 mesh insect screen. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

4.05 HEAT DETECTORS
Furnish and install analog/addressable heat detectors, SIGA-HRS. The combination heat detector and twist lock base shall be U.L. listed compatible with the EST3 fire alarm control panel. The heat detector shall have a flashing status LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady at full brilliance. The detector may be reset by actuating the control panel’s reset switch. The vandal security-locking feature shall be used in those areas as indicated on the drawings. Electronics of the unit shall be shielded to protect against false alarms from E.M.I. and R.F.I.

4.06 DUCT DETECTORS

Duct Detector shall be SIGA-SD.

PART 5 - WIRING

5.01 INSTALLER’S RESPONSIBILITIES

The installer shall coordinate the installation of the fire alarm equipment. All conductors and wiring shall be installed according to the manufacturer’s recommendations.

It shall be the installer’s responsibility to coordinate with the supplier, regarding the correct wiring procedures before installing any conduits or conductors.

5.02 INSTALLATION OF SYSTEM COMPONENTS

System components shall be installed in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, California Electrical Code (CEC), local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ).

All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per California Electrical Code, Article 760.

5.03 SPECIAL INSTALLATION REQUIREMENTS

All fire alarm equipment panel and field devices shall be installed in conduit EMT (electric metallic tubing).

All system programming and system pretests must be performed by the campus vendor Edwards Service, a Division of Tyco, Inc.

PART 6 – WARRANTY AND FINAL TEST

6.01 GENERAL

A. Any electrical defects for one year (365 days) from the date of final acceptance.
6.02 FINAL TEST

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

A letter from the Contractor certifying that the system is installed entirely in accordance with the system manufacturer’s recommendations and within the limitations of the required listings and approvals, that all system hardware and software has been visually inspected and functionally tested by a manufacturer’s certified representative, and that the system is in proper working order.

A. Before the installation shall be considered completed and acceptable by the awarding authority, a test of the system shall be performed as follows:

1. The contractor’s job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.

2. At least one half of all tests shall be performed on battery standby power.

3. Where application of heat would destroy any detector, it may be manually activated.

4. The communication loops and the indicating appliance circuits shall be opened in at least two (2) locations per zone to check for the presence of correct supervisory circuitry.

5. When the testing has been completed to the satisfaction of both the contractor’s job foreman and the representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.

6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.

7. Prior to final test the fire department must be notified in accordance with local requirements.

6.03 AS BUILT DRAWINGS, TESTING, AND MAINTENANCE INSTRUCTIONS
A. A complete set of reproducible “as-built” drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system.

B. Operating and instruction manuals shall be submitted prior to testing of the system. Four (4) complete sets of operating and instruction manuals shall be delivered to the owner upon completion.

C. Complete, accurate, step-by-step testing instructions giving recommended and required testing frequency of all equipment, methods for testing each individual piece of equipment, and a complete trouble shooting manual explaining how to test the primary internal parts of each piece of equipment shall be delivered to the owner upon completion of the system.

D. Maintenance instructions shall be complete, easy to read, understandable, and shall provide the following information:

1. Instruction on replacing any components of the system, including internal parts.

2. Instructions on periodic cleaning and adjustment of equipment with a schedule of these functions.

3. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.

4. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

**6.04 OWNER TRAINING**

A. The manufacturer shall provide factory training to the two technicians from the school district. These technicians shall be trained and certified as manufacturers certified technicians to perform any work on the system after the installation of the system. All cost for this training is at the fire alarm contractor’s expense as is to be figured into the price of the project.

**END OF SECTION**
PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Earthwork operations, including excavation, filling, and compaction:
   1. Removal of rock.
   2. Removing refuse and debris remaining from site clearing operations.
   3. Rough and finish grading of site. Compacting fill and backfill to attain indicated grades.
   4. Erosion and sediment control.
   5. Excavating for footings and foundations.
   6. Requirements for trenching and bedding of pipeline trenches performed under separate respective utility sections.
   7. Furnishing and installing granular base course, as required, under vapor retarders at interior concrete slabs on grade, behind retaining walls, and for trench bedding.

