ADDENDUM NO. 3 TO PROJECT NO. 45678

CONSTRUCTION, HVAC, PLUMBING AND ELECTRICAL WORK
HARRIET TUBMAN RESIDENTIAL CENTER
6706 PINE RIDGE ROAD
AUBURN, NEW YORK 13021

October 6, 2017

NOTE: This Addendum forms a part of the Contract Documents. Insert it in the Project Manual. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

SPECIFICATION GROUP

GENERAL REQUIREMENTS - CONSTRUCTION, HVAC, PLUMBING AND ELECTRICAL WORK

1.  015000 CONSTRUCTION FACILITIES & TEMPORARY CONTROLS: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

2.  015123 CONSTRUCTION HEAT AND TEMPORARY HEAT: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

3.  019113 GENERAL COMMISSIONING REQUIREMENTS: Delete this Section in its entirety.

CONSTRUCTION WORK

4.  023313 UNDERGROUND UTILITY LOCATOR SERVICE: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

5.  044301 CUT STONE: Add the accompanying section (pages 044301 – 1 through 044301 – 6) to the Project Manual.

6.  061000 ROUGH CARPENTRY: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".
7. 062000 FINISH CARPENTRY: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

8. 072100 BUILDING INSULATION: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

9. 074646 MINERAL FIBER CEMENT SIDING: Add the accompanying section (pages 074646 – 1 through 074646 – 5) to the Project Manual.

10. 081116 ALUMINUM DOORS AND FRAMES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

11. 088853 SECURITY GLAZING: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

12. 096429 WOOD FLOORING PATCHING AND REFINISHING: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

13. 099101 CONSTRUCTION PAINTING: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

14. 101423 INTERIOR SIGNS: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

15. 129344 RECREATION EQUIPMENT: Add the accompanying section (pages 129344 – 1 through 129344 – 1) to the Project Manual.

16. 213118 FIRE PUMP SYSTEM: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

17. 320117 PAVEMENT REPAIR AND RESURFACING: Add the accompanying section (pages 320117 – 1 through 320117 – 1) to the Project Manual.

18. 321216 ASPHALT CONCRETE PAVING: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

19. 323113 CHAIN LINK FENCE AND GATES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

20. 323114 GATE SYSTEMS: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

21. 330132 MANHOLE REHABILITATION: Delete this Section in its entirety.

22. 330514 CHANGING ELEVATIONS OF MANHOLES AND DRAINAGE STRUCTURES: Delete this Section in its entirety.

23. 331219 WATER UTILITY DISTRIBUTION FIRE HYDRANTS: Delete this Section in its entirety.

24. 333104 PLASTIC DRAINAGE PIPE (SANITARY): Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".
25. 333216 PACKAGED PUMP STATION: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

26. 333913 MANHOLES AND DRAINAGE STRUCTURES WITH FRAMES AND COVERS: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

27. 333914 PRECAST CONCRETE WASTEWATER STRUCTURES (SANITARY): Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

28. 334105 PLASTIC DRAINAGE PIPE (STORM DRAINAGE): Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

HVAC WORK

29. 230523 VALVES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

30. 230550 VIBRATION ISOLATION: Add the accompanying section (pages 230550 – 1 through 230550 – 4) to the Project Manual.

31. 230554 DUCT AND EQUIPMENT IDENTIFICATION: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

32. Page 230923 - 1, Article 1.06, Add the following paragraph:

   "C. Existing control devices and wiring to be re-used. HeadEnd (Workstation's software and such) to be replaced. Contractor to provide any additional devices to achieve sequence of operation. Existing system is Johnson Controls."

33. 232003 THERMOMETERS AND GAUGES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

34. 233113 METAL DUCTWORK: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

35. 233300 DUCTWORK ACCESSORIES: Add the accompanying section (pages 233300 – 1 through 233300 – 8) to the Project Manual.

36. 234100 AIR FILTERS: Add the accompanying section (pages 234100 – 1 through 234100 – 3) to the Project Manual.

37. 237313 AIR HANDLING UNITS: Add the accompanying section (pages 237313 – 1 through 237313 – 4) to the Project Manual.

38. 238126 DUCTLESS SPLIT SYSTEM AIR CONDITIONERS: Add the accompanying section (pages 238126 – 1 through 238126 – 4) to the Project Manual.

39. 238127 AIR COOLED CONDENSING UNITS: Add the accompanying section (pages 238127 – 1 through 238127 – 3) to the Project Manual.
40. 238216 COILS: Add the accompanying section (pages 238216 – 1 through 238216 – 1) to the Project Manual.

41. 238223 UNIT VENTILATORS: Add the accompanying section (pages 238223 – 1 through 238223 – 3) to the Project Manual.

ELECTRICAL WORK

42. 260505 WIRING FOR GATE SYSTEMS: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

43. 262726 WIRING DEVICES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

44. 262812 SAFETY SWITCHES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

45. 265100 INTERIOR LIGHTING FIXTURES: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

46. 265200 EMERGENCY LIGHTING - UNIT EQUIPMENT: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

47. 265300 EXIT LIGHT FIXTURES: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

48. 265533 SECURITY FENCE LIGHTING SYSTEM: Discard the section bound in the Project Manual and substitute the accompanying section noted "Revised 10/4/17".

49. 275112 INTERCOM AND ZONE PAGING: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

50. 281354 METAL DETECTOR: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

51. 281604 MICROWAVE DETECTION SYSTEM: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

52. 281605 PERIMETER ALARM SYSTEM: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

53. 282304 VIDEO SURVEILLANCE SYSTEM: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

54. 283105 MODIFICATIONS TO FIRE ALARM SYSTEM: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

55. 284601 ELECTRONIC DOOR LOCKING AND MONITORING SYSTEM: Discard all previously issued versions and substitute the accompanying Section noted “Revised 10/4/17”.

Page 4 of 6
CONSTRUCTION WORK DRAWINGS

56. Drawing No. C-0131: Delete this drawing in its entirety.

57. Addendum Drawing:
   a. Drawing No. C-0121, noted "ADDENDUM DRAWING 10/04/17" accompanies this Addendum and forms part of the Contract Documents.

58. Revised Drawings:
   a. Drawings listed below, noted "ADDENDUM 3 10/04/17" accompany this Addendum and superseded the same numbered all previously issued versions.

   **Civil Drawings**
   
   C-0001  C-0120  C-0501  C-0510  
   C-0100  C-0121  C-0503  C-0511  
   C-0101  C-0130  C-0504  C-0512  
   C-0102  C-0132  C-0506  C-0517  
   C-0110  C-0140  C-0508  C-0601  
   C-0111  C-0160  C-0509  C-0602  
   C-0161  

   **Structural Drawings**
   
   S-0001  S-1103  S-1302  S-7501  
   S-1101  S-1301  S-4101  S-7502  
   S-1102  

   **Architectural Drawings**
   
   A-1003  A-1203  A-1403  A-2202  
   A-1004  A-1301  A-1601  A-2402  
   A-1101  A-1303  A-2004  A-3101  
   A-1102  A-1305  A-2101  A-3102  
   A-1104  A-1401  A-2102  A-4101  
   A-1202  A-1402  A-2103  

**HVAC WORK DRAWINGS**

59. Revised Drawings:
   
   a. Drawings listed below, noted "ADDENDUM 3 10/04/17" accompany this Addendum and superseded the same numbered all previously issued versions.

   M-1102  M-1106  M-2102  M-2104  
   M-1103  M-2101  M-2103  M-7502  
   M-1105
PLUMBING WORK DRAWINGS

60. Revised Drawings:
a. Drawings listed below, noted "ADDENDUM 3 10/04/17" accompany this Addendum and superseded the same numbered all previously issued versions.

Fire Protection Drawings
F-0001   F-1101   F-1102   F-7501

Plumbing Drawings
P-1403   P-2102   P-7501   P-7503   P-1404

ELECTRICAL WORK DRAWINGS

61. Revised Drawings:
a. Drawings listed below, noted "ADDENDUM 3 10/04/17" accompany this Addendum and superseded the same numbered all previously issued versions.

Electrical Drawings
E-1001   E-1107   E-2101   E-7602
E-1003   E-1108   E-2103   E-7603
E-1102   E-1700   E-7600   E-7604
E-1105

Security Drawings
EY-0002   EY-1501   EY-1701   EY-7606
EY-0003   EY-1502   EY-2101   EY-7608
EY-1201   EY-1503   EY-7601   EY-7613

END OF ADDENDUM

Margaret F. Larkin
Executive Director
Design and Construction
PART 1   GENERAL

1.01   DESCRIPTION

A. Provide the construction facilities and temporary controls necessary for the Work, unless otherwise indicated.
   1. The construction facilities and temporary controls specified to be provided by a particular Contract shall be kept operational by that Contractor for the Work of all related Contracts at all times Work is being performed by a Contractor.
   2. The construction facilities and temporary controls specified to be provided by a particular Contractor shall be installed as soon after award of the Contract as necessary to enable the Work of each Contract to proceed on schedule, and maintained until completion of the Work of all related contracts unless otherwise directed in writing.
   3. Any Contractor who requires additions to the construction facilities and temporary controls specified to be provided by another Contractor, shall provide and maintain them.

1.02   RELATED WORK SPECIFIED ELSEWHERE

A. Construction Heat and Temporary Heat: Section 015123.

1.03   TEMPORARY LIGHT AND POWER

A. Electrical energy for temporary light and power will be made available without charge.

B. Extent of Temporary Wiring: Contractors may ascertain the extent of the temporary wiring provided under the Electrical Work Contract by examining the Electrical Drawings. Wiring for Contractors’ trailers is not included.

C. Electrical Work Contract:
   1. Make necessary arrangements, through the Director’s Representative, for temporary electrical service at location indicated.

D. All Contracts:
   1. Any Contractor requiring additional lighting shall provide additional fluorescent fixtures or incandescent lampholders (with lamps), but in no case shall the load on any branch circuit or feeder exceed its rated capacity.
   2. Install materials for temporary light and power in conformance with the National Electrical Code.
3. Materials for temporary light and power need not be new if they are in satisfactory operating condition.
4. Provide ground-fault protection for personnel (such as portable plug-in type ground-fault circuit-interrupters) on single phase 15 and 20 ampere receptacle outlets which are in use.
5. Receptacle outlets, portable cord connectors and attachment plugs shall have standard NEMA configurations.
6. As the progress of the Work allows, and as approved, completed portions of the permanent wiring and electrical service may be utilized for temporary light and power.

1.04 TEMPORARY WATER

A. Water will be made available for the Work without charge at source or sources directed within the limits of the existing supply and usage.

B. All Contracts: Prevent waste of water.

1.05 TEMPORARY TOILETS

A. Construction Work Contract: Provide toilet facilities for Contractor’s and subcontractors employees engaged on the Project, including employees of other contractors. Locate toilets where directed, and maintain them in a sanitary condition.

<table>
<thead>
<tr>
<th>NUMBER OF EMPLOYEES</th>
<th>MINIMUM NUMBER OF FACILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 or less</td>
<td>1 toilet</td>
</tr>
<tr>
<td>20 or more</td>
<td>1 toilet and 1 urinal per 40 employees</td>
</tr>
<tr>
<td>200 or more</td>
<td>1 toilet and 1 urinal per 50 employees</td>
</tr>
</tbody>
</table>

*Toilet/Urinal Combinations shall count as only one facility.

1. Where water and sewer connections are available, provide water closets, otherwise provide approved chemical or electric toilets.
2. Locate toilet facilities no more than 1000 feet from any work location.
   a. Exception: Mobile crews having readily available transportation to nearby toilet facilities.

1.06 PROTECTION OF WORK AND EXISTING PROPERTY

A. Protect installed Work and existing property during performance of the Work.
B. Maintain the building in a watertight condition during performance of the Work.
C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
D. Provide protective coverings at wall projections, jambs, sills, and soffit of openings.
E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, and movement of heavy objects by covering them with durable sheet materials.

F. Protect smoke detectors from airborne dust and debris.
1. At the beginning of each work day, provide protective coverings over smoke detectors in areas where airborne dust and debris will be generated by the Work.
2. At the end of the work day, clean the areas in which the smoke detectors are located by whatever means necessary to assure that airborne dust and debris will not contaminate the smoke detectors, then remove protective coverings.
3. Provide signs, instructions and alternate methods for reporting a fire during the periods that the smoke detectors are covered.
4. Notify the Director’s Representative and have procedures approved.

G. Prohibit traffic or storage upon waterproofed and roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

H. Protect existing trees and plants during performance of the Work unless otherwise indicated. Box trees and plants within the grading limit lines. Do not deposit excavated materials or store building materials around trees or plants. Do not attach guy wires to trees.

I. Prohibit traffic from landscaped areas.

J. Cleaning tools of cementitious and other insoluble materials:
1. Do not wash tools in sinks or other sanitary drainage systems. Protect all drainage systems from debris that can clog or damage piping and fixtures.
2. Take all precautions necessary to prevent cementitious and other insoluble materials from flowing into floor drains.
3. Dispose of excess cementitious and other insoluble debris with the other rubbish.

1.07 BARRIERS AND ENCLOSURES

A. All Contracts: Provide barriers during performance of the Work to:
1. Prevent unauthorized entry to work areas.
2. Allow for State’s occupancy of Site.
3. Protect existing facilities and adjacent properties from damage.
4. Protect vehicular and pedestrian traffic.

B. Construction Work Contract:
1. Temporary Partitions: Provide temporary partitions to form fire resistive barriers between work areas and areas occupied by State personnel. Construct the partitions of 3-5/8 inch width steel framing or 2 x 4 wood framing, with 5/8 inch thick Type X (ASTM C 36) gypsum board on both sides of partition. Secure the partitions in place without damaging existing construction. Seal joints on the State occupied side with joint materials.
tape and compound. Provide 1-3/4 inch thick solid core flush wood doors or 18 gage flush steel doors, and steel door frames. Equip doors with full mortise hinges and lockset. Furnish the Director’s Representative with 2 keys for each lock.

1.08 SECURITY

A. Key Deposits: A $25 deposit will be required for each key issued by the Facility. Deposits will be refunded upon return of the keys.

B. Facility Key Regulations:
1. Sign Facility keys out and in on a daily basis unless otherwise directed.
2. Keep keys on person at all times while on the premises. Do not loan or give keys to other persons.
3. Do not remove keys from the premises without written permission from the Director’s Representative.
4. Report lost, missing, or stolen keys immediately to the Facility Safety/Security Department. Assume responsibility for cost of necessary key and lock replacement as a result of lost, missing, or stolen keys.

C. Identification Cards

D. Promptly relock doors and security screens located in access routes, storage areas, and work areas after use.

E. Restore, by the end of each work day, existing in place safety/security items such as doors, screens, alarm systems components, that required removal, replacement, or adjustment to perform the Work, unless otherwise authorized in writing by the Director’s Representative.

F. Remove all tools and materials from patient occupied work areas when the work areas are not attended by employees and at the end of each work day. Store tools in a locked tool box, cabinet, or shed. Store materials where directed, in a location secure from access by patients and clients.

1.09 WATER CONTROLS

A. Provide and maintain pumping equipment necessary to keep the work areas free from water. Discharge water into existing storm drainage systems or otherwise disperse as directed.

1.10 FIRE PREVENTION

A. Take precautions necessary to prevent fires.

B. Fuel for cutting and heating torches shall be acetylene or LP-gas only, and shall be contained in Underwriters Laboratory or Federal Department of Transportation approved containers.
C. Furnish and maintain a currently inspected 20 pound capacity multi-class A:B:C fire extinguisher in the immediate vicinity where welding tools or torches are in use.

D. Furnish and maintain a currently inspected fire extinguisher of the appropriate class and size whenever the temporary storage of materials changes that areas classification of fire load or life safety.

E. Do not use flammable liquids, other than those specified, within a building without the written approval from the Director’s Representative.

F. Tarpaulins shall be flameproof and shall be securely anchored when attached to scaffolding or when used to enclose any portion of a building.

G. If required by the nature of the work and facility regulations, the Contractor shall obtain from the facility and pay all costs associated with “Hot Work Permits” including fire watches to execute the work of its contract. Perform hot work in accordance with the Fire Code of New York State and the Hot Work Program approved for the work. Prior to, during and after performing hot work, inspect the hot work area for compliance with the requirements of the permitted Hot Work Program.
   1. Post signage “Caution: Hot Work In Progress - Stay Clear” in conspicuous locations warning others before they enter a hot work area where the area is accessible to persons other than the operator of the hot work equipment.
   2. See applicable facility permits and conditions bound in the Appendix.