B. Referenced Sections:
   1. Section 012100 - Allowances.
   2. Section 013300 - Submittal Procedures.
   3. Section 014500 - Quality Control: Administrative requirements for laboratory testing.
   4. Section 015200 - Construction Facilities.
   5. Section 017123 - Field Engineering: General requirements for engineering services during construction.
   7. Section 018113 - Sustainable Design Requirements.
   8. Section 031000 - Structural Concrete: Requirements for vapor retarder.
   9. Section 311000 - Site Clearing: Requirements for clearing, grubbing, and the disposition of unwanted waste and utilities.
   10. Section 329119 - Landscape Grading.
   11. Section 334613 - Foundation Drainage.

C. Interpretations: Specific requirements included in this Section are intended to comply with the recommendations of the Geotechnical Investigation Report, including all current supplements. If discrepancies or conflicts between this Section and the Geotechnical Investigation Report occur, interpretations will be made by the Geotechnical Engineer. Since the Geotechnical Investigation Report is based on a limited sample of testing conducted on the site, actual conditions may dictate recom-
mendations different from this Section or the Geotechnical Investigation Report.

D. Comply with construction waste management requirements specified in Section 017419.

E. Comply with applicable procedural requirements of Section 018113.

1.02 REFERENCES

A. ASTM International (ASTM):
   1. C 33-08 - Specification for Concrete Aggregates.
   3. D 698-07 - Test Method for Laboratory Comparison Characteristics of Soil Using Standard Effort (12,000 ft·lb/ft³ [600 kN·m/m³]).

B. California Building Standards Code (CBSC):
      a. Chapter 11B - Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Publicly Funded Housing:
         1) Division II - Site Accessibility.
            a) Section 1129B - Accessible Parking Required.
               (1) 1129B.3 - Parking Space Size.
   c. Chapter 33 - Safeguards During Construction.

C. California Occupational Safety and Health Standards (OSHA):
   1. Article 6 - Excavations and Shoring.

D. California Department of Transportation (CALTRANS):

E. Public Works Standards, Inc. (PWS):

F. United States Green Building Council (USGBC):
   1. Leadership in Energy and Environmental Design (LEED):

1.03 GEOTECHNICAL REPORTS

A. Subsurface investigations have been conducted at the site and the results are contained in the Geotechnical Investigation Report, copies of which
are available, for review as information only, at the offices of the Architect and the Geotechnical Engineer.

B. Interpretations: Specific requirements included in this Section are intended to comply with the recommendations of the Geotechnical Investigation Report, including all current supplements. If discrepancies or conflicts between this Section and the Geotechnical Investigation Report occur, interpretations will be made by the Geotechnical Engineer. Since the Geotechnical Investigation Report is based on a limited sample of testing conducted on the site, actual conditions may dictate recommendations different from this Section or the Geotechnical Investigation Report.

1.04 DEFINITIONS

A. Excavation consists of removal and disposal of material encountered when establishing required grade elevations.

B. Material includes soils, obstructions visible on ground surface, underground structures, and utilities indicated to be removed, and other items encountered that are not classified as rock excavation or unauthorized excavation.

C. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of Architect.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Pre-Grading Conference: Schedule conference at job site in advance of beginning work with representatives of the Owner, Architect, Civil Engineer, Geotechnical Engineer, grading subcontractor, paving subcontractors, landscaping subcontractor, and building department. Review and resolve conflicts involving requirements of details and specifications. Record discussions and furnish a copy to all attendees.

B. Layout and Grades: Contractor shall provide construction surveying by a registered land surveyor or professional civil engineer licensed to practice in the State of California for the following:
   1. Establishment of field survey control lines and temporary benchmarks.
   2. Providing line and grade offset stakes for curb/gutter and furnishing of cut sheets to the Owner's Representative and the Owner.
   3. Providing line and grade survey for water, storm and sanitary sewer pipes and location of structures.
   4. Providing building layout lines and grading stakes.
   5. Provision and maintenance of all surveying stakes, lines, and benchmarks.

C. Sequencing: Place rock blanket prior to diverting water to storm lines or drainage channels.

D. Scheduling: Schedule completion of rock blanket and drainage devices to coincide with any grading that alters the normal flow of storm water drainage.
1.06 SUBMITTALS

A. Quality Control Submittals:
   1. Test Reports: In accordance with the provisions of Section 013300, and in conjunction with the requirements of Section 014500, submit the following:
      a. Test reports and certifications relative to import material.
      b. Verification of excavations and footing subgrades.
      c. Field density test reports.
      d. Optimum moisture/maximum density curves for each type of soil encountered.
      e. Report of actual unconfined compressive strength and results of bearing tests of each strata tested.
      f. Soil compaction reports prior to the placement of concrete and excavations for footings.
   2. Certificates: Submit as specified in Geotechnical Report.
      a. Grading.
      b. Final compaction report.