1.11 TEMPORARY FIRE PROTECTION

A. If the existing building is to be partially occupied during the course of the project, all existing exits, fire walls, fire barriers and fire protection systems shall be continuously maintained in the occupied phases in compliance with the Fire Code of New York State. Comply with NFPA 241 for items not specifically addressed in the Fire Code of New York State.

B. Those portions occupied by the facility must be available for their use 24 hours a day, seven days a week during the contract period unless otherwise scheduled in these documents.

C. Prior to removal of existing fire walls, fire barriers and fire protection systems, if such removal is part of the work, install equivalent temporary fire walls, fire barriers and fire protection systems as defined in these documents and as approved by the Director’s Representative and/or the facilities representative.

D. The cost of all labor, fire watches, variances, materials, installations, maintenance and removal of such temporary fire protection systems or modifications to the existing systems are the responsibility of the Contractor. Install permanent fire walls, fire barriers and fire protection systems, if provided as part of the work, as
soon as practical.

1.12 ACCESS ROADS

A. Routes of ingress and egress on the premises to the location of the Work shall be as directed.

B. Keep designated access roads clear of dirt and debris resulting from the Work.

C. Provide means of removing mud from vehicle wheels before entering paved roads.

D. Construction Work Contract:
   1. Continually maintain access roads for construction traffic use until no longer needed. Maintenance shall include removal of snow and ice.

1.13 TEMPORARY ROADS

A. Construction Work Contract:
   1. Provide and maintain temporary roads for the use of all persons lawfully frequenting the site.
   2. From the start of construction, provide and maintain adequate temporary roads which access all areas of the site requiring work under this and all related contracts. Provide a temporary road section sufficient to carry the heaviest construction traffic wheel loads resulting from this and all related contracts. Also provide an access spur from the nearest temporary road to State Field Office parking area(s).
   3. Crown or slope the surface of temporary roads for adequate drainage. Provide temporary drainage, including swales, ditches, culverts and pumps as required, to maintain the temporary roads and prevent ponding water on the roads or on the site.
   4. Permanent roads are not designed or intended for construction equipment use. Continually maintain temporary roads for construction traffic use until no longer needed. Maintenance shall include, but not be limited to, grading and compacting to remove ruts and depressions, removal of snow and ice, and measures to control dust.
   5. Prior to placing the permanent asphalt concrete and/or Portland cement concrete paving required by this Contract, provide uncontaminated specified materials necessary to meet full sections and grades.

1.14 PARKING

A. All Contracts:
   1. Park vehicles in areas where directed.
   2. Keep designated parking areas clear of dirt and debris resulting from the Work.
   3. If requested, register vehicles which are to be parked at the Facility with the Facility Safety/Security Department.
   4. Remove ignition key from unattended vehicles and lock doors.
B. Construction Work Contract: Remove snow from parking areas allocated to all Contractors.

1.15 RUBBISH REMOVAL

A. Clean up and containerize the rubbish (refuse, debris, waste materials, and removed materials and equipment) resulting from the Work at least once a day and more often if the rubbish interferes with the work of others or presents a hazard. Leave work areas broom clean, except where more stringent cleaning is specified, at the end of each day. Locate containerized rubbish on the Site where directed.

B. Remove rubbish from State property at least once a week and more often if the rubbish presents a hazard. Properly dispose of rubbish.

C. Burning of rubbish will not be permitted.

D. Also comply with the requirements of Section 017419.

1.16 RELOCATION AND REMOVALS

A. Should a change in location of any construction facilities and temporary controls be necessary in order to progress the Work properly, remove and relocate such items as directed.

1. Electrical Work Contract: Frequently relocate/revise the temporary lighting as Contractors progress the Work of their contracts causing changes to the condition of the building (installation or relocation of walls, partitions, ceilings, equipment, etc.). Keep pace with the changes and maintain a minimum of 10 foot candles in each recomposed work area.

B. Remove the construction facilities and temporary controls when they are no longer required. Restore permanent facilities used for or connected to temporary facilities to their original condition or better.

1.17 GENERAL CLEANING

A. Construction Work Contract:

1. Provide general cleansing services to the State Field Office trailer at a frequency of two (2) times per week for the duration of this Contract. Cleaning to include the following at a minimum:

a. Cleaning of toilet rooms, including plumbing fixtures. Replenish toilet room supplies as needed.

b. Sweeping and mopping of floors.

c. Dusting of all rooms.

d. Removal and proper disposal of trash from all trash receptacles.

e. Clearing and removal of mud, snow and ice at all entrances, including steps and walkways to parking areas between the work hours of 6:00 am to 5:00 pm.
PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION
SECTION 015123

CONSTRUCTION HEAT AND TEMPORARY HEAT

PART 1 GENERAL

1.01 CONSTRUCTION HEAT - ALL CONTRACTS

A. Prior to the time the building or any major part of the building is enclosed, provide construction heat (as differentiated from temporary heat), of a nature as required and approved to accomplish the following:
   1. Protect materials and equipment being installed as part of the Contract from freezing.
   2. Enable workers to accomplish their respective tasks in a satisfactory manner.

B. Do not use electric heaters.

1.02 TEMPORARY HEAT - BUILDING ENCLOSED

A. Construction Work Contract:
   1. Temporary heat shall be provided under the Construction Work Contract for all Contracts related to the Project.
   2. Provide temporary heat for Buildings 01 and 02, starting at such time as directed, when in the opinion of the Director’s Representative, the building or any major part of it is enclosed.
      a. The building, or any part of it, shall be considered enclosed when the exterior walls and roof deck or overhead closures are sufficiently completed to exclude the elements, except for windows, doors, ventilators and similar openings which shall be temporarily sealed weathertight with suitable closures.
      b. In the event a building under construction is of window wall design, and the window walls are not installed as scheduled, provide temporary weathertight wall closures in sufficient time so as not to delay construction of the building.
   3. Include in the contract sum the cost of providing temporary heat for 160 days for Buildings 01 and 02 concurrently. Heating shall be maintained 24 hours a day, including weekends.
      a. The actual number of days required for temporary heat shall be as determined by the Director’s Representative.
      b. In the event such determination results in more or less than the specified number of days, the contract sum will be adjusted by Order on Contract.
      c. Applicable daily charges for price adjustment (if any) shall be the average daily rate paid during the period of temporary heat, i.e. (total cost of providing temporary heat divided by the...
number of days). Furnish daily records of temporary heat costs to the Director’s Representative, so that necessary price adjustments may be calculated.

4. Temporary heat consists of, but is not limited to, the following:
   a. Trailer mount forced air gas fired heater:
      1) Make/model: GENERAC MAC400G or equal.
      2) Quantity: As required to meet the requirements of part 4.e below.
   b. Furnishing and operating a sufficient number of temporary heating units to maintain required temperatures.
   c. Furnishing units of approved manufacture, complete with a combustion chamber and a smoke flue outlet, so designed that all products of combustion are vented through smoke flue piping to the exterior of the building. Do not use electric heaters.
   d. Furnishing fuel for maintaining temporary heat.
   e. Maintaining building temperature between 45 and 55 degrees F, unless higher temperatures are required for the installation of specified materials.
   f. Moving, relocating, and adjusting heating units as required or directed, to protect the Work of all Contracts.
   g. Taking precautions necessary to protect all portions of the building from smoke or gas damage and to prevent hazardous conditions which could result in damage to property or injury to persons.

5. In addition:
   a. Provide and maintain 2 eight inch scale direct reading thermometers in each building, at locations directed.
   b. Provide where directed in each building, 2 seven day, self contained recording thermometers, for the purpose of recording air temperatures in the building.
      2) Charts: Furnish and deliver to the Director’s Representative at the site, a supply of charts and ink, in quantity as required for the duration of temporary heat. Furnish charts of the 7 day type, designed for working temperatures from 0 degrees F to 100 degrees F (Dickson Model 2012).
      3) The Director’s Representative will maintain operation of the thermometers.
      4) Recording thermometers and charts shall become the property of the State.

1.03 RESPONSIBILITY

A. Construction Work Contract:
   1. Assume responsibility for damage due to frost and freezing during the period when temporary heat is required to be provided. Repair damage due to improper equipment, such as stains, smudges, soot or fire.
B. All Contracts:
   1. Progress the Work so that temporary heat can be provided as and when specified, and directed.

1.04 TEMPORARY HEAT - OPERATION BY STATE PERSONNEL

A. When, in the opinion of the Director’s Representative, the permanent heating system is completed, the Director’s Representative will arrange for operation of the heating system in accordance with the provisions of Article 20 of the General Conditions concerning State occupation and operation. At such time, Contractor will be relieved of responsibility for temporary heat.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION
SECTION 017423

PRE-OCCUPANCY CLEANING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Final Cleaning: Section 017716.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 PRE-OCCUPANCY CLEANING

A. Perform the pre-occupancy cleaning when directed by the Director's Representative.

B. Sequence: Begin pre-occupancy cleaning operations at the top floor and proceed down to the lowest floor. Complete the cleaning required on each floor before proceeding to the next floor.

C. Perform the pre-occupancy cleaning within the minimum standards specified, including but not limited to the following requirements.

1. Floor Maintenance:
   a. Do not splash, disfigure, or damage baseboards, walls, stair risers, furniture or equipment during these operations.
   b. Take proper precautions to advise building occupants of wet and/or slippery floor conditions during the cleaning operations.
   c. Be responsible for the security of equipment, materials, tools, etc. The Director's Representative (if space is available) will assign storage area(s) for the neat storage of tools and equipment.
   d. Sweeping and Damp Mopping:
      1) Thoroughly sweep the floors to remove visible dirt and debris. Remove all visible paint marks, wads of gum, tar and similar substances from the floor surface.
      2) After sweeping and damp mopping operations, all floors shall be clean and free of dirt streaks; no dirt shall be left in corners, behind radiators, under furniture, behind doors, on stair landings and treads. Entrances and all similar areas shall be swept clean of all dirt and trash. No dirt shall be left where sweepings have been picked up. There shall be no dirt, trash or foreign matter under desks, tables, chairs, etc.
   e. Wet Mopping and Scrubbing:
1) Properly prepare the floors, thoroughly sweep to remove all visible dirt and debris. Remove all paint spots, wads of gum, tar and similar substances from the floor surface. On completion of the mopping and scrubbing, the floors shall be clean and free of dirt, water streaks, mop marks, string, etc., properly rinsed, and dry mopped to present an overall appearance of cleanliness. All surfaces shall be dry and corners and cracks clean after the wet mopping or scrubbing. Scrubbing shall be accomplished by machine or by hand with a brush.

f. Floor Finishing:
1) Proper preparation of a floor, prior to refinishing, is considered the most important procedure in floor maintenance. Therefore, special attention must be given to the following requirements: Sweep entire floor area with treated dust cloth to control airborne dust and apply the proper stripping solution or synthetic disinfectant detergents to the floor; scrub with a floor scrubbing machine or agitate with a mop to remove old finish and/or old wax, soap film, dirt and stains; pick up dirty solution with a mop, squeegee or wet vacuum and thoroughly rinse with clean water and dry.

2) Apply floor finish in even coats. The number of coats applied will depend on the type and condition of the floor, but shall not be less than 2 coats.

3) Take special care when applying the floor finish, do not splash or coat the baseboard, walls, furniture or equipment.

g. Machine scrub concrete floors and wash with a germicidal cleaner, finish with 2 coats of sealer.

h. Machine scrub vinyl floor tile and wash and strip and refinish with 2 coats of sealer and 2 coats of finish as per EPA guidelines on asbestos hazard reduction.

i. Machine scrub ceramic and quarry tile flooring and wash with a germicidal type cleaner, rinse with clean water and wipe with a well-wrung mop.

j. Vacuum carpeting thoroughly.

k. Coat vinyl floors in Geriatric program and living areas with a floor finish that is slip resistant and that results in little or no shine when dry, such as Johnson's complete or equivalent.

1. Use Hilliard 341 on non-conductive floors, or equivalents.

2. Dusting: Do not move dust from spot to spot, but remove directly from the areas in which it lies by the most effective means such as appropriately treated dusting cloths, vacuum tools, etc. When doing high cleaning, dust shall not be allowed to fall from high areas onto furniture and equipment below. The following conditions shall exist after the completion of each dusting task:

   a. There shall be no dust streaks.

   b. Corners, crevices, moldings, and ledges shall be free of all dust.
c. There shall be no oils, spots or smudges on dusted surfaces caused by dusting tools.
d. When inspected by a flashlight, there shall be few traces of dust on any surface.

3. Damp Wiping: Use a clean damp cloth or sponge to remove all dirt, spots, streaks and smudges from walls, doors (both wood and metal), glass and other specified surfaces. When dry, the surfaces shall have a polished appearance. The wetting solution shall contain an appropriate cleaning agent. When damp wiping in toilet areas, a multi-purpose (disinfectant-deodorizer) cleaner shall be used.

4. Bright Metal Polishing: Polish bright metal by damp wiping and drying with a suitable cloth. If a polished appearance is not thereby produced, apply the appropriate metal polish.

5. Windows and Glass:
   a. Wash and clean all interior and exterior glass, with the inside and outside cleaning of windows to be performed on the same day.
   b. After each washing operation, all glass shall be clean and free of dirt, grime, streaks, excessive moisture and shall not be cloudy.
   c. Window sills, sash and woodwork about interior glass and other such surroundings shall be thoroughly wiped free of drippings and other water marks.
   d. Cleaners shall use pads to protect window sills when placing cleaning materials on them and all such pads and/or cloths necessary to protect the property shall be furnished by the Contractor. Window sills are not to be utilized in lieu of ladders and/or step ladders.
   e. Extreme care shall be taken in opening any and all windows, when opening them for cleaning, assume full responsibility for damage to glass and painted surfaces.

6. Spot Cleaning: Following this operation, smudges, marks or spots shall have been removed from the designated areas without causing unsightly discoloration.

7. Trash Removal:
   a. Collect and remove all refuse, debris, rubbish and trash throughout the entire building. Unless otherwise directed by the Director's Representative all collected matter shall be deposited in dumpsters of sanitation trucks provided by the Contractor, and removed from the site.
   b. Collect and remove all refuse, debris, rubbish and trash from the interior of the air handling unit enclosures under each window or wherever located. Vacuum the interior of each unit. This will require the removal and replacement of cover plates. Personnel will be made available to demonstrate the proper procedure for the removal and replacement of the cover plates.

8. Ceilings: Vacuum acoustic ceilings, taking care not to damage them. Vacuum painted plaster ceilings and spot clean where required. Wash entire ceiling if stain results.

9. Fixtures and Equipment:
a. Thoroughly scour, wash and disinfect all equipment and fixtures, including, but not limited to toilet bowls, seats, urinals, wash basins, mirrors, shelving, dispensers, receptors, slop sinks, water fountains, kitchen equipment, refrigerators and booth partitions, various dispensers, walk-in refrigerators, and lockers.

b. Plumbing fixtures (drinking fountains, wash basins, urinals, toilets, etc.) shall be thoroughly washed, using a germicidal solution, and dried, leaving no dust, spots, streaks or stains, rust, mold, encrustation or excess moisture. The walls and floor adjacent to fixtures shall be free of spots, drippings and water marks. Drinking fountains shall be kept free of trash, ink, coffee grounds, etc., and nozzles free from encrustation.

c. Light fixtures, including glass and plastic lenses, ceiling and wall-mounted lights, cover panels, side panels, louvers, fixture frames and lamps, shall be vacuumed and cleaned with a damp cloth.

d. Supply vents, exhaust grilles and room fan coil units shall be thoroughly vacuumed and cleaned.

10. Walls:
   a. Dust and spot clean painted and vinyl-covered walls. In areas where spot cleaning will produce color differences, the entire wall shall be washed, cleaned and wiped dry.
   b. Scrub ceramic tile walls with a germicidal cleaner, rinse and wipe dry.
   c. Vacuum brick and concrete interior walls and all adhered debris shall be removed in accordance with guidelines established by the Structural Clay Products Institute, the National Concrete Institute and the National Concrete Masonry Association.