B. Sustainable Design Submittals:
   1. Product Data and Certification Letter for Credit MR 4.1 and Credit MR 4.2: Indicate percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content. Include statement indicating costs for each product having recycled content.
   2. Product Data for Credit MR 5.1 and Credit MR 5.2: For regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
      a. Submit in record form approved by the Owner’s Representative the amount (in tons or cubic yards) of material imported to the Project.
      b. Provide manifest, weight tickets, receipt, and invoices that identify origin and quantities of all imported or on-site recycled materials approved and used as imported materials.

1.07 QUALITY ASSURANCE

A. Certification:
   1. Certify source and type of backfill proposed to be incorporated into the work.
   2. Certify levels of excavations, footings, and subbed grades by licensed surveyor.
      a. Conform to the applicable requirements of Section 017123 and Geotechnical Report.
1.08 FIELD CONDITIONS

A. Underground Utilities: Buried utility lines may exist. If encountered, notify the Architect for direction on preservation, relocation, or demolition.
   1. Cooperate with Owner and utility companies in maintaining respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
   2. Do not interrupt existing utilities serving facilities occupied by Owner or others, except when authorized in writing by Owner, and then only after acceptable temporary utility services have been provided.
   3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

B. Rock: Geotechnical Investigation indicates presence of rippable and non-rippable rock. Contractor shall use equipment equal to Caterpillar D9L Series to remove rock subject to ripping methods.
   1. Coordinate with Structural Engineer regarding use of rock benching to support foundations.

PART 2 - PRODUCTS

2.01 DESCRIPTION

A. Regulatory Requirements: Comply with applicable portions of codes and regulations of governmental agencies having jurisdiction, including applicable portions of CBC Chapter 33. Where those requirements conflict with the Contract Drawings, comply with the more stringent provisions.
   1. Soils Report: Comply with recommendations of the Geotechnical Investigation report referenced. Grading, backfill, and compaction provisions stated in this Section are minimum recommendations.
   2. Geotechnical Engineer: The Owner will retain the Project Geotechnical Engineer who will have the responsibilities of observing the performance of the work of this Section, making supplementary recommendations, and approving or rejecting import materials proposed for use.
      a. Conform to the recommendations of the Geotechnical Engineer.
   4. Comply with appropriate provisions of the Storm Water Pollution Prevention Plan regarding cleaning and protection.

2.02 SUSTAINABILITY REQUIREMENTS

A. LEED Goals: For information on LEED goal requirements, refer to Section 018113. Contractor shall provide a narrative for the following LEED goals:
   1. MR Credit 2.1 and MR Credit 2.2: Facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.
      a. The actual dollar cost of the amount of this product used on the project must be tracked. The actual dollar cost shall be separated into the amount that meets the requirements of Section 018119 and amount that does not meet the requirements (for
2.03 PERFORMANCE CRITERIA

A. Performance Requirements: Classification of soils when made in connection with the work of this Contract shall be in accordance with the applicable requirements of ASTM D 2487 and ASTM D 2488.

2.04 MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Structural Fill: Provide native soils approved for backfill by the Geotechnical Engineer, or when required, granular, non-expansive import fill material approved for soil-fills, soil-rock fills, or rock fills by the Geotechnical Engineer.

1. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand conforming to ASTM D 2940, with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

2. Fill material should not contain more than 30% gravel and rock sized particles (material larger than 3/4-inch).

   *a. If more than 30% rock is used, the fill material is classified as a rock fill and is subject to special handling and placement criteria.

   b. Soils that have an expansion index greater than 20 should not be used within the upper 4 feet of finish building pad or within the upper 2 feet of finish hardscaping subgrade.

C. Backfill Material: Provide native soils approved for backfill by the Geotechnical Engineer, or when required, granular, non-expansive import backfill material, having the following characteristics:

1. Liquid Limit: Not greater than 30, as determined in accordance with ASTM D 4318.

2. Plasticity Index: Not greater than 12, as determined in accordance with ASTM D 4318.

3. Expansion Index: Not greater than 20, as determined in accordance with UBC Standard 18-2.
4. Gradation: Fill material shall not contain rocks or lumps over 6 inches in any dimension and not more than 15 percent larger than 2-1/2 inches. Comply with the following:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENTAGE PASSING</th>
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<tbody>
<tr>
<td>3-inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 200</td>
<td>Less than 30</td>
</tr>
</tbody>
</table>

D. Subslab Base (Sand):
1. Provide clean, free-draining sand having a Sand Equivalent of not less than 30, as determined in accordance with ASTM D 2419.
2. ASTM C 33 having a Sand Equivalent of not less than 30 as determined in accordance with ASTM D 2419.