11. Wood and Metal Doors: Remove protective tape from doors, frames and signage and kickplates. Remove all tape and adhesive residues. Clean and polish all unpainted metal on doors, including, but not limited to, trim, hardware, kickplates, handplates and door knobs. Wood doors shall be thoroughly cleaned and oiled and wiped dry.

12. Elevators: Clean all surfaces in the interior of the car including hoistway doors and services of the corridors on the side of the elevator and all bright metal surfaces polished. All resilient tiles shall be cleaned and spray buffed. Dust and damp wipe elevator cab doors, wall and bright work. Scrub and wash elevator cab floors using germicidal detergent.

13. Stairwells: Sweep all stairs clean. Remove all paint spots, wads of gum, tar and similar substances and wash with a germicidal cleaner. Vacuum brick and/or concrete block walls, remove spots, stains, etc. and wash and dry (wipe or blow dry).

14. Porches/Entrances: Thoroughly sweep, vacuum and wash porches and entrances with a germicidal cleaner.

15. Other:
   a. Overhead items, such as louvers, grilles, pipes, molding, etc., shall be dusted, vacuumed and spot cleaned.
b. Metal surfaces such as hardware, frames, cover plates, stainless steel counters and sinks, corner guards, conveyors, etc., shall be cleaned with a damp cloth and polished where required.

c. Furniture and equipment shall be wiped clean using special care, be responsible for damage to this equipment. Where the workers see a piece of equipment too delicate or have doubt regarding how to proceed, they will request further instructions from the Director's Representative.

d. For all operations where furniture or equipment is moved, no chairs, waste baskets or other similar items shall be stacked on desks, tables or window sills. Upon completion of work, all furniture and equipment must be returned to its original position.

e. Under no circumstances shall any product or procedure be used that may leave a non-conductive film.

f. Notify the Facility Safety Department prior to entering the building(s) and immediately following leaving the building(s) each work day, in order to deactivate and re-activate any building alarm systems.

16. Safety Standards: Conform to all Federal, State and Local Codes and Safety Standards and to the best practices of the trade.

END OF SECTION
SECTION 023313

UNDERGROUND UTILITY LOCATOR SERVICE

PART 1   GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Field Engineering: Section 017123.

1.02 REFERENCES

A. American Society of Civil Engineers, CI/ASCE 38-02, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.”

B. American Public Works Association, Uniform Color Code.”

1.03 DEFINITIONS

A. Utility Quality Levels:
   1. Level A: Precise horizontal and vertical location of utilities obtained by the actual exposure (or verification of previously exposed and surveyed utilities) and subsequent measurement of subsurface utilities, usually at a specific point. Minimally intrusive excavation equipment is typically used to minimize the potential for utility damage. A precise horizontal and vertical location, as well as other utility attributes, is shown on plan documents. Accuracy is typically set to 15-mm vertical and to applicable horizontal survey and mapping accuracy as defined or expected by the project owner.
   2. Level B: Information obtained through the application of appropriate surface geophysical methods to determine the existence and approximate horizontal position of subsurface utilities. Quality level B data should be reproducible by surface geophysics at any point of their depiction. This information is surveyed to applicable tolerances defined by the project and reduced onto plan documents.
   3. Level C: Information obtained by surveying and plotting visible above-ground utility features and by using professional judgment in correlating this information to quality level D information.
   4. Level D: Information derived from existing records or oral recollections.

1.04 DESCRIPTION

A. Retain an independent utility locator service company to field locate and mark existing underground utilities and service connections. The word “independent” as used above means a person not in the regular employment of the Contractor or having any vested interest in the Contractor's business.
1. Level B locator service shall be performed in all project areas where excavations, regrading of the ground surface, and penetrations of the ground surface are to be performed.
   a. Contractor shall include a minimum of 40 hours of Level A locator service to locate underground utilities as identified on the contract drawings or as identified during the Level B investigation that require more specific location, invert elevation, size, etc. Level A investigation shall only be performed at locations where shown or as directed.
   b. In heavy metal areas, such as near perimeter fences, ground penetrating radar shall be used to determine the location of underground utilities. The use of equipment that induce a tracing signal along the utility path (such as a Metrotech unit) can cause false readings, shall not be used within five feet of fences.

2. The Level A investigation shall be performed as follows:
   a. Hand excavation may be performed for depths of three feet or less.
   b. Vacuum excavation shall be performed at depths greater than three feet.
   c. All excavation test pits shall be backfilled by close of business that day.

3. Support and protect all utilities and service connections to remain in place.
4. The locator service shall field locate and mark underground utilities and service connections prior to excavation.
5. The contractor shall be responsible for coordinating the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.
6. All costs associated with the repair of underground utilities and service connections hit/damaged during the investigative work shall be the responsibility of the contractor.
7. Utility location services shall be in accordance with the provisions of CIASCE 38-02, “Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.”

1.05 SUBMITTALS

A. Quality Control Submittals:
1. Submit detailed experience and qualification information about the underground utility locator service company and the persons that will be performing the Work. Detailed experience and qualification information shall include:
   a. Minimum of five (5) years experience in field locating, marking and staking out of existing underground utilities and service connections.
      1) Qualifying Experience: Project information of 5 similar projects, which the locator service company, had worked on during the past 5 years. Information shall include for each project:
         a) Name and Address of project.
b) Dates worked on project.
c) Name and telephone Number of contact person at the project site for which the locator service was performed.

b. Description of types of utility locator equipment (investigation equipment) that company will utilize to perform the underground utility investigation.
c. Names of persons that the persons that will be performing the Work, including the number of years of experience and training that the persons have in the use of the equipment. Include copy of training certificates for locator equipment proving the person performing the locator service are trained on the equipment being used.

2. Submit Quality Control Submittals within 10 days of contract award.

B. Investigative Report:
1. Submit detailed written report and scaled drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified.
   a. All documentation shall be referenced to existing data (horizontal and vertical) previously established.
   b. Provide three (3) paper copies and one (1) electronic copy of detailed written report and drawings.
2. Submit Investigative Report at least two weeks prior to advancing construction within the scheduled areas of excavation within the project site.

1.06 COORDINATION AND SCHEDULING

A. Coordinate the Work to determine the extent of the areas of subsurface investigation required to locate all underground utilities and service connections in the areas of excavation.

B. Coordinate the Work with the Director’s Representative to minimize utility disruptions and facility operations. Provide a schedule for the Work required to the Director’s Representative for approval. Upon approval of the schedule, notify the Director’s Representative a minimum of three (3) working days prior to performing the Work.

C. Within the areas of excavation, all underground utilities and service connections shall be field located and their locations marked at least two (2) weeks prior to the performance of the required excavation work.

PART 2 PRODUCTS (Not Used)
PART 3 EXECUTION

3.01 WORK AREAS AND PERFORMANCE

A. If any underground utilities and service connections are hit or damaged during the Work, immediately inform the Director’s Representative for directions on how to proceed.

B. The utility locator service investigative work, field location and marking of underground utilities and service connections and submission of the investigative report must be completed before any excavation work can begin.
   1. Contractor shall maintain markings throughout the contract duration or until a time when directed (in writing) by the Director’s Representative that maintaining of the markings are no longer required.

C. Provide subsurface investigation information, detailed written report and drawings of the subsurface investigation, documenting all underground utilities and service connections located and identified, prior to the performance of the required excavation work.

D. If during the Level B investigations, unknown underground utilities are discovered, the Director’s Representative shall be notified as soon as possible or before the close of that business day.

E. Field Marking of underground utilities shall follow the American Public Works Association (APWA) uniform color code:
   White: Proposed Excavation.
   Pink: Temporary Survey Markings.
   Red: Electric power lines, cables, conduit and lighting cables.
   Yellow: Gas, oil, steam, petroleum and gaseous material.
   Orange: Communications, alarm, signal lines, cables or conduit.
   Blue: Potable water.
   Purple: Reclaimed water, irrigation and slurry lines.
   Green: Sewer and drain lines.

END OF SECTION
SECTION 044301
CUT STONE

PART 1 GENERAL

1.01 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION
A. Concrete Inserts: Installed under the Work of Section 033000.

1.02 RELATED WORK SPECIFIED ELSEWHERE
A. Mortar: Section 040513.
B. Flashing and Trim: Section 076000.
C. Joint Sealers: Section 079200.

1.03 SUBMITTALS
A. Shop Drawings: Setting and detail drawings showing dimensions, sections, jointing, anchoring, and setting number of each stone.
   1. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated.
B. Product Data: Suppliers' catalog sheets and specifications for stone units; and catalog sheets, specifications, and installation instructions for accessories.
C. Samples:
   1. Stone: Each kind and type specified, 12 inches x 12 inches x one inch, showing quality, color range and veining, grain, and finish.
   2. Accessories: Each item and type specified.

1.04 QUALITY ASSURANCE
A. Certification: Affidavit from stone supplier certifying that each kind and type of stone provided for this project meets the requirements of these specifications.
B. Qualifications:
   1. Stone Supplier: The firm performing the Work of this Section shall have been regularly engaged in supplying, cutting, and finishing cut stone for a minimum of 10 years, and shall have completed 5 similar projects using the same kind and type of stone.
   2. Installer: Individual with minimum 5 years of experience specializing in installing cut stone.
C. Source Quality Control: Stone of a given color range and grain shall come from a single quarry.

D. Defects:
   1. Do not use stone units with chipped arises, cracks, voids, stains, or other defects which will be visible in the finished Work.
   2. Do not patch or hide defects. Remove defective stone units from the Site.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store stone in a manner that will prevent wetting, soiling, staining, and other damage.

B. Handle stone in a manner that will prevent chipping, staining, and other damage. Use suitable lifting devices. Protect stone with suitable wood or other rigid cushioning materials.

1.06 PROJECT CONDITIONS

A. Environmental Requirements; Cold Weather Conditions:
   1. At temperatures below 40 degrees F, maintain mortar temperature between 40 degrees F and 120 degrees F. If necessary, heat mixing water and sand to produce the required results.
   2. At temperatures between 40 degrees F and 32 degrees F, protect masonry from rain and snow for 24 hours after laying.
   3. At temperatures between 32 degrees F and 20 degrees F, provide wind breaks and cover the masonry to prevent wetting and freezing. Maintain masonry above freezing for not less than 24 hours using auxiliary heat or insulating blankets.
   4. At temperatures below 20 degrees F, provide heated enclosures for laying the masonry. At the end of the workday, maintain the enclosures and keep the Work from freezing for not less than 24 hours.
   5. Do not lower freezing point of mortar by use of antifreeze, calcium chloride or other additives.
   6. Do not use frozen materials or materials coated with ice or frost.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, to design stone cladding assembly.

B. General: Design stone anchors and anchoring systems according to ASTM C 1242.
   1. Stone anchors shall withstand not less than two times the weight of the stone cladding in both compression and tension.
C. Structural Performance: Stone cladding assembly shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Wind Loads: As indicated on S-0001.

D. Seismic Performance: Stone cladding assembly shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   1. Component Importance Factor: 1.0.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

F. Safety Factors for Stone: Design stone cladding assembly to withstand loads indicated without exceeding stone's allowable working stress determined by dividing stone's average ultimate strength, as established by testing, by a safety factor of 8.

2.02 LIMESTONE

A. Type: Indiana Oolitic Limestone; ASTM C 568, Class II.

B. Color:
   1. Buff.

C. Grade: Meet Indiana Limestone Institute of America (ILI) grade description.

D. Finish:
   1. Smooth; machine-planed with tool marks removed by hand.

2.03 MORTAR TYPES AND GROUT

A. Portland Cement-Lime Setting Mortar: Comply with ASTM C 270, Proportion Specification:
   1. Type S: For setting exterior stone masonry.
   2. Type N: With white portland cement and white aggregate for pointing exterior stone masonry.

B. Grout: ASTM C 476, fine or coarse as most suitable for the particular job conditions.

2.04 ACCESSORIES

A. Anchors: Type 302/304 stainless steel bars, 1/8 x 1-1/4 inches unless otherwise shown on the Drawings.

B. Cramps: Type 302/304 stainless steel bars, 1/8 x 1 inch unless otherwise shown on the Drawings.
C. Dowels: Type 302/304 solid stainless steel rods, not less than 3/8 inch diameter.

D. Anchor Bolts, Washers, and Nuts: Type 304 stainless steel.

E. Setting Buttons/Pads: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.

F. Stone Cleaner: Non-staining cleaning solution which will not harm stone or mortar.

2.05 FABRICATION

A. Cut stone to the required dimensions and profiles, with surfaces finished to true planes.
   1. Cut or drill to form chases, openings, reveals, reglets, and similar spaces and features shown and as required for contiguous work.
   2. Cut or drill holes and sinkages for anchors, supports, fasteners, and necessary lifting devices. If possible, do not locate holes or sinkages within 2 inches of exposed surfaces.
   3. Unless otherwise shown, cut stone for a uniform joint width of 1/4 inch.

B. Tolerances: Stone shall be cut within the indicated tolerances for the specified finish. In the case of optional tolerance specifications, comply with the most stringent tolerances unless otherwise indicated.
   1. Limestone: Fabrication tolerances in the "ILI Handbook" by the Indiana Limestone Institute of America, Inc.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive cut stone for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.
   1. Verify that required built-in anchorage items are installed in designed locations.

3.02 PREPARATION

A. Just prior to setting stone, clean surfaces that support the Work of this Section.

B. Clean stone before setting by scrubbing with fiber brushes, followed by a thorough drenching with clear water. Use only mild cleaning solutions that contain no harsh or caustic abrasives or fillers.

C. If stone is not wet at time of setting, drench or sponge stone with clean water except do not wet expansion joint or control joint surfaces that require sealant.
3.03 INSTALLATION

A. Install stone plumb and true to line in level courses, unless otherwise shown. Set stone in full mortar setting bed and completely fill joints, accessory sinkages, and lifting holes with mortar, except keep expansion joints, control joints, and other required cavities free of mortar.

B. Solidly build-in accessories, supports, and contiguous items of other trades unless otherwise shown or directed.

C. Set stone with 1/4 inch wide joints and beds, unless otherwise shown. If necessary, temporarily use wet wooden wedges for proper spacing.
   1. Tolerance: Maximum variation of ± 1/4 of specified width.

D. Fill space between back of stone units and backup wall solidly with mortar or grout.

E. After mortar has set "thumb-print" hard, rake out exposed joints 3/4 inch deep. Brush face of joints clean. Remove wooden wedges when setting bed will maintain stone in position without movement.

3.04 POINTING

A. Except where joints are to be pointed with sealant, wet the raked joints and point full with pointing mortar. Cut joints flush and neatly tool surface of joints slightly concave. Finish joints that abut other masonry to match the joint finish of the adjacent masonry. Place pointing mortar in layers not more than 3/8 inch. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
   1. Tool joints with a round jointer having a diameter 1/8 inch larger than width of joint, when pointing mortar is thumbprint hard.

3.05 CLEANING

A. Clean the stone after completion of setting, pointing, and other Work liable to soil the stone.
   1. Carefully remove excess mortar and other encrusted matter.
   2. Scrub soiled surfaces of stone with mild detergent or stone cleaner and water. Use non-metallic tools.
      a. Do not use any acid bearing cleaner on limestone.
   3. Remove any remaining stains by rubbing with a carborundum stone and restore the specified surface finish.
   4. Flush stone with clean water to remove any remaining residue of cleaning agent and dirt.
3.06 PROTECTION

A. Protect face materials against staining. Remove misplaced mortar immediately.

B. Protect newly laid masonry from exposure to precipitation, excessive drying, freezing, soiling, backfill, and other harmful elements.

C. Cover top of walls with non-staining, waterproof, temporary covering when work is not in progress. Protective covering shall overhang each side of wall a minimum of 2 feet and be securely anchored.

D. Protect sills, ledges, off-sets, and similar features from drippings and other damage during construction.

END OF SECTION
<table>
<thead>
<tr>
<th>SHEET</th>
<th>SHEET OF DRAWING NUMBER: DESIGN &amp; CONSTRUCTION</th>
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**Legend:**
- **TYPE:** Description of the item.
- **DESCRIPTION:** Detailed description of the item.
- **LOCATION:** Area or specific location within the building.
- **DATE:** Date of installation or completion.
- **REMARKS:** Additional notes or remarks.

**Notes:**
- Special requirements or instructions for each item.
- Any special installation or operational details.

**Building & Light Fixture Schedule:**
- List of all building and light fixtures, including:
  - Type of fixture
  - Location
  - Date of installation
  - Remarks

**Electrical:**
- Specific electrical requirements or installations.
- Any electrical systems or components.

**Building & Light Fixture Schedule:**
- Overall schedule detailing the installation of various fixtures.
- Dates and locations are crucial for tracking progress.

**Notes:**
- Cross-references to other schedules or documents.
- Any changes or updates to the schedule.

**Reference:**
- Other related documents or schedules for cross-referencing.

**Signatures:**
- Signatures of responsible personnel for verification and approval.

**Schedule Details:**
- Specific details for each item, including:
  - Description
  - Location
  - Date
  - Remarks

**Summary:**
- Summary of completed and ongoing work.
- Progress against the schedule.

**Action Items:**
- Any actions required for the next phase.
- Priority tasks for immediate attention.

**Next Steps:**
- Next steps in the project timeline.
- Actions to be taken immediately.

**Timeline:**
- Key milestones and deadlines.
- Timeline for completion of each phase.

**Checklist:**
- Checklist for verifying completion of items.
- Items that need to be cross-checked for accuracy.

**Contact:**
- Contact details for further information or clarification.

**General:**
- Any general notes or advice for future projects.
- Lessons learned from this project.

**Emergency:**
- Contact numbers and emergency procedures.

**Emergency Contact:**
- Key contacts for emergency situations.
- Details for immediate response in case of an emergency.
EPOXY COATED CAST IRON SHOWER DRAIN WITH HEAVY DUTY DESIGN BASED ON MAXITROL R600(S); VIOLET SPRING CAST BRONZE COUNTERSUNK PLUG AND POLISHED STAINLESS STEEL ROUND ACCESS STAINLESS STEEL SHELL, ELASTOMER BELLOWS, STAINLESS STEEL ADAPTER AND MALE INTAKE

### RG-2 GAS REGULATOR

- **Tag**: MECH
- **Water Heaters (2)**
- **Boiler**

### SERVICE

- **Connection Control Program**: Submit Application (DOH-347 Form and Plans) to NYS Department of Health for Approval of the Plan Submission and Installation.
- **Testing**: Provide Testing by a Certified Tester. Submit Test Result for Considering Full Approval.

#### GAS REGULATOR SCHEDULE

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<th>Location</th>
<th>Fuel</th>
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<th>M.B.</th>
<th>Supplier and Model</th>
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#### ELECTRICAL DATA

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<td>304 STAINLESS STEEL, APEX TYPE 5, ADA COMPLIANT, WIDE HOUSING</td>
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#### KH-3 MIXING VALVE

- **Type**: Color-Coded Dial Thermometer
- **Remarks**: See "C" Contract for Lavatory

#### LH-1 LAUNDRY

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#### WP-1 WATER HEATER

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#### Zurn 212-FCIS AS-ACT

- **Location**: Surface Mounted
- **Remarks**: LEAD FREE BRONZE BODY

#### Zurn 375

- **Location**: Recessed Wall
- **Remarks**: LEAD FREE BRONZE BODY

#### ACORN ENGINEERING COMPANY

- **Staff Water Closet - Water Closet - ADA Staff Water Closet - Shower Retrofit - Water Closet - ada compliant**
- **Surface Mounted Wall Shower**
- **Recessed Wall Shower**
- **Surface Mounted Showerhead, 14 Gage Material**
**CONSTRUCTION**

**DEEP TRENCH NOTE:**
For trenches that are deeper, the images show the course stone above the 4" distribution pipe. It is recommended as an additional course of lean concrete to provide strength and stability for the trench. The trench should be trenched to a depth equal to the depth of the 4" distribution pipe plus the additional course of stone. The trench should be backfilled with clean, washed gravel or similar aggregate material. The trench should be backfilled with clean, washed gravel or similar aggregate material.

**GENERAL NOTES:**
1. Do not install system in wet soils.
2. All trenching and backfilling should be in accordance with local code requirements.
3. Backfill should be compacted to provide stability and prevent settlement.
4. The trench should be sloped away from the building to allow for proper drainage.
5. Minimum length of absorption field for pressure distribution should be 10 feet.
6. Minimum depth of absorption field should be 1 foot.
VESTIBULE FRAMING REMOVALS PLAN

VESTIBULE FRAMING PLAN

1. Remove ALL FRAMING REMOVALS
2. Remove ALL FRAMING REMOVALS
3. Remove ALL FRAMING REMOVALS
4. Remove ALL FRAMING REMOVALS
5. Remove ALL FRAMING REMOVALS

NOTES:

1. ALL REPAIRS TO BE PERFORMED
2. PROVIDE REPAIRS TO MEET THE REQUIREMENTS
3. PROVIDE ALL REPAIRS TO MEET THE REQUIREMENTS
4. PROVIDE ALL REPAIRS TO MEET THE REQUIREMENTS
5. PROVIDE ALL REPAIRS TO MEET THE REQUIREMENTS

NEW YORK STATE OFFICE OF CHILDREN AND FAMILY SERVICES

BUILDING 1 FRAMING PLANS

S-1102
CONSTRUCTION STANDARDS: INCLUDING BUT NOT LIMITED TO, COMPLYING WITH THE FOLLOWING:

- 2013 NFPA 72 INSTALLATION OF FIRE ALARM SYSTEMS
- 2014 NFPA 70 NATIONAL ELECTRIC CODE
- 2013 NFPA 13 INSTALLATION OF FIRE SPRINKLERS
- 2010 ASCE 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES WITH SUPPLEMENT NO.1
- 2009 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES

REFERENCE STANDARDS:

- NEW YORK STATE LABOR DEPARTMENT INDUSTRIAL CODE FOR ITEMS RELATING TO PEOPLE WHO WORK IN THE BUILDING SUCH AS SAFETY GLASS
- 2015 INTERNATIONAL ENERGY CONSERVATION CODE (2nd Printing) WITH NY 2016 ENERGY CODE SUPPLEMENT
- 2015 INTERNATIONAL FIRE CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL PROPERTY MAINTENANCE CODE (4th Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL MECHANICAL CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL BUILDING CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL EXISTING BUILDING CODE (5th Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT – GOVERNING CODE
- FIRE CODE 33 WELDING AND OTHER HOT WORKS
- FIRE CODE 33 FIRE SAFETY DURING CONSTRUCTION AND REMOVALS
- EXISTING BUILDING CODE 15 CONSTRUCTION SAFEGUARDS

CODE COMPLIANCE SCHEDULE - LEVEL 0

<table>
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<tr>
<th>NAME</th>
<th>AREA</th>
<th>OCCUPANCY</th>
<th>FUNCTION DESCRIPTION</th>
<th>CLASSIFICATION</th>
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<th>GROSS</th>
<th>NET</th>
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<td>I-3</td>
<td>Institutional - Inpatient Treatment Areas</td>
<td>OLF 240</td>
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<td>113 SF</td>
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<td>298 SF</td>
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<td>OLF 300</td>
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<td>171 SF</td>
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CODE COMPLIANCE LEGEND

- Institutional - Inpatient Treatment Areas
- Accessory storage areas, mechanical equipment room

CONSTRUCTION TYPE: III (Occupancy I-3, Condition 5 (Restricted Movement))

ALTERATION LEVEL: Calculation

Building Area: 11,366 SF
Alteration Level 1: Add 25% (1,382 SF) of Total Building Area
Alteration Level 2: Area x 50%

ADDITION

Addition of a new area permitted when the new area is less than half of the building area. The area added is calculated as follows:

Area Added = (Building Area / 2) = 11,366 / 2 = 5,683 SF


FUNCTION CLASSIFICATION LEGEND

- Institutional - Inpatient Treatment Areas
- Accessory storage areas, mechanical equipment room
WARNING

PROVIDE CAMPUS WIDE UPGRADES

HARRIET TUBMAN RESIDENTIAL CENTER
6706 PINE RIDGE ROAD
AUBURN, NY 13021

45678 - C

EYP/CONSTRUCTION

FINAL SUBMISSION 08/14/2017

1

A-1005

BUILDING 01
CODE COMPLIANCE
NOTE (ADDENDUM 2):

REMOVAL KEYNOTES R-14 & R-22 DELETED FROM DRAWING

EXISTING CMU WALL TO BE REMOVED U.N.O.
(REFER TO REMOVAL KEYNOTE 17)

REMOVALS SYMBOLS LEGEND

EXISTING DOOR AND FRAME SYSTEM TO BE REMOVED U.N.O.
(REFER TO REMOVAL KEYNOTE 18)

EXISTING WINDOW SYSTEM TO BE REMOVED U.N.O.
(REFER TO REMOVAL KEYNOTE 25)

EXISTING CASEWORK AND/OR MILLWORK TO BE REMOVED

EXIST WALL TO REMAIN

EXIST DOOR TO REMAIN

EXIST WINDOW TO REMAIN

REMOVAL NOTES

1. REMOVE ALL EXISTING CEILING SYSTEM IN THEIR ENTIRETY INCLUDING FINISH, MESH, AND SUPPORTS THROUGHOUT BUILDING UNLESS NOTED OTHERWISE.

2. REMOVE ALL EXISTING RESIDENT BEDROOM FURNITURE IN ITS ENTIRETY

3. THOROUGHLY CLEAN ALL SURFACES (NOT OTHERWISE NOTED) WITH FUNGICIDE

4. REPLACE ALL WINDOW SEALANT

5. REMOVE ALL WALL BASE THROUGHOUT BUILDING.

6. REMOVE ALL WOOD WALL MOUNTED ACCESSORY AT THE ENTRY TO EACH BEDROOM DOOR.

WARNING

PROVIDE CAMPUS WIDE UPGRADES

HARRIET TUBMAN RESIDENTIAL CENTER
6706 PINE RIDGE ROAD
AUBURN, NY 13021

EYP/CONSTRUCTION

FINAL SUBMISSION
08/14/2017

LEVEL 0 REMOVALS

A-1101
NOTE (ADDENDUM 1):
REMOVAL KEYNOTES R-12, R-15, R-55, & R-56 DELETED FROM DRAWING

NOTE (ADDENDUM 2):
REMOVAL KEYNOTES R-03, R-14, R-22, R-29, R-32, R-57, & R-58 DELETED FROM DRAWING

NOTE:
REMOVE ALL EQUIPMENT AND CASEWORK/COUNTERTOP EXISTING CMU WALL TO BE REMOVED U.N.O. (REFER TO REMOVAL KEYNOTE 17)

REMOVALS SYMBOLS LEGEND:
EXISTING DOOR AND FRAME SYSTEM TO BE REMOVED U.N.O. (REFER TO REMOVAL KEYNOTE 18)
EXISTING WINDOW SYSTEM TO BE REMOVED U.N.O. (REFER TO REMOVAL KEYNOTE 25)
EXISTING CASEWORK AND/OR MILLWORK TO BE REMOVED (REFER TO REMOVAL KEYNOTE R22)
EXIST WALL TO REMAIN
EXIST DOOR TO REMAIN
EXIST WINDOW TO REMAIN

REMOVALS SYMBOLS LEGEND:

REMOVED MATERIALS:
EXISTING WALL GWB & CEILING FINISH AT CLERESTORY TO BE REMOVED
ALL WALL GWB & CEILING FINISH
AT CLERESTORY TO BE REMOVED

NOTE:
REMOVE ALL EXISTING CEILING SYSTEM IN THEIR ENTIRETY INCLUDING FINISH, MESH, AND SUPPORTS THROUGHOUT BUILDING UNLESS NOTED OTHERWISE.

NOTE:
REMOVE ALL EXISTING RESIDENT BEDROOM FURNITURE IN ITS ENTIRETY

NOTE:
THOROUGHLY CLEAN ALL SURFACES (NOT OTHERWISE NOTED) WITH FUNGICIDE

NOTE:
REPLACE ALL WINDOW SEALANT

NOTE:
REMOVE ALL WALL BASE THROUGHOUT BUILDING.

NOTE:
REMOVE ALL WOOD WALL MOUNTED ACCESSORY AT THE ENTRY TO EACH BEDROOM DOOR.

NOTE:

WARNING:
THE ALTERATION OF THIS MATERIAL IN ANY WAY, UNLESS DONE UNDER THE DIRECTION OF A COMPARABLE PROFESSIONAL, I.E. ARCHITECT FOR AN ARCHITECT, ENGINEER FOR AN ENGINEER OR LANDSCAPE ARCHITECT FOR A LANDSCAPE ARCHITECT, IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW AND/OR REGULATIONS AND IS A CLASS 'A' MISDEMEANOR.

OWNER:
NEW YORK STATE OFFICE OF CHILDREN AND FAMILY SERVICES

CLIENT:

CONSULTANT:

CONTRACT:

TITLE:

LOCATION:

SHEET TITLE:

DESIGNER:

PROJECT NUMBER:

DRAWN BY:

DRAWING NUMBER:

FIELD CHECK:

APPROVED:

SHEET OF

36x24 PLOT SHEET

LEVEL 1 REMOVALS PLAN

KEYNOTE LEGEND

R15 REMOVE WINDOW AND ALL ASSOCIATED HARDWARE IN THEIR ENTIRETY.
R17 REMOVE PORTION OF INTERIOR CMU WALL TO THE EXTENT SHOWN. GRIND AND GROUT EXPOSED CMU EDGES FLUSH.
R18 REMOVE EXISTING DOOR AND FRAME AND ALL ASSOCIATED HARDWARE IN ITS ENTIRETY.
R24 REMOVE MASONRY WALL AS REQUIRED FOR DOOR & LINTELED FRAME.
R25 REMOVE EXISTING STEEL WINDOW SYSTEM.
R42 REMOVE EXISTING GLAZING FROM WINDOW FRAME. FRAME TO REMAIN.
R51 REMOVE EXISTING STEEL DOOR PANEL AND ALL ASSOCIATED HARDWARE
R53 REMOVE EXISTING MASONRY PIER DOWN TO EXISTING TO THE FOUNDATION
R54 EXISTING BUILDING SIGNAGE, SALVAGE & PROTECT FOR RE-USE/RE-INSTALLATION.
R74 REMOVE EXISTING FOLDING PARTITION IN ITS ENTIRETY. REMOVE TRACK SYSTEM IN ITS ENTIRETY.

NOTE (ADDENDUM 3):
REMOVAL KEYNOTES R-15, R-16, R-17, R-18, & R-58 DELETED FROM DRAWING

NOTE (ADDENDUM 3):
REMOVAL KEYNOTES R-14, R-22, R-29, R-32, R-57, & R-58 DELETED FROM DRAWING
A-1203

NOTE:
GRADE LINE TO REFLECT
A01 - LEVEL 1
0' - 0".

C54

C28

1
A-1403
2

A-1403

BUILDING ELEVATIONS

A-1202

TYPICAL MASONRY CONDITION. REPAIR AND CLEAN

TYPICAL STUCCO CONDITION. REPAIR AND CLEAN

TYPICAL CONDITION AT KEYNOTE C65

NOTE:

FINAL GRADE TO BE BELOW FINISHED FLOOR. REFER TO
CIVIL DRAWINGS FOR FINAL GRADE ELEVATIONS.

GENERAL NOTES

1. REPAIR ALL CRACKS IN MASONRY, ASSUME 50 LF
2. REPAIR ALL CRACKS IN STUCCO, ASSUME 20 LF
3. REPAIR AND CLEAN ALL EXTERIOR MASONRY AND STUCCO. FINAL COLOR PER
DIRECTORS REPRESENTATIVE.
4. THOROUGHLY CLEAN ALL SURFACES (NOT OTHERWISE NOTED) WITH FUNGICIDE
5. REPLACE ALL WINDOW SEALANT
6. CLEAN ALL OPENINGS AFTER REMOVALS OF SEALANT OR RESIDUE IN PREPARATION
OF THE WORK.
7. CLEAN ALL LOUVERS INTERIOR AND EXTERIOR.
8. REPAIR ALL EXISTING BENT METAL FASCIA AND STANDING SEAM ROOF

CONSTRUCTION & DESIGN

NEW YORK STATE OFFICE OF
CHILDREN AND FAMILY SERVICES

CLIENT:

CONTRACT:

TITLE:

LOCATION:

CONSULTANT

SHEET TITLE:

DESIGNED BY:

PROJECT

NUMBER:

DRAWN BY:

DRAWING NUMBER:

FINAL SUBMISSION

08/14/2017

THE ALTERATION OF THIS MATERIAL IN ANY WAY, UNLESS
DONE UNDER THE DIRECTION OF A COMPARABLE
PROFESSIONAL, I.E. ARCHITECT FOR AN ARCHITECT,
ENGINEER FOR AN ENGINEER OR LANDSCAPE ARCHITECT
FOR A LANDSCAPE ARCHITECT, IS A VIOLATION OF THE
NEW YORK STATE EDUCATION LAW AND/OR REGULATIONS
AND IS A CLASS 'A' MISDEMEANOR.