E. Subslab Base (Aggregate):
1. Provide clean, free-draining aggregate, having a gradation equal to the following:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENTAGE PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-inch</td>
<td>100</td>
</tr>
<tr>
<td>3/8</td>
<td>30-100</td>
</tr>
<tr>
<td>No. 4</td>
<td>0-5</td>
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</table>

F. Utility Trench Pipe Bedding: Clean, free-draining sand, gravel, crushed aggregate, or native materials having a Sand Equivalent of not less than 30, as determined in accordance with ASTM D 2419.

G. Porous Fill: 3/8 inch to 1/2-inch washed, uncrushed pea gravel.

H. Water: Clean and free from deleterious amounts of acids, alkalis, salts, and organic matter.

I. Geotextile Tensile Fabric: Mirafi 600X, or equal.

J. Filter Fabric: Mirafi 140N, or equal.

K. Vapor Retarder: Refer to Section 033100.

L. Shoring Materials: Provide materials for shoring and bracing in good and serviceable condition.

M. Synthetic Soil Binder: Durasoil synthetic organic dust control agent, as manufactured by Soilworks, LLC, or other standard manufacturer’s spray on adhesives designed for dust suppression.
1. Product shall be non-toxic, non-dissipating, non-curing, colorless, and odorless.
2. Product shall be capable of being applied in any weather conditions.
N. Rock Blanket: Clean, smooth Carol Canyon cobble, obtained from KRC Rock, or equal single source, of color and type as indicated on Contract Drawings. Rock shall have an average size of 8 inches to 12 inches, none smaller than 6 inches.

2.05 SOURCE QUALITY CONTROL

A. Import fill material shall be tested by laboratory and approved by Geotechnical Engineer prior to importing.
   1. Notify Geotechnical Engineer of location of material proposed for use at least 72 hours in advance of import operations.

B. Contractor shall comply with the sampling requirements in the guidelines and will be required to pay for removal and disposal costs of any soil brought on site determined not to conform to Department of Toxic Substance Control (DTSC) requirements and standards for school sites. Refer to the document Clean Imported Fill Material dated October 2001 issued by DTSC.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Prior to and during the work of this Section, examine site conditions and previously performed work, and verify that soil conditions are as characterized in the Geotechnical Investigation report referenced.

3.02 PREPARATION

A. Protection:
   1. Provide and maintain planking and protection for walks, curbs, and drains. Box around corners of building walls to prevent damage by trucking, grading, and other operations.
   2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
   3. Barricade open excavations occurring as part of this work with a minimum 5-foot setback and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
   4. Keep adjacent streets and drives clean of any dirt created by earthwork operations.

B. Erosion and Sediment Control: Comply with requirements and recommendations of Contract Civil Drawings.

C. Dust Control:
   1. Control dust on and near the work, and on and near off-site borrow areas.
   2. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors, and concurrent performance of other activities on the site.
   3. Install synthetic soil binder in accordance with manufacturer's instructions as required to control dust.
D. Ground Surface Preparation: Refer to Geotechnical Report Recommendations.
   1. Clearing and Stripping: Conform to the general requirements of Section 311000.
      a. Reuse only those stripped soils approved by the Geotechnical Engineer.
      b. Stockpile reusable soils in a location acceptable to the Owner.
      c. Remove rejected soils from the site for disposal in a legal manner.
   2. Proof Rolling: Proof roll stripped surfaces to ascertain the presence of soft, wet, yielding soils or other unstable materials that must be undercut.
   3. Scarifying: Scarify ground surface exposed by stripping to a depth recommended in Geotechnical Investigation. Following scarifying, moisture condition soil and compact as specified below.

E. Subdrains: Provide subdrains as recommended by Geotechnical Engineer in accordance with Section 334613.

3.03 EXCAVATION

A. Shoring and Bracing:
   2. Provide minimum requirements for trench shoring and bracing to comply with applicable codes and regulations.
      a. Comply with the Geotechnical Investigation, and as directed by the Geotechnical Engineer.
      b. Shore in accordance with OSHA Article 6 requirements for construction safety.
   3. Maintain shoring and bracing in excavations regardless of time period excavations will be open.