WARNING

PROVIDE CAMPUS WIDE UPGRADES

HARRIET TUBMAN RESIDENTIAL CENTER
6706 PINE RIDGE ROAD
AUBURN, NY 13021

45678 - C

EYP/

CONSTRUCTION

EYP/

BUILDING ELEVATIONS

A-1202
Note: All work is to be installed using aluminum kick-out flashing, provided prefabricated aluminum kick-out flashing, provided prefabricated aluminum kick-out flashing. Provide prefabricated aluminum kick-out flashing. Provide prefabricated aluminum kick-out flashing. Provide prefabricated aluminum kick-out flashing.


Blind rivet at 2 1/2" O.C. Secure kick-out flashing to flashing. Provide continuous buyt, 3" = 1'-0"7 Kick-out flashing elevation. Provide continuous buyt, 3" = 1'-0"8 plan at kick-out flashing. Provide continuous buyt, 1 1/2" = 1'-0"9 kick-out flashing axonometric.


Provide continuous buyt, 3" = 1'-0"4 eave at clearstory. Provide continuous buyt, 3" = 1'-0"5 eave detail. Field verify existing roof structure. Existing roof structure panels to remain. Existing metal fascia with butyl tape both ends. Hem ends. Metal fascia to match existing. Seal perimeter channel trim. Provide perforated prefabricated existing, field verify material indications. See detail 5/A-1305 for face.

1' - 2 1/2" 5" 5" Match existing verify in field 2 2 2 2 Wood nailer. Continuous cut 2x pt.

6"± 6"± Match existing verify in field 2 2 2 2 Wood nailer. Continuous cut 2x pt.

Field verify existing roof structure. Existing roof structure panels to remain. Existing metal fascia with butyl tape both ends. Hem ends. Metal fascia to match existing. Seal perimeter channel trim. Provide perforated prefabricated existing, field verify material indications. See detail 5/A-1305 for face.

1' - 2 1/2" 5" 5" Match existing verify in field 2 2 2 2 Wood nailer. Continuous cut 2x pt.

6"± 6"± Match existing verify in field 2 2 2 2 Wood nailer. Continuous cut 2x pt.
### Door Schedule & Types

**Door Schedule & Abbreviations**

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<td>FRAME MATERIALS</td>
<td>FRAME TYPE</td>
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**Door Schedule**

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<td>1-38 Bedroom</td>
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</table>
CONSTRUCTION STANDARDS: INCLUDING BUT NOT LIMITED TO, COMPLYING WITH THE FOLLOWING:

- 2014 NFPA 70 NATIONAL ELECTRIC CODE
- 2013 NFPA 13 INSTALLATION OF FIRE SPRINKLERS
- 2010 ASCE 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES WITH SUPPLEMENT NO.1

REFERENCE STANDARDS:

- NEW YORK STATE LABOR DEPARTMENT INDUSTRIAL CODE FOR ITEMS RELATING TO PEOPLE WHO WORK IN THE BUILDING SUCH AS SAFETY GLASS,
- 2015 INTERNATIONAL ENERGY CONSERVATION CODE (2nd Printing) WITH NY 2016 ENERGY CODE SUPPLEMENT
- 2015 INTERNATIONAL FIRE CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL FUEL GAS CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL MECHANICAL CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL BUILDING CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
- 2015 INTERNATIONAL EXISTING BUILDING CODE (5th Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT – GOVERNING CODE
- FIRE CODE 33 FIRE SAFETY DURING CONSTRUCTION AND REMOVALS
- EXISTING BUIDING CODE 15 CONSTRUCTION SAFEGUARDS

FIXTURE COUNTS BASED ON ACTUAL OCFS PROVIDED OCCUPANT LOAD. ACTUAL OCCUPANTS LESS THAN NOTE:

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<th>RESIDENTS</th>
<th>GYMNASIUM</th>
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<tr>
<td>(1 PER 25)</td>
<td>(1 PER 15)</td>
<td></td>
</tr>
<tr>
<td>46</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

NOTE:

1. STAFF
2. 1/8" = 1'-0" 1 CODE COMPLIANCE PLAN
3. ACTUAL BUILDING AREA = 6,465 SF
4. ALLOWABLE AREA PERMITTED UNDER IBC 2015 = 40,000 SF
5. ALLOWABLE AREA PERMITTED UNDER 1992 NYS BUILDING CODE = 6,000 SF
7. SPRINKLER SYSTEM ADDED.
8. # OCCUPANTS (CODE)
9. # OCCUPANTS (OCFS)
10. CALCULATED

LIFE SAFETY SCHEDULE

<table>
<thead>
<tr>
<th>EXIT ACCESS TRAVEL DISTANCE TO AN EXIT (IN FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PATH INTO EXIT</td>
</tr>
<tr>
<td>PATH ID</td>
</tr>
<tr>
<td>EXIT SIGNAGE</td>
</tr>
<tr>
<td>DOOR IN EGRESS PATH</td>
</tr>
<tr>
<td>EXIT ACCESS TRAVEL DISTANCE TO AN EXIT (IN FEET)</td>
</tr>
</tbody>
</table>

FUNCTION CLASSIFICATION LEGEND

- Accessory Storage Areas, Mechanical Equipment
- Room
- Educational Classroom area
- Service Rooms
- Institutional - Inpatient Treatment Areas
- Washroom
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-12004</td>
<td>Building 02 Code Compliance</td>
<td>10/04/2017</td>
</tr>
<tr>
<td>AS-12004-1</td>
<td>Addendum No. 3</td>
<td>10/04/2017</td>
</tr>
</tbody>
</table>

Warning: The alteration of this material in any way, unless done under the direction of a comparable professional, i.e., architect for an architect, engineer for an engineer or landscape architect for a landscape architect, is a violation of the New York State Education Law and/or regulations and is a class 'A' misdemeanor.
NOTE (ADDENDUM 2):

REMOVAL KEYNOTES R-12, R-22, R-27, R-32, & R-49, DELETED FROM DRAWING

REMOVE & REBUILD EXISTING 6" CMU WALL (6'-8" HIGH) ALONG INTERIOR. CMU TO BE ANCHORED TO STEEL COLUMNS WHERE STEEL RUNS PAST AT COLUMN LINES 1 & 2.

NORTH CMU WALL, REPAIR AND REPOINT. ASSUME 40 LF

SOUTHWEST CMU WALL, REPAIR AND REPOINT. ASSUME 10 LF

NORTHEAST CMU WALL, REPAIR AND REPOINT. ASSUME 16 LF

SOUTH CMU WALL, REPAIR AND REPOINT. ASSUME 40 LF

EXISTING CMU WALL TO BE REMOVED U.N.O. (REFER TO REMOVAL KEYNOTE 17)

EXISTING DOOR AND FRAME SYSTEM TO BE REMOVED U.N.O. (REFER TO REMOVAL KEYNOTE 18)

EXISTING WINDOW SYSTEM TO BE REMOVED U.N.O. (REFER TO REMOVAL KEYNOTE 25)

EXISTING CASEWORK AND/OR MILLWORK TO BE REMOVED (REFER TO REMOVAL KEYNOTE R22)

EXISTING WALL TO REMAIN

EXISTING DOOR TO REMAIN

EXISTING WINDOW TO REMAIN

REMOVAL NOTES

1. REMOVE ALL EXISTING CEILING SYSTEMS IN THEIR ENTIRETY INCLUDING FINISH, MESH, AND SUPPORTS THROUGHOUT BUILDING UNLESS NOTED OTHERWISE

2. THOROUGHLY CLEAN ALL SURFACES (NOT OTHERWISE NOTED) WITH FUNGICIDE

3. REPLACE ALL WINDOW SEALANT

4. REMOVE ALL WALL BASE THROUGHOUT BUILDING UNLESS NOTED OTHERWISE


NOTE (ADDENDUM 3):

REMOVAL PLANS

1. 10/04/2017 ADDENDUM NO. 3
NOTE:

- ALL NEW PARTITIONS TYPE E80 UNLESS NOTED OTHERWISE

REPAIR ALL CMU WALL CRACKS. ASSUME 40 LINEAR FEET

WARNING

PROVIDE CAMPUS WIDE UPGRADES

HARRIET TUBMAN RESIDENTIAL CENTER
6706 PINE RIDGE ROAD
AUBURN, NY 13021

THE ALTERATION OF THIS MATERIAL IN ANY WAY, UNLESS DONE UNDER THE DIRECTION OF A COMPARABLE PROFESSIONAL, I.E. ARCHITECT FOR AN ARCHITECT, ENGINEER FOR AN ENGINEER OR LANDSCAPE ARCHITECT FOR A LANDSCAPE ARCHITECT, IS A VIOLATION OF THE NEW YORK STATE EDUCATION LAW AND/OR REGULATIONS AND IS A CLASS 'A' MISDEMEANOR.

NOTE:

- PROVIDED E80 WALL TYPE TO ALIGN WITH T/ EXISTING FIBERGLASS ENCLOSURE. SEE 6/A-2401

KEYNOTE LEGEND

- C04 REFINISH WOOD FLOORS AND PROVIDE STRIPING PATTERN TO MATCH EXISTING
- C25 WALL MATS AT ALL WALLS OF GYMNASIUM (EACH 24" x 84" ). PROVIDE CUT OUTS FOR ALL WINDOWS AND WALL MOUNTED DEVICES, VERIFY LOCATIONS IN FIELD
- C26 REPLACE EXTERIOR METAL PILASTERS IN KIND. COLOR BY DIRECTORS REPRESENTATIVE
- C29 FDC CONNECTION
- C42 GUTTER - FULL LENGTH OF BUILDING.
- C43 DOWNSPOUT - 3" X 4"

1/8" = 1'-0" 1 LEVEL 1 FLOOR PLAN

1/8" = 1'-0" 2 A01 - ROOF PLAN

10/04/2017 ADDENDUM NO. 3
3" = 1'-0"

TYPICAL CEILING ASSEMBLIES

ABOVE CEILING PERIMETER WHEN WALL EXTENDS

TYPICAL CEILING SUPPORT SECTION @ TERMINATES @ CEILING

TERMINATES @ CEILING SECTION @ PERIMETER WHEN WALL

TYPICAL FRPB CEILING SUPPORT

CFMF JOIST SPAN TABLE

<table>
<thead>
<tr>
<th>SPAN</th>
<th>JOIST</th>
<th>BRIDGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>6&quot; x 36&quot;</td>
<td>-</td>
</tr>
<tr>
<td>12'-0&quot;</td>
<td>6&quot; x 42&quot;</td>
<td>T/2 x 2&quot; MDS</td>
</tr>
</tbody>
</table>
PROVIDE CAMPUS WIDE UPGRADES

HARRIET TUBMAN RESIDENTIAL CENTER
6706 PINE RIDGE ROAD
AUBURN, NY 13021

KEYNOTE LEGEND

C26 REPLACE EXTERIOR METAL PILASTERS IN KIND. COLOR BY DIRECTORS REPRESENTATIVE
C27 STEEL DOOR AND FRAME SYSTEM. REFER TO DOOR SCHEDULE.
C28 STEEL DOOR PANEL. REFER TO DOOR SCHEDULE.
C29 FDC CONNECTION

C42 GUTTER - FULL LENGTH OF BUILDING.
C43 DOWNSPOUT - 3" X 4"

NOTE:
FINAL GRADE TO BE BELOW FINISHED FLOOR. REFER TO CIVIL DRAWINGS FOR FINAL GRADE ELEVATIONS.

1 09/25/2017 ADDENDUM NO. 1
2 10/04/2017 ADDENDUM NO. 3
C25 WALL MATS AT ALL WALLS OF GYMNASIUM (EACH 24" x 84"). PROVIDE CUT OUTS FOR ALL WINDOWS AND WALL MOUNTED DEVICES, VERIFY LOCATIONS IN FIELD.

KEYNOTE LEGEND

KEY VALUE KEYNOTE TEXT

1/4" = 1'-0"

GYMNASIUM - NORTH INTERIOR ELEVATION

GYMNASIUM - SOUTH INTERIOR ELEVATION

ENLARGED PLAN AT DRINKING FOUNTAIN

ELEVATION AT DRINKING FOUNTAIN
### Door Schedule

<table>
<thead>
<tr>
<th>Door No.</th>
<th>Room Name</th>
<th>Type</th>
<th>Door Height</th>
<th>Door Width</th>
<th>Finish</th>
<th>Anchors</th>
<th>Fire Rating</th>
<th>Hardware</th>
<th>Size</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fire Service Room</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>EAL-4</td>
<td>EAL-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mechanical</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>EAL-4</td>
<td>EAL-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gymnasium (2-11B)</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>S-10</td>
<td>IAL-4</td>
<td>10</td>
<td>LHR</td>
</tr>
<tr>
<td>4</td>
<td>Gymnasium (2-11A)</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>S-10</td>
<td>IAL-4</td>
<td>10</td>
<td>RHR</td>
</tr>
<tr>
<td>5</td>
<td>Lobby (2-11)</td>
<td>X</td>
<td>IAL-4</td>
<td>45 MIN</td>
<td></td>
<td></td>
<td></td>
<td>IAL-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Storage (2-10)</td>
<td>X</td>
<td>X</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Storage (2-9A)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Multi-Purpose Classroom (2-9)</td>
<td>X</td>
<td>IAL-4</td>
<td>45 MIN</td>
<td></td>
<td></td>
<td></td>
<td>IAL-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Storage (2-8)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Multi-Purpose Classroom (2-7A)</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>F3</td>
<td>STL</td>
<td>CEO</td>
<td>3/A-2602</td>
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<td>11</td>
<td>Utility (2-6)</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>F3</td>
<td>STL</td>
<td>CEO</td>
<td>3/A-2602</td>
</tr>
<tr>
<td>12</td>
<td>Toilet (2-5)</td>
<td>3'-0&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>NV</td>
<td>FRP</td>
<td>IAL-4</td>
<td>WML</td>
<td>S-4</td>
<td>45 MIN</td>
</tr>
<tr>
<td>13</td>
<td>Toilet (2-4)</td>
<td>3'-0&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>F</td>
<td>FRP</td>
<td>IAL-4</td>
<td>WML</td>
<td></td>
<td>45 MIN</td>
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<td>14</td>
<td>Janitor (2-3)</td>
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<td></td>
<td></td>
<td></td>
<td>IAL-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Vestibule (2-2)</td>
<td>3'-8&quot;</td>
<td>7'-0&quot;</td>
<td>1 3/4&quot;</td>
<td>FG</td>
<td>IAL-4</td>
<td>S-4</td>
<td>IAL-4</td>
<td></td>
<td>4 RHR</td>
</tr>
</tbody>
</table>

### Door Schedule Abbreviations

- **Glass Type**
- **Door Materials**
- **Door Types**
- **Fire Rating**
- **Hardware**
- **Size**
- **Notes**
CONSTRUCTION STANDARDS: INCLUDING BUT NOT LIMITED TO, COMPLYING WITH THE FOLLOWING:

- EXISTING BUILDING CODE 15 CONSTRUCTION SAFEGUARDS
- BUILDING CODE 33 SAFEGUARDS DURING CONSTRUCTION
- FIRE CODE 33 FIRE SAFETY DURING CONSTRUCTION AND REMOVALS
- FIRE CODE 35 WELDING AND OTHER HOT WORKS

UNDER THE NEW YORK STATE UNIFORM FIRE PREVENTION AND BUILDING CODE, ALL BUILDING PROJECTS MUST MEET OR EXCEED THE FOLLOWING CODES AND REFERENCE STANDARDS IDENTIFIED AS APPLICABLE:

-2015 INTERNATIONAL EXISTING BUILDING CODE (5th Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT – GOVERNING CODE
-2015 INTERNATIONAL BUILDING CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
-2015 INTERNATIONAL PLUMBING CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
-2015 INTERNATIONAL MECHANICAL CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
-2015 INTERNATIONAL FUEL GAS CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
-2015 INTERNATIONAL PROPERTY MAINTENANCE CODE (4th Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
-2015 INTERNATIONAL FIRE CODE (3rd Printing) WITH NY 2016 UNIFORM CODE SUPPLEMENT
-2015 INTERNATIONAL ENERGY CONSERVATION CODE (2nd Printing) WITH NY 2016 ENERGY CODE SUPPLEMENT

NEW YORK STATE LABOR DEPARTMENT INDUSTRIAL CODE FOR ITEMS RELATING TO PEOPLE WHO WORK IN THE BUILDING SUCH AS SAFETY GLASS, PROVISIONS FOR WINDOW WASHING, COT SPACE FOR FEMALE EMPLOYEES, ASBESTOS ABATEMENT, BOILER DESIGN, ETC.

REFERENCE STANDARDS:
-2009 ICC/ANSI A117.1 ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES
-2010 ASCE 7 MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES WITH SUPPLEMENT NO.1
-2012 NFPA 13 INSTALLATION OF FIRE SPRINKLERS
-2014 NFPA 70 NATIONAL ELECTRIC CODE
-2013 NFPA 72 INSTALLATION OF FIRE ALARM SYSTEMS

NOTES:
1. ALTERATION LEVEL 1 CONSIDERED ON THIS BUILDING, ONLY REPAIRS. WORK CLASSIFIED AS REPAIRS PER 2015 IEBC.
**FRAME MATERIALS**

- STL:
  - OVERHEAD DOOR:
    - FLUSH
      - STEEL
  - DOOR MATERIALS
    - CEO:
      - ANCHOR TYPES
        - LHR:
          - CONCRETE EXISTING OPENING
          - LEFT HAND REVERSE
          - OVER HEAD

**Exterior Steel Doors & Frames**

- FACTORY FINISH
  - CONCEALED EXISTING OPENING
  - LEFT HAND REVERSE
  - OVER HEAD

**Hand Type**

- EAL-4

**Finishes**

**Grade**

- C44
  - C43
  - C42

**Hand**

- TYPE

**Removals**

- Door Schedule

**Door Schedules Abbreviations**

**Door Materials**

- Frame Type
  - INDOOR TYPES
  - DOOR TYPES

**Building 04 Plans, Elevations & Removals**

- Construction
  - Key
    - Value
    - Keynote Text
SECTION 061000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 REFERENCES

A. Standards: Comply with the following unless otherwise specified or indicated on the Drawings:

2. Plywood: Product Standard PS 1 for Softwood Plywood, Construction and Industrial by the U.S. Department of Commerce.
4. Grading Rules:
   a. Douglas Fir, Hem-Fir, Idaho White Pine, and other Western Woods: Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB).
   b. Southern Pine: Southern Pine Inspection Bureau (SPIB).
   c. Redwood: Redwood Inspection Service (RIS).
5. Preservative Treatment: American Wood Preservers’ Association (AWPA) and American Wood Preservers Bureau (AWPB) Standards, quality control methods, and inspection requirements.

1.02 QUALITY ASSURANCE

A. Mill and Producers Mark: Each piece of lumber and plywood shall be gradestamped indicating type, grade, mill, and grading agency certified by the Board of Review of the American Lumber Standards Committee. Mark shall appear on unfinished surface, or ends of pieces with finished surfaces.

1. Pressure Preservative Treated Material: Accredited agency quality mark, on each piece of wood, indicating treatment.
2. Fire-Retardant Treated Material: Accredited testing agency mark, on each piece of wood, indicating compliance with the fire hazard classification.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Keep materials dry. Make provision for air circulation around and between stacks of wood products.
PART 2   PRODUCTS

2.01  LUMBER

A.  General: Furnish seasoned dimension lumber dressed to nominal sizes indicated with 19 percent maximum moisture content at time of dressing, marked “S-DRY”. Comply with dry size requirements of PS 20.
   1.  Dress: Surfaced 4 sides (S4S) unless otherwise indicated.

B.  Framing Lumber: Species: Douglas Fir or Hem-Fir (WWPA or WCLIB), or Southern Pine (SPIB), or Spruce-Pine-Fir (NGLA) unless otherwise indicated.
   1.  Light Framing; 2 inches through 4 inches thick, less than 6 inches wide: Standard and Better grade, except Stud grade for stud framing.
   2.  Structural Framing; 2 inches through 4 inches thick, 6 inches wide and wider: No. 2 grade.

C.  Board Lumber; less than 2 inches thick:
   1.  Exposed Board Lumber, for Paint Finish: Southern Pine No. 1 (SPIB), Douglas Fir 2 Common (WWPA), Select Merchantable (WCLIB), or Spruce-Pine-Fir Appearance (NGLA).
   2.  Concealed Board Lumber: Southern Pine No. 3 (SPIB), any species No. 4 (WWPA), any species Standard (WCLIB), or Spruce-Pine-Fir No. 1 / No. 2 (NGLA).

D.  Miscellaneous Lumber: Standard grade, No. 3 grade, or better grade of the following species unless otherwise indicated:
   2.  Furring: Spruce, Hem-Fir, or Spruce-Pine-Fir except Douglas Fir or Southern Pine for furring required to receive preservative treatment.

2.02  PLYWOOD

A.  Sheathing : APA RATED SHEATHING, EXPOSURE 1. Furnish APA PS 1 veneered panels, with span ratings for the required thicknesses as listed below unless otherwise indicated.

<table>
<thead>
<tr>
<th>THICKNESS</th>
<th>SPAN RATING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>32/16</td>
</tr>
<tr>
<td>3/4</td>
<td>48/24</td>
</tr>
</tbody>
</table>

2.03  MISCELLANEOUS MATERIALS

A.  Asphalt Felt: Asphalt-saturated felt, No. 15, without perforations, complying with ASTM D 226.

B.  Rosin Paper: Commercial, rosin-sized building paper, 0.010 inch thick.
C. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
1. Water-Vapor Permeance: Not less than 8 perms per ASTM E 96/E 96M, Desiccant Method (Procedure A).
2. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg when tested according to ASTM E 2178.
3. Allowable UV Exposure Time: Not less than three months.

D. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.04 PRESERVATIVE TREATMENT

A. Treat lumber and plywood where indicated and as specified. Comply with applicable AWPA and AWPB Standards and quality control and inspection requirements.

B. Complete fabrication of items to be treated to the greatest extent possible prior to treatment. Where items must be cut after treatment, coat cut surfaces with heavy brush coat of the same chemical used for treatment or other solution recommended by AWPA Standards for the treatment.

C. Pressure Treatment (Above Ground Use): Treat the following wood items with waterborne preservatives for above ground use, complying with AWPB LP-2.
Redry wood to a maximum moisture content of 19 percent after treatment.
1. Nailers, blocking, cants, shim stock, and similar members used in conjunction with roofing (including related flashings, trim and vapor barrier) and coping.
2. Nailers, blocking, furring, stripping, and similar concealed members in contact with exterior masonry and concrete (including interior wythe of exterior walls).
3. Wood items indicated or scheduled on the Drawings to be preservative treated.

2.05 FASTENERS AND ANCHORING DEVICES

A. Select and furnish items of type, size, style, grade, and class as required for secure installation of the Work. Items shall be galvanized for exterior locations, high humidity locations, and for use with treated wood. Unless shown or specified otherwise, comply with the following:
2. Wood Screws: FS FF-S-111.
8. Toggle Bolts: FS FF-B-588.
10. Wall Plugs: Corrugated type, galvanized steel, 24 USS gage min, not less than 2 inches wide x 2-1/2 inches deep.
11. Metal Hangers and Framing Anchors: Size and type for intended use, galvanized finish, manufacturer’s recommended fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

A. Wood Framing: Install in accordance with applicable provisions of the AFPA “Manual for Wood Frame Construction”, unless otherwise indicated.

B. Plywood:
   1. Install in accordance with APA Design/Construction Guide, Residential & Commercial, unless otherwise indicated.
   2. Fasten in accordance with APA recommendations.

C. Nailers and Blocking: Attach to substrate as required to support applied loading.

D. Treated Wood: Brush-coat field cut surfaces with same treatment material.

3.02 BUILDING WRAP INSTALLATION

A. Cover exposed exterior surface of sheathing with building wrap securely fastened to framing immediately after sheathing is installed.

B. Cover sheathing with building wrap as follows:
   1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
   2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

C. Comply with manufacturer’s written instructions and warranty requirements.
   1. Seal seams, edges, fasteners, and penetrations with tape.
   2. Extend into jambs of openings and seal corners with tape.

END OF SECTION
PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Nailers and Blocking: Section 061000.

B. Casework: Section 064000.

1.02 SUBMITTALS

A. Product Data for each material.

B. Samples:

1.03 QUALITY ASSURANCE

A. Mill and Producer's Label: Each lumber and panel item shall bear label indicating type, grade, mill, and grading agency on unfinished surface, or on end of material with finished surfaces.

1. Panels shall bear APA or equivalent grade-mark; each panel.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Store materials and completed fabricated wood items in a dry, well ventilated area completely protected from the weather. Comply with temperature and humidity requirements for storage and installation as specified in the applicable quality standards.

B. Protect sanded and prefinished surfaces during handling and installation. Keep such surfaces covered with polyethylene film or other suitable protective covering.

1.05 PROJECT CONDITIONS

A. Environmental Requirements: Maintain constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent in spaces to receive the Work of this Section.
PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber: Kiln-dried to 12 percent average moisture content for exterior Work; 8 percent for interior Work.

B. Fasteners:
   1. Nails, Spikes, and Staples: Size and type to suit application; non-ferrous metal or galvanized steel for exterior locations, high humidity locations, treated wood, and wood to receive transparent finishes; plain finish for other interior locations.
   2. Bolts, Nuts, Washers, Lags, and Screws: Medium carbon steel; size and type to suit application; galvanized for exterior locations, high humidity locations, and treated wood; plain finish for other interior locations.
   3. Anchors: Toggle bolt type for anchorage to hollow masonry; expansion shield and lag bolt type for anchorage to solid masonry or concrete; galvanized steel or stainless steel.
      a. Surface: Smooth.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine substrate conditions and surfaces upon which finish Work is to be installed. Do not proceed with finish Work until unsatisfactory substrate conditions are corrected.

3.02 PREPARATION

A. Condition the Work of this Section to average prevailing humidity conditions in installation areas prior to installing.

3.03 INSTALLATION

A. Comply with workmanship and finishing standard requirements of the AWS Quality Grade specified herein.

B. Install the Work plumb, level, and free of distortion. Shim where required, with concealed shims.

C. Cut wood items to fit unless specified to be shop-fabricated, or shop-cut to exact size. Scribe and cut for accurate fit where Work abuts other finish Work. Drill pilot holes at corners before making cutouts.

D. Distribute defects to the greatest appearance advantage possible.

E. Attach the Work securely in place.
1. Nailing: Blind nail where possible. Use finishing nails where exposed. Set nail heads for filling, except for exterior wood scheduled to receive natural finish (if any).

2. Anchoring: Secure the Work to anchors or to blocking which is built-into or directly attached to substrates.

3.04 PROTECTION

A. Protect installed Work from damage by Work of other trades. Maintain temperature and humidity requirements during the construction period in interior installation areas.

END OF SECTION
SECTION 072100
BUILDING INSULATION

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each type of insulation specified.
   1. Include data substantiating that the materials comply with the specified thermal resistance and vapor resistance qualities.

B. Samples:
   1. Blanket, Batt or Roll: 12 inch sq.
   2. Rigid Type: 6 inch sq.
   3. Loose Type: One pt.

C. Quality Control Submittal:

1.02 QUALITY ASSURANCE

A. Allowable Thickness Variations: Manufacturer’s standard units which vary slightly from the thickness indicated may be acceptable, subject to the approval of the Director.

B. Thermal Resistance: The thicknesses shown are for the thermal resistance (R-Value in accordance with ASTM C 177 or ASTM C 518) specified for each material. The R-Values specified are minimum acceptable. Provide adjusted thicknesses as directed for the use of material having a different thermal resistance.

C. Certification: Affidavit by the polystyrene thermal insulation manufacturer, certifying that the insulation was manufactured with CFC and HCFC-free blowing agents.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Do not allow insulation materials to become wet or soiled, or covered with ice or snow. Comply with manufacturer’s recommendations for handling, storage, and protection during installation.

B. Do not deliver flammable insulation materials to the project site more than 2 days ahead of the time of installation. Protect at all times against ignition.
C. Protect insulation materials subject to deterioration by sunlight from exposure to sunlight.

D. Complete the installation and concealment of insulation materials as rapidly as possible.

1.04 PROJECT CONDITIONS

A. Do not proceed with the installation of insulation on walls or under slabs until the Work which follows (and which conceals the insulation) is ready to be performed.

B. Examination of Substrate: Examine the substrate and the conditions under which the insulation Work is to be performed. Do not proceed with the insulation Work until unsatisfactory conditions have been corrected.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid (Board) Insulation (Drawing Designation Type 2A): Rigid cellular polyisocyanurate thermal insulation boards surfaced with other materials; ASTM C1289.
   1. Aged R-Value:
      a. 1 Inch Thick: R = 5.7.
      b. 2 Inch Thick: R = 11.4.
   2. Facing Type:
      a. Fiberglass reinforced aluminum foil on both sides.

B. Rigid (Board) Insulation (Drawing Designation Type 2B): Rigid cellular polyisocyanurate thermal insulation boards surfaced with other materials; ASTM C1289.
   1. Aged R-Value:
      a. 1 Inch Thick: R = 5.7.
      b. 2 Inch Thick: R = 11.4.
   2. Facing Type:
      a. Felt or glass-fiber mat facer on both sides.

C. Rigid (Board) Insulation (Drawing Designation Type 1C): Extruded polystyrene thermal insulation boards; ASTM C 578, Type IV, manufactured with CFC and HCFC-free blowing agents.
   1. Aged R-Value:
      a. 1/2 Inch Thick: R = 2.5 @ 40 degrees F and 2.5 @ 75 degrees F.
      b. 1 Inch Thick: R = 5.0 @ 40 degrees F and 5.0 @ 75 degrees F.
      c. 1-1/2 Inches Thick: R = 7.5 @ 40 degrees F and 7.5 @ 75 degrees F.
      d. 2 Inches Thick: R = 10.0 @ 40 degrees F and 10.0 @ 75 degrees F.
2. Edges and Ends: Square or tongue-and-groove at manufacturer’s option.

D. Rigid (Mineral Fiber Board) Insulation (Drawing Designation Type 5C):
Mineral fibers and water-resistant binders formed into rigid, non-combustible boards; ASTM C 612.
1. R-Value:
   a. 1 Inch Thick: R = 4.35.
   b. 1-1/2 Inch Thick: R = 6.53.
   c. 2 Inches Thick: R = 8.70.
2. Class I: Non-load bearing.
4. Type III, Class A - With a reflective barrier membrane covering one principal face. Membrane flame spread rating of 25 or less.

E. Mineral Fiber Insulation (Drawing Designation Type 4A): Inorganic mineral fibers and resinous binders formed into flexible blankets, batts or rolls; ASTM C 665.
1. R-Value:
   a. 2-1/2 Inches Nominal Thickness: R = 7.0.
   b. 3-1/2 or 3-5/8 Inches Nominal Thickness: R = 11.0.
   c. 6-1/4 or 6-1/2 Inches Nominal Thickness: R = 19.0.
2. Type I - Blankets with no membrane covering.

F. Adhesive for Bonding Insulation: The type recommended by the insulation manufacturer.

G. Mechanical Anchors: Type and size shown or, if not shown, as recommended by the insulation manufacturer for the type of application shown and condition of substrate.

H. Vapor Retarder: Polyethylene sheeting; ASTM D 4397; 6 mils minimum thickness, 3.7 g/m2 per 24 hr maximum water vapor transmission rate.

I. Fluid-Applied Acrylic Insulation Coating: Thermal insulating coating that imparts exceptional insulating properties to a variety of substrates:
   1. Thermal Conductivity (ASTM C518 at 77°F): 0.2468 BTU-in/ sq. ft.-hr-Deg. F (R value at one inch equals 4.1)
   2. Flame Spread (ASTM E84): Class A
   3. Smoke Developed (ASTM E84): Class A
   4. Total Dry Film Thickness: 100 mils
   5. Volume Solids 74% minimum.