B. Dewatering: Provide and maintain, at all times during construction, the means and devices with which to promptly remove and properly dispose of water entering structural excavation, pipe trenches, and other excavations. Accomplish dewatering by methods that will ensure a dry excavation and the preservation of required lines and grades. Dewatering methods employed shall comply with local water quality control regulations.
   1. Commence dewatering for structures and pipelines when water is first encountered and continue until excavation is dry enough to continue operations.
      a. No concrete shall be laid in water, nor shall water be allowed to rise over them until the concrete has set for at least 8 hours.
   2. Do not allow water to rise around pipes until joint compounds have set hard and there is no possibility of flotation.
   3. Dispose of water from the work in a suitable manner without damage to adjacent property. Do not drain water into work already built or under construction.
   4. Dispose of water in a manner that will not constitute a nuisance or a menace to public health and safety.
C. Pipeline Trench Excavation:
   1. Provide open-cut trenches for pipelines. Excavate bottom of trenches uniformly to the **same** grade of the bottom of the pipe. Give trench bottom a final trim using a string line, such that each pipe section when first laid will be continually in contact with the ground along the extreme bottom of the pipe. Rounding the trench to form a cradle for the pipe will not be required.

   2. Over-Excavation, When Ordered: Over-excavate trenches, beyond the depth indicated when ordered by the Geotechnical Engineer. Refill trench to the grade of the bottom of the pipe with material specified for pipe bedding.
      a. Place bedding material in layers, condition to optimum moisture content, and compact as specified below.
      b. Perform over-excavation less than 6 inches below the limits indicated at no additional cost to the Owner. Additional payment will be made to the Contractor in accordance with a negotiated price when the over-excavation is 6 inches or greater below the limits shown.

   3. Over-Excavation, When Not Ordered, Specified, or Shown: Refill to the required grade as specified above when over-excavation is carried below the grade specified. No additional payment will be made to Contractor for such overexcavation.

   4. Refer to Division 21 and Division 26 for additional requirements related to mechanical and electrical underground installations.

   5. Refer to Division 33 for additional requirements related to underground utility installations.

D. Excavation for Structures: Conform to the recommendations of the Geotechnical Investigation.
   1. Excavate materials within the proposed building area to satisfactory soil conditions as ordered by Geotechnical Engineer.
   2. Conform to elevations and dimensions shown within a tolerance of plus-or-minus 0.10-foot, and extend a sufficient distance from footings and foundations to permit placement and removal of concrete formwork, installation of services, and inspection.

   3. **Slope Fills:** Fill slopes may be constructed at a 2 to 1 gradient if keyed and benched into natural soil. Keyways shall be 10 feet wide and 3 feet deep measured on the downhill side.

E. Site Grading: In order to create uniform bearing condition for the proposed structural areas within the project limits, the following earthwork is recommended:

   1. The proposed building pads shall be excavated to at least **18 inches** below the lowest footing bottom or **5 feet below the existing site grades,** whichever is greater in accordance with the recommendations of the geotechnical report. The lateral limits of the building pad over-excavations shall extend **at least 10 feet** laterally beyond the footprint in accordance with the recommendations of the geotechnical report.
2. Retaining wall areas and other ancillary structures shall be over-excavated a minimum of 1.5 feet below the bottom of the footing and extend laterally 2 feet beyond the footprint.

3. Exterior concrete flatwork areas shall be excavated to a depth of at least 12 inches below the proposed concrete flatwork sub-grade elevation and replaced with low expansive compacted fill (Expansion Index not exceeding 50%). This shall extend at least 2 feet laterally beyond these improvements.
   a. Refer to Article 3.05 for compation.

4. Non-structural/landscaped areas, existing fill may remain in place. However, depending on the use of the area, existing fill may need to be excavated and replaced as compacted fill.

F. Material Storage: Stockpile satisfactory excavated materials where directed by Owner and Geotechnical Engineer until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.
   1. Locate and retain soil materials away from edge of excavations.
   2. Dispose of excess soil material and waste materials in a legal manner.