2.02 ACCESSORIES

A. Tape for Sealing Vapor Retarders: 2-1/2 inch wide, 2 Mil, high strength aluminum foil coated with an aggressive, high temperature adhesive system recommended by insulation manufacturer.
PART 3 EXECUTION

3.01 PREPARATION

A. Verify that adjacent materials are dry and ready to receive insulation.

3.02 INSTALLATION

A. Comply with manufacturer’s printed instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer’s technical representative for specific recommendations before proceeding with the work.

B. Extend insulation full thickness over entire surface to be insulated. Apply a single layer of insulation of the required thickness, unless otherwise indicated or required to make up the total thickness. Cut and fit tightly around obstructions, and fill voids with insulation.
   1. Do not place insulation over, or within 3 inches of recessed lighting fixtures.

C. Install insulation with factory applied barrier membrane facing the warm side of building spaces. Tape ruptures in barrier membrane.
   1. Install reflective barrier membrane insulation with 3/4 inch air space in front of reflective barrier membrane wherever possible.

D. Install separate polyethylene sheeting vapor barrier where shown, in accordance with manufacturer’s printed instructions. Lap and tape all seams and joints a minimum of 6 inches.

E. Install fluid-applied acrylic insulation coating in accordance with manufacturer’s printed instructions; provide multiple coats to achieve DFT indicated.

END OF SECTION
SECTION 074646
MINERAL FIBER CEMENT SIDING

PART 1  GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Rough Carpentry/Sheathing and Building Wrap: Section 061000.

1.02 REFERENCES


1.03 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013000 does not apply to this Section.

B. Product Data: Catalog sheets, specifications and installation instructions for each item specified.
   2. Material descriptions.
   3. Dimensions of individual components and profiles.
   4. Finishes.

C. Samples:
   1. Samples for Initial Selection: For siding including related accessories.
   2. Samples for Verification: For each type, color, texture, and pattern required.
      a. 12 inch long by actual-width sample of siding.
      b. 12 inch long by actual-width samples of each type of trim and accessories.

D. Color Samples: Manufacturer's standard colors for siding.

E. Quality Control Submittals:
   1. Product Certificates: For each type of siding, from manufacturer.
   2. Manufacturer’s Field Reports: Verification of existing conditions.
   3. Installer’s Qualifications Data:
      a. Name of each person who will be performing the Work and their employer’s name, business address and telephone number.
b. Names and addresses of 3 similar projects that each person has worked on during the past 5 years.

4. Company Field Advisor Data:
   a. Name, business address and telephone number of Company Field Advisor secured for the required services.
   b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
   c. Services and each product for which authorization is given by the Company, listed specifically for this project.

F. Contract Closeout Submittals:
   1. Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative.
   2. Warranty: Copy of specified Warranty.

1.04 QUALITY ASSURANCE

A. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Source Limitations: Obtain each type, color, texture, and pattern of siding, including related accessories, from a single source and from a single manufacturer.

C. Pre-Installation Conference: Before the siding Work is scheduled to commence, a conference will be held by the Director’s Representative at the Site for the purpose of reviewing the Contract Documents and discussing requirements for the Work.

1.05 DELIVERY, STORAGE AND HANDLING

A. Store materials flat and off the ground in a dry, well-ventilated, weather tight place.

1.06 PROJECT CONDITIONS

A. Environmental Requirements: Comply with manufacturer’s printed recommendations regarding environmental conditions under which siding can be constructed.

1.07 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.08 WARRANTY

A. Manufacturer’s Warranty: 30 year warranty for the siding.
1.09 MAINTENANCE

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Furnish full lengths of siding including related accessories, in a quantity equal to 2 percent of amount installed.

B. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES


2.02 MATERIALS

A. Organic (wood) fibers mixed with Portland cement, fly ash, additives, and powdered rejects. Wood grains and architectural features pressed into surface.

2.03 FIBER-CEMENT SIDING

A. ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

B. Horizontal Pattern:
   1. Boards:
      a. 7 1/4 to 7 1/2 inches wide; 6 inch exposure.
   2. Style:
      a. Plain.
   3. Texture:
      a. Smooth.
C. Attachment: Blind nailed.

D. Factory Priming: Manufacturer's standard acrylic primer.

2.04 ACCESSORIES

A. Siding Accessories: Starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
   1. Provide accessories made from same material as matching color and texture of adjacent siding unless otherwise indicated.

B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
   1. Corner Posts:
      a. Plain.
   2. Door and Window Casings:
      a. Plain.

C. Colors for Decorative Accessories:
   1. As selected by the Director’s Representative from manufacturer's full range of industry colors.

D. Flashing: Provide minimum 24 gage corrosion-resistant metal such as galvanized steel, stainless-steel, or copper at window and door heads and where indicated.

E. Fasteners:
   1. Stainless-steel fasteners.
   2. For fastening to wood studs, use siding nails or ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean substrates of projections and substances detrimental to application.

3.03 INSTALLATION

A. Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
   1. Do not install damaged components.
B. Install fiber-cement siding and related accessories.
   1. Install fasteners (blind nailed) at each stud no more than 24 inches o.c.

3.04 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

3.05 FINISHING

A. Finish factory primed siding with a minimum of one coat of 100 percent acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer’s written product recommendation and written application instructions.

B. Use exterior grade sealant that complies with either ASTM C-834 for primed products or ASTM C-920 for finished products for all gaps that require filling with sealant. Follow the manufacturer’s written instructions for use.

C. Cover exposed field cut edges with sealant or primer.

D. Fill dents, chips, scratches, and similar defects with exterior grade patching compound or putty. Follow the manufacturer’s instructions.

3.06 PROTECTION

A. Apply heavy kraft paper or other heavy protective coating approved by the Director’s Representative, masked in place to prevent surface damage.

END OF SECTION
SECTION 081116
ALUMINUM DOORS AND FRAMES

PART 1   GENERAL

1.01   RELATED WORK SPECIFIED ELSEWHERE

A. Finish Hardware and Thresholds: Section 087100.
B. Glass and Glazing: Section 088100.

1.02   SUBMITTALS

A. Shop Drawings: Show details of each frame type, elevation and construction for each door type, conditions at openings, location and installation requirements for finish hardware (including cutouts and reinforcements), details of connections, and anchorage and accessory items.
   1. Include a schedule of doors and frames using the same reference numbers for details and openings as those on the Contract Drawings.
B. Product Data: Catalog sheets, specifications, and installation instructions for each type door and frame specified.
C. Samples:
   1. Frames: Corner sample of each type, 18 x 18 inches, with mortises, reinforcements, and specified finish.
   2. Doors: Corner sample of each type showing construction, 18 x 18 inches, with mortises, reinforcements, and specified finish.
   3. Color Samples: Manufacturer's standard colors showing maximum variation of each color. Submit actual production sections large enough to establish the allowable color shade range.

PART 2   PRODUCTS

2.01   STOREFRONT PERFORMANCE

A. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures on Drawing S-0001.
B. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
   1. Single Entrance Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
   2. Storefront Glazing System: Maximum air leakage of .06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
C. Energy Performance: Certify and label energy performance according to NFRC as follows:
   1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.76 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
   2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.22 as determined according to NFRC 200.

2.02 MATERIALS

A. Aluminum:
   1. Extruded Shapes: 6063 alloy, T5 temper.
   2. Rolled Shapes: 6061 alloy, T6 temper.

B. Steel Subframes: ASTM A 36 plates, shapes and bars.

C. Reinforcement: Manufacturer's standard formed or fabricated steel units, of shapes, plates or bars; galvanized after reinforcement fabrication, ASTM A 123.

D. Fasteners: Aluminum, non-magnetic stainless steel, or other non-corrosive metal fasteners compatible with aluminum door components and other items to be fastened; Phillips flat-head screws for exposed fasteners (if any), finished to match fastened item.
   1. Do not use exposed fasteners except for necessary application of surface mounted hardware. Use concealed screws when required for application of glazing stops.

E. Inserts: Cast iron, malleable iron, 12 gage galvanized steel, ASTM A 153, for required anchorage to concrete or masonry Work.

F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent test agency.
   b. Stainless Steel: Bolts, Alloy Group 1 or 2; ASTM F593, Nuts; ASTM F 594.

G. Machine Screws for Steel Subframes: ASME B18.6.3.

H. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
I. Compression Weatherstripping: Replaceable stripping of either molded neoprene gaskets complying with ASTM D 2000, Designation 2BC415 to 3BC620, or molded PVC gaskets complying with ASTM D 2287.

J. Glazing Gaskets: Stripping of molded neoprene complying with ASTM D 2000, Designation 2BC415 to 3BC620, or molded PVC complying with ASTM D 2287, or molded closed-cell neoprene complying with ASTM C 509, Type II, for glazing factory-installed glass and panels, and for gaskets which are factory-installed in a "captive" assembly of glazing stops.

2.03 FABRICATION

A. Frames:
   1. Fabricate door frames, and frames combining transoms, sidelights, and panel framing of thermally broken extruded aluminum not less than 0.125 inch thick.
   2. Door Stops: Manufacturer's standard integral extruded shapes.
   3. Glazing Beads: Formed or extruded, not less than 0.05 inch wall thickness. Fabricate formed beads of sheet aluminum. Fasten glazing beads to frames with self-tapping screws spaced not more than 12 inches apart.
   5. Subframes: Fabricate subframe assemblies and accessories, as shown, of materials specified herein.
   6. Thermal Break: Manufacturer's standard continuous thermal barrier.

B. Glazed Doors:
   1. Fabricate stiles and rails of extruded aluminum tubular shapes, 3/16 inch min wall thickness, not less than 5-1/2 inches wide. Attach extrusions together by means of concealed mechanical fasteners and concealed welding.
   2. Glazing Beads: Manufacturer's standard extruded shapes.
   3. Door Edges: Lock stile edge of single acting doors shall be beveled 1/8 inch in 2 inches.

C. Finish Hardware Preparation: Attach concealed reinforcements and cut mortises of sizes required and where located by the approved hardware schedule, for the proper installation of finish hardware.
   1. Reinforcements: 1/4 inch thick aluminum.
   2. Install reinforcements within mortises at the depths required to bring the hardware surfaces flush with the door and jamb surfaces.
   3. Extend reinforcements for hinges, pivots, floor hinges, 4 inches above and below mortises on side jambs and door edges.
   4. Reinforce all doors not mortised for concealed door closers on both sides for surface door closer application; and all frames on both sides for closer arm application.
2.04 FINISHES

A. Preparation: After fabrication of doors and frames, but before lamination of panels (if any), prepare the aluminum surfaces for finishing in accordance with the Aluminum Association recommendations and standards. Process all components of each assembly simultaneously to attain complete uniformity of color.

B. Finish exposed aluminum door and frame components as follows:
   1. Natural Anodized Finish (Door): NAAMM AA-M21C22A41, (minimum thickness of 0.7 mils), natural aluminum color.
   2. High-Performance Organic Finish (Framing): 2-coat fluoropolymer finish complying with AAMA 2605, full strength 70 percent Kynar 500 Fluorocarbon Coating (polyvinylidene fluoride, PVDF) applied by the coil coating process. Minimum dry film thickness .9 mil.
      a. Color: As Selected by Director’s Representative

PART 3 EXECUTION

3.01 INSTALLATION

A. Securely anchor sub-framing to supporting structures, plumb and level and properly prepared to receive aluminum doors and frames.

B. Protect areas of frames and panels to be in contact with sealants and surfaces of glazing rebates and glazing beads with protective, strippable tape. Do not apply lacquer to such areas. Remove tape immediately before application of caulking or glazing compound.

C. Paint aluminum surfaces in contact with masonry and incompatible metals with bituminous paint.

D. Door Installation: Fit doors accurately in their frames, with the following clearances:
   3. Bottom; no Threshold or Carpet: 3/8 inch.
   4. Bottom, at Threshold or Carpet: 1/8 inch.

3.02 PROTECTION

A. Provide protective covering to protect aluminum doors and frames from damage or defacement after erection.

3.03 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating finish hardware items just prior to final inspection. Leave Work in complete and proper operating condition.
B. When directed, or just prior to final inspection remove protective coverings and clean aluminum surfaces with products specifically formulated for aluminum and known to be compatible with finishes specified herein.

END OF SECTION
SECTION 088853
SECURITY GLAZING

PART 1  GENERAL

1.01  RELATED WORK SPECIFIED ELSEWHERE

A. Glass and Glazing: Section 088100.

1.02  REFERENCES

A. American Society for Testing and Materials (ASTM), ASTM International, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA, 19428-2959, www.astm.org


1.03  DEFINITIONS

A. Sheet Materials: The term “Sheet Materials” as used in this Section refers to monolithic polycarbonate sheets, glass clad polycarbonate sheets, and laminated polycarbonate sheets specially fabricated for ballistics and/or forced-entry resistance.

1.04  SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittals Requirements” in Section 01330 does not apply to this Section.

B. Product Data: Catalog sheets, specifications, glazing details, and installation instructions for each type of sheet materials, and glazing materials specified.

C. Samples:
   1. Sheet Materials: 12 x 12 inch pieces for each type specified.
   2. Setting blocks: Full size, not less than 4 inches long.
   5. Spacer Shims: 4 inches long.
D. **Quality Control Submittals:**
   1. **Test Reports:** Test data to substantiate sheet material assembly’s compliance with the requirements of this Section.
   2. **Certificate:** Affidavit required under Quality Assurance Article.
   3. **Manufacturer’s Qualifications Data:** Written certification that the manufacturer has been actively marketing security glazing materials for the past 3 years.
   4. **Installer’s Qualifications Data:**
      a. Name of each person who will be installing the Work of this Section and their employer’s name, business address and telephone number.
      b. Names and addresses of 3 similar projects that each person has worked on during the past 5 years.
   5. **Compatibility:** Written certification from sheet materials manufacturer that all proposed glazing materials are compatible with specified sheet material.

E. **Contract Closeout Submittals:**
   1. **Maintenance Data:** Deliver 2 copies, covering installed products, to the Director’s Representative.

**1.05 QUALITY ASSURANCE**

A. **Testing Laboratory:** Independent testing laboratory with the test facilities, experience, and capability to demonstrate the proposed sheet material assemblies compliance with the requirements of this Section to the satisfaction of the Director.

B. **Certification:** Affidavit by the sheet material manufacturer, certifying that chemically strengthened glass was cut to final size before treatment.

C. **Manufacturer’s Qualifications:**
   1. The manufacturer shall have been actively marketing security glazing materials in the United States for a minimum of 3 years.
   2. The manufacturer shall have the technical expertise and qualified technical representatives to resolve questions or problems that may arise both during and after the Work is completed.

D. **Installer’s Qualifications:** The persons installing the security glazing and their Supervisor shall be personally experienced in security glazing systems and shall have been regularly employed by a Company installing security glazing systems for a minimum of 5 years.

E. **Product Identification Labels:**
   1. Identify each piece of forced entry resistant sheet material with a one inch high x 3 inches long self-adhesive transparent label, indicating the manufacturer and product name. Place the stencil on the glass, if applicable, readable from the secure side. Locate label in the upper right corner 2 inches from the top and side of the frame.
1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store sheet material assemblies with manufacturer’s labels intact.

B. Deliver exposed polycarbonate sheets with strippable water resistant protective masking intact. Do not capture protective masking in frame when installing sheet material. Protective masking to remain intact during installation. Where sheet material is in direct sunlight, remove protective masking.

C. Protect sheet material assemblies from damage during handling, storage, and installation.

1.07 PROJECT CONDITIONS

A. Environmental Requirements: Comply with glazing materials manufacturer’s printed recommendations regarding environmental conditions under which glazing materials can be installed.

1.08 MAINTENANCE

A. Extra Material: Furnish 5 percent (minimum of one piece) of each size of Type S-4 Sheet required for the Project. Deliver in the manufacturer’s original container labeled with the size and location to be used. Store at the Site where directed.