G. Use of Explosives:
   1. The use of explosives will not be permitted.

3.04 FILL

A. General: Conform to the Geotechnical Investigation referenced with regard to backfill recommendations.

B. Trenches: Conform to Section 306-1.3 of the Standard Specifications and recommendations of Geotechnical Engineer regarding backfill of trenches.
   1. Prepare trench with bed of 3/4-inch aggregate 4 inches to 6 inches deep and thoroughly densify. Give trench bottom a final trim using a string line, such that each pipe section when first laid will be continually in contact with the gravel layer along the extreme bottom of the pipe. Cover the pipe with aggregate fill as indicated on the Contract Drawings and compact to 90 percent relative compaction. Utility trenches shall be properly backfilled in accordance with the requirements of the Green Book. Pipe shall be bedded with clean sands (Sand Equivalent greater than 30), to a depth of at least one foot over the pipe. Remainder of the trench backfill shall be derived from on-site soil or approved import soil, compacted as necessary, until the required compaction is obtained.
   2. Backfill with utility trench pipe bedding to 12 inches over pipe. Fill balance of trench with on-site soils, or as indicated on Contract Drawings.

C. Backfill excavations as promptly as work permits, but not until completion of the following:
   1. Acceptance by Architect of construction below finish grade including, where applicable, waterproofing and drainage systems.
   2. Inspection, testing, and approval of underground utilities by governing agencies, including survey of underground utilities.
4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.
5. Removal of trash and debris.
6. Completion of permanent or temporary horizontal bracing on horizontally supported walls and retaining walls.

D. Backfilling Unauthorized Excavation:
1. Under footings, foundation bases, or retaining walls, fill unauthorized excavation by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering required top elevation.
   a. Lean concrete fill may be used to bring elevations to proper position only when acceptable to Architect.
2. In other locations, backfill and compact unauthorized excavations as specified for authorized excavations of the same classification, unless otherwise directed by Geotechnical Engineer.

E. Placement: Place backfill materials in 6-inch to 8-inch loose lifts as directed by Geotechnical Engineer.
1. Place backfill and fill materials evenly adjacent to structures, to required elevations. Prevent wedging action of backfill against structures by carrying the material uniformly around structure to approximately same elevation in each lift.
2. Do not place backfill or fill material on muddy surfaces.

F. Place fill material in layers to required subgrade elevations in accordance with recommendations of Geotechnical Engineer, for each area classification listed below:
1. In excavations, use excavated or borrow material acceptable to Geotechnical Engineer.
2. Under grassed areas, use excavated or borrow material acceptable to Architect.
3. Under walks, steps, and ramps, provide compacted subgrade.
4. Under concrete vehicular pavements, provide subslab base material.
5. Under building slabs, provide specified subslab base material.
   a. Install vapor retarder at on-grade slabs to be finished with floor coverings.
      1) Refer to Section 033100 for vapor retarder installation requirements.
6. Under aggregate base course for asphalt, pavements provide compacted subgrade.

3.05 COMPACTION

A. General: Control soil compaction during construction to provide required minimum percentage of maximum density specified for each area classification. Comply with requirements of ASTM D 1557, Method D, corrected by replacement for material retained on the 3/4-inch sieve. When the amount of material retained on the 3/4-inch sieve is less than 10 percent, use Method C.
1. Compaction and testing for paved areas shall be performed immediately prior to installation of paving. Subgrades subjected to wet
weather prior to paving shall be retested at Contractor's expense. Subgrade not in conformance with these Specifications at time of paving shall be recompacted.

B. Moisture Control: Where subgrade, or layer of soil material, requires moisture conditioning before compaction, uniformly apply water to surface of subgrade, or layer of soil material, preventing free water from appearing on surface during, or subsequent to, compaction operations.
1. The moisture content of the fill soils at the time of compaction shall not vary more than 3 percent above optimum moisture content.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.
3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing, until moisture content is reduced to a satisfactory value, as determined by moisture-density tests.

C. Maximum Density Requirements: Provide not less than the following percentages of maximum density of soil material, compacted at near least 2% above optimum moisture content, for the actual density of each layer of soil material-in-place:
1. Building Slabs and Steps: Compact each layer of backfill or fill material to 95 percent maximum dry density, or as directed by Geotechnical Engineer.
   a. Compact fill within building areas that has an Expansion Index greater than 30 shall be placed at near optimum moisture content and compacted to 95 percent of ASTM D 1557.
2. Footings: Compact each layer of backfill or fill material to 95 percent maximum dry density, or as directed by Geotechnical Engineer.
3. Pavements: Compact each layer of backfill or fill material to 95 percent maximum density.
   a. Fire Lane Access and Truck and Trash Pickup Apron Pavements: Compact each layer of backfill or fill material to 95 percent maximum density.
4. Flatwork: Compact each layer of backfill or fill material to 95 percent maximum density.
5. Planting or Unpaved Areas: Compact each layer of backfill or fill material to 90 percent maximum dry density.
   a. Refer to agronomic report regarding compaction at planting areas.
6. Trenches: Compact each layer of backfill or fill material to the same maximum dry density as required for the surface use above.
   a. If trench depth exceeds 5 feet, methods of fill placement and compaction shall be reviewed and approved by Geotechnical Engineer.

3.06 FINISH GRADING
A. General: Uniformly grade areas to specified tolerances between points where elevations are shown, or between points and existing grades.
B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures without ponding. Finish surfaces free from irregularities and abrupt changes, and as follows:

1. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 0.05-foot above or below the required subgrade elevation.
2. Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.04-foot above or below the required subgrade elevation.
3. Grassed Areas: Finish areas to within not more than 0.10-foot above or below the required finish grade elevations. Slope drainage away from building. Refer to Section 329119.
4. Planting Areas: Finish areas to 4 inches below finish grade elevations, or as indicated on Contract Landscape Drawings, to receive topsoil. Refer to Section 329119.

C. Grading Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation with a tolerance of plus-or-minus 0.04-foot.

D. Grading for Accessibility: Surface slopes for accessible parking spaces and access aisles shall not exceed 2 percent in any direction, in accordance with CBC 1129B.3, Item 4.

3.07 SUBSLAB BASE

A. Install aggregate base over subgrade as indicated on the Contract Drawings.

B. Install vapor retarder over subgrade or over aggregate base at all on-grade slabs to be finished with floor coverings, and as indicated on the Contract Drawings.

1. Refer to Section 033100 for vapor retarder installation requirements.

C. Do not install subslab base material over vapor retarder at on-grade slabs.

3.08 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Due to the possibility of variations in soil conditions, the recommendations of the Geotechnical Investigation are contingent upon representation on site by Geotechnical Engineer. Conditions other than those noted in the Geotechnical Investigation shall be confirmed or modified based on the results of field and laboratory tests, and observations during grading operations. The Geotechnical Engineer will determine field density and degree of compaction in accordance with ASTM D 1556 or ASTM D 6938.

B. Foundation bearing subgrades and fill layers will be inspected and approved by Geotechnical Engineer before further construction work is performed. Test of subgrades and fill layers shall be performed as follows:

1. Footing Subgrade: For each compacted fill layer on which footings will be placed, conduct at least one field density test for every 2000 square feet of subgrade to verify required soils density.
2. Paved Areas and Building Slab Subgrade: Conduct at least one field density test of subgrade for every 2000 square feet of paved areas or building slab, but in no case less than three tests. In each compacted fill layer, make one field density test for every 2000 square feet of overlaying building slab or paved area, but in no case less than three tests.

3. Moisture Barrier: Inspect moisture barrier for proper lapping installation, without breaks or punctures, prior to installation of subslab base.

4. Foundation Wall Backfill: Conduct at least two field density tests, at locations and elevations as directed by Geotechnical Engineer.

5. Trenches: Conduct one field density test at vertical intervals not exceeding 2 feet, and at horizontal intervals not exceeding 200 feet of trench.

C. If subgrade or fills that have been placed are below specified density, provide additional compaction and testing at no additional expense to Owner. Provide corrective work at the direction of Geotechnical Engineer.

3.09 ADJUSTING

A. Reconditioning: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density and moisture content prior to further construction.

B. Verify that rock blanket is not dislodged by surface flow and that downstream flow over vegetation is reduced to acceptable limits.

3.10 CLEANING

A. Remove and legally dispose of trash, debris, and waste materials from the site.
   1. Dispose of surplus excavated materials off site.

3.11 PROTECTION

A. Protection of Graded Areas: Protect newly graded areas from traffic and erosion, and keep free of trash and debris.
   1. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Erosion Control: At the completion of grading operations provide protection from erosion due to wind and water at those areas where construction is not immediately anticipated.
   1. Coordinate operations with landscaping work to provide planting or hydroseeding of native grasses as a temporary or permanent solution to minimize erosion damage.
   2. Remove erosion control devices and return surfaces to natural conditions.

END OF SECTION