PART 2 PRODUCTS

2.01 COMPANIES


E. Dlubak Corporation, 520 Chestnut Street, Blairsville, PA 15717, (800) 336-0562, www.dlubakglass.com

2.02 MATERIALS

A. Chemically Strengthened Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class 1 (clear), quality Q3 (glazing select), chemically tempered. Modulus
of Rupture 30,000 psi. Cut chemically strengthened glass to final size and seam edges before treatment.

B. Polycarbonate: Extruded polycarbonate, UV stabilized, mar-resistant surface coating, smoke density rating less than 75, ASTM D 2843; extent of burning characteristics less than one inch when tested in accordance with ASTM D 635.

C. Tempered Float Glass (Type S-10 only); ASTM C 1048, Kind FT, Condition A, Type I, Class 1, tempered by the manufacturer’s standard process after cutting to final size.

D. Interlayer For Laminating Polycarbonate To Glass: Polyurethane, as recommended by the sheet manufacturer, specifically designed for lamination, with demonstrated long-term ability to maintain physical and visual properties under installed conditions.

2.03 FORCED ENTRY RESISTANT SECURITY GLAZING TYPES

A. Type S-4 Sheet:
   1. Glass Clad Polycarbonate Laminate Sheet: Chemically strengthened clear glass laminated to each side of a polycarbonate core, fabricated to produce the required forced entry resistance listed below.
   2. Forced Entry Resistance: H.P. White TP-0500.01 Level 1, or ASTM F1915 Grade 4.
   3. Overall Nominal Thickness: 9/16 inch.
   5. Products:
      b. ICGCP 916 CS by Standard Bent Glass.
      c. 9/16” ArmorProtectPlus #121100 by Oldcastle Glass.
      e. DGCP562 by Dlubak Corp.

2.04 INSULATING FORCED ENTRY RESISTANT SECURITY GLAZING TYPES

A. Type S-10 Sheet:
   1. Organically Sealed Insulating Units: Manufacturer’s standard edge construction of spacers and sealant permanently bonded to glass surfaces and hermetically sealed with secondary sealant to provide a dehydrated air space 1/2 inch thick with -60 degrees F dew point.
   2. Glass Clad Polycarbonate Laminate Sheet: Chemically strengthened clear glass laminated to each side of a polycarbonate core, fabricated to produce the required forced entry resistance listed below.
      a. Forced Entry Resistance: H.P. White TP-0500.01 Level 1 or ASTM F1915 Grade 4.
      b Overall Nominal Thickness: 9/16 inch.
      c. Products:
         1) Secure-Tem + Poly 2117 by Global Security Glazing.
         2) ICGCP 916 CS by Standard Bent Glass.
         3) 9/16” ArmorProtectPlus by Oldcastle Glass.
5) DGCP562 by Dlubak Corp.

3. Tempered Float Glass; ASTM C 1048, Kind FT, Condition A, Type I, Class 1, tempered by the manufacturer’s standard process.
   b. Cut glass to final size before tempering.

4. Overall Nominal Thickness of Sealed Unit: 1-5/16 inches.

2.05 GLAZING MATERIALS
   A. Setting Blocks: Comply with ASTM C 864, Shore A durometer hardness of 85 +/- 5 percent ASTM Test Method D 2240. Provide compatible setting blocks specifically recommended by the by the sheet material manufacturer for use with sheet materials and glazing materials used.
   B. Spacer Shims: Shore A durometer hardness of 50 to 60 ASTM Test Method D 2240. Provide compatible spacer shims of material, size, and shape specifically recommended by the sheet material manufacturer for the materials used.
   C. Glazing Tape: Preformed, 100 percent solid, butyl-based elastomeric tape or ribbon (coiled on release paper), non-staining and non-migrating, with continuous built-in shim (pre-shimmed), if recommended in writing by the glazing manufacturer for the application indicated, comply with AAMA 800.
   D. Glazing Sealant: Silicone, ASTM C 920, Type S, Grade NS, Class 25, Use G. Verify compatibility of sealant with sheet material other glazing materials, and frame with sealant manufacturer.
   E. Sealant Colors: For exposed materials provide color as indicated or, if not indicated, as selected by the Director from the manufacturer’s standard colors. For concealed materials, provide any of the manufacturer’s standard colors.
   F. Cleaners, Primers, and Sealers: Types recommended by glazing material manufacturer, compatible with polycarbonate.
   G. Glazing for Type S-10 Sheet in Fixed Windows: Extruded, closed-cell neoprene sponge, shape and density as required to maintain seal, provide manufacturer’s recommended adhesive.

PART 3 EXECUTION

3.01 EXAMINATION
   A. Examine glazing channels and stops for defects that will prevent satisfactory installation of sheet glazing system. Report unsatisfactory conditions to the Director in writing. Do not proceed with installation until unsatisfactory conditions have been corrected.
B. Inspect each piece of sheet material immediately before installation. Remove from the Site pieces that have observable damage or face imperfections.

3.02 PREPARATION

A. Remove coatings that are not firmly bonded to the substrate.

B. Clean the glazing channel, and other framing members to receive sheet material, immediately before glazing.

C. Immediately prior to installation, peel back factory applied protective masking only to a dimension sufficient for edge engagement. Do not totally remove masking from sheet.

3.03 INSTALLATION

A. Each installation shall withstand normal temperature changes without sheet material delamination, failure of glazing materials to remain watertight and airtight, deterioration of glazing materials and other defects in the work.

B. Install sheet and glazing material in accordance with the recommend standards detailed in the “Glazing Manual” of the Glass Association of North America except as indicated and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the sheet material and glazing materials.

C. Primer: Apply primer to surfaces when recommended by glazing material manufacturer.

D. Setting Blocks:
1. Install a minimum of 2 identical setting blocks sized to provide 0.1 inch long for each square foot of sheet material area but not less than 4 inches long.
2. Height of setting blocks to provide the recommended nominal bite and minimum edge clearance for the security glazing used.
3. Width as required providing proper support of sheet materials but allowing water passage to weep holes.
4. Install at quarter points in heal bead of sealant, do not block weeps.

E. Glazing Tape:
1. Cut glazing tape to proper length prior to application. Install strips in 4 separate sections. Do not run continuously around corners.
2. Install tape continuously against permanent stop 3/16 to 1/4 inch below sightline. Do not permit gaps or joints in tape except at corners. Do not lap adjoining lengths of tape. Miter or butt ends of tape at corners and seal with compatible sealant.

F. Glazing for Type S-10 Sheet in Fixed Windows: Install closed cell sponge in accordance with manufacturer’s printed recommendations.
G. Sheet Glazing: Set sheet material on setting blocks and press against tape with sufficient pressure to ensure full contact and adhesion at perimeter. Install removable stop.

H. Spacer Shims: Insert continuous spacer shims between sheet material and applied stop to keep sheet in compression against tape, do not displace glazing tape. Install shims in 4 separate sections. Do not run continuously around corners, or come in contact with sheet material cut edges.

I. Glazing Sealant:
1. Install continuous cap bead on both sides of sheet material.
2. Force sealant into channel to eliminate air pockets and voids and to ensure a complete bond of sealant to sheet material and framing.
3. Tool exposed surfaces of sealant eliminate air pockets and to provide a substantial “wash” away from sheet material.
4. Clean off excess sealant as work progresses using methods that will not damage sheet or glazing material.
5. Cure glazing materials in accordance with manufacturer’s instructions and recommendations, to obtain high early bond strength, internal cohesive strength, and surface durability.

3.04 PROTECTION AND CLEANING

A. Remove factory installed protective masking from sheet that is in high humidity or direct sunlight immediately after installation. Prolonged exposure can make removal of masking difficult.

B. Mark glazed openings immediately upon installation of sheet material by attaching crossed streamers to framing. Do not apply markers of any type to surfaces of sheet material.

C. Protect exposed surfaces of polycarbonate from construction operations with temporary covering. Do not apply tape to sheet material.

D. Replace sheet material included in the Work that is broken or otherwise damaged from the time Work is started at the site until the date of physical completion.

E. Maintain sheet material in a reasonably clean condition until the date of physical completion.
1. Clean and trim excess glazing material from the sheet material and stops or frames promptly after installation.

F. When directed, or just before the project is turned over to the State, remove temporary covering, dirt and other foreign material from both surfaces of sheet material installed under this Contract, and clean sheet material on both sides.

END OF SECTION
SECTION 096429

WOOD FLOORING PATCHING AND REFINISHING

PART 1 GENERAL

1.01 SUBMITTALS

A. Shop Drawings: Show paint marking layout.

B. Product Data:
   1. Specifications, application instructions, and maintenance recommendations for floor sealer, marking paint and finish.
   2. Color chips for base and marking paint.

1.02 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Wood Flooring: Full-size units equal to 2 percent of quantity installed, but no less than 10 linear feet.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Marking paint, and finish materials shall be delivered to the site in unopened original containers, bearing manufacturer's printed labels.

1.04 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Make arrangements, through the Director's Representative, to maintain a minimum temperature of 65 degrees F and a relative humidity of 50 percent or lower for a period of 2 days before delivery of flooring, during, and continuously after installation.
   2. Maintain a minimum temperature of 65 degrees F and a relative humidity of 50 percent or lower for a period of 2 days before, during, and 2 days after installation.
   3. Do not apply finish in areas where dust is being generated or will be generated while the finish is drying.

1.05 SEQUENCING AND SCHEDULING

A. Scheduling: Do not perform the Work of this Section until all trades have completed all items above the floor area.
PART 2   PRODUCTS

2.01   MATERIALS

A. Maple Strip Flooring: Furnished by Owner from extra stock on-site (approximately 20 sq ft.)

B. Finishing Materials:
   1. Finish: Group 3: Gymnasium oil-based type (surface) finish listed on latest MFMA Floor Finish List.
   2. Marking Paint: Compatible with sealer and finish, and recommended by sealer and finish materials manufacturer.

PART 3   EXECUTION

3.01   PREPARATION

A. Broom clean substrate.

B. Remove approximately 20 Sq ft. of damaged and cracked wood flooring.

C. Pre-clean the floor to remove surface soil by tack ragging or proprietary cleaning products.

3.02   INSTALLATION

A. Place sheathing paper over patched area substrate. Lap edges and ends a minimum 2 inches and fasten in place.

B. Lay flooring patches with the longest dimension to match existing area. Machine fasten flooring to substrate.

C. Install flooring with a one inch expansion void at the perimeter of the floor and around permanent building features penetrating through the flooring.

3.03   SURFACING

A. Machine sand flooring patched areas with drum sander, edger, and buffer using coarse, medium, and fine sandpaper. Sand patched areas of flooring to a smooth, even, uniform surface without drum stop marks, gouges, streaks, or shiners.

B. Dry abrade the entire floor with rotary floor machines equipped with screen discs or proprietary pads.

C. Remove all sanding dust from surface and joints of floor.
3.04 FINISHING

A. Apply sealer finish at patched areas in accordance with manufacturer's printed instructions.

B. Apply finish to entire floor in accordance with manufacturer's printed instructions.
   1. Apply marking paint and finish in accordance with material manufacturer's instructions.
   2. After abrading floor and before first coat of finish, paint game lines and other markings as to match existing, using marking paint. Apply paint to accurate lines with complete coverage and sharp edges.
   3. Apply 2 coats of finish over entire floor area. Buff and clean between each coat after preceding coat is dry.

3.05 PROTECTION

A. Protect wood flooring during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration and protect until time of Project Completion.

END OF SECTION
PART 1 GENERAL

1.01 DEFINITIONS

A. The word “paint” in this Section refers to substrate cleaners, fillers, sealers, primers, undercoats, enamels and other first, intermediate, last or finish coatings.

B. The word “primer” in this Section refers to substrate cleaners, fillers, sealers, undercoats, and other first or intermediate coats beneath the last or finish coating.

C. The words “finish paint” in this Section refers to the last or final coat and previous coats of the same material or product directly beneath the last or final coat.

D. Finish Paint Systems: Finish paint and primers applied over the same substrate shall be considered a paint system of products manufactured or recommended by the finish coat manufacturer.

1. Finish paint products shall meet or exceed specified minimum physical properties.

1.02 SUBMITTALS

A. Painting Schedule: Cross-referenced Painting Schedule listing all exterior and interior substrates to be painted and specified finish paint type designation; product name and manufacturer, recommended primers and product numbers, and finish paint color designation for each substrate to be painted.

1. Designate exterior substrates by building name and number, substrate to be painted and surface location.

2. Designate interior substrates by building name and number, floor, room name and number, and surface to be painted.

B. Product Data Sheets: Manufacturer’s published product data sheets describing the following for each finish paint product to be applied:

1. Percent solids by weight and volume, solvent, vehicle, weight per gallon, ASTM D 523 gloss/reflectance angle, recommended wet and dry film thickness, volatile organic compound (VOC) content in lbs/gallon, product use limitations and environmental restrictions, substrate surface preparation methods, directions and precautions for mixing and thinning, recommended application methods, square foot area coverage per gallon, storage instructions, and shelf-life expiration date.

2. Manufacturer’s recommended primer for each finish paint product and substrate to be painted.
3. Manufacturer’s complete range of available colors for each finish paint product to be applied.

C. Finish Paint Type Samples: Two finish paint samples applied over recommended primers for each substrate to be painted.
   1. Samples shall be in the designated color and specified ASTM D 523 reflectance.
   2. Label each sample with the following information:
      a. Project number and Painting Schedule designation describing substrates and locations represented by the sample.
      b. Finish paint and primer manufacturer, product names and numbers, finish paint color and reflectance.
   3. Leave a 1 inch wide exposed strip of unpainted substrate and each coat of primer and finish paint.
   4. Sample Sizes:
      a. Wall, Ceiling, and Floor Substrates: 12 inch square panels.
      b. Concrete and Concrete Masonry Unit Substrates: 4 inch square blocks.
      c. Sheet Metals: 4 inch by 8 inch flat sheets.
      d. Bar and Tubular Metals: 8 inch long bars or tubular stock.

D. Quality Control Submittals:
   1. Test Reports: Furnish certified test results from an independent testing laboratory, showing that products submitted comply with the specifications, when requested by the Director’s Representative
   2. Certificates: Furnish certificates of compliance required under QUALITY ASSURANCE Article.

1.03 QUALITY ASSURANCE

A. Volatile Organic Compounds (VOCs) Regulatory Requirements: Chapter III of Title 6 of the official compilation of Codes, Rules and Regulations of the State of New York (Title 6 NYCRR), Part 205 Architectural Surface Coatings.
   1. Certificate of Compliance: List of each paint product to be delivered and installed. List shall include written certification stating that each paint product listed complies with the VOC regulatory requirements in effect at the time of job site delivery and installation.

B. Container Labels: Label each product container with paint manufacturer’s name, product name and number, color name and number, thinning and application instructions, date of manufacture, shelf-life expiration date, required surface preparations, recommended coverage per gallon, wet and dry film thickness, drying time, and clean up procedures.

C. Field Examples:
   1. Prior to on-site painting, at locations designated by the Director’s Representative, apply field examples of each paint type to be applied.
   2. Field examples to be applied on actual substrates to be painted and shall duplicate earlier approved paint samples.
a. Interior field examples to be applied in rooms and spaces to be painted with the same products.
b. Field Example Minimum Wet and Dry Film Thickness: As indicated on approved product data sheet.
c. Application: Apply each coat in a smooth uniform wet mil thickness without brush marks, laps, holidays, runs, stains, cloudiness, discolorations, nail holes and other surface imperfections.
  1) Leave a specified exposed width of each previous coat beneath each subsequent coat of finish paint and primer.
d. Use of Field Examples: Field examples shall serve as a quality control standard for acceptance or rejection of painting Work to be done under this Section.

3. Field Example Sizes:
a. Floor, Wall, and Ceiling Examples: 200 square feet with 2 foot wide strips.
b. Door and Frame Examples: One door and frame with 12 inch wide horizontal strips.
c. Linear Substrate Examples: 20 lineal feet with 12 inch long strips.

4. Do not begin applying paints represented by field examples until examples have been reviewed and approved by the Director’s Representative.
   a. Protect and maintain approved field examples until all painting work represented by the example has been completed and approved.

D. Compatibility of Paint Materials: Primers and intermediate paints shall be products manufactured or recommended by the finish paint manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to the Site in original, unopened containers and cartons bearing manufacturer’s printed labels. Do not deliver products which have exceeded their shelf life, are in open or damaged containers or cartons, or are not properly labeled as specified.

B. Storage and Handling: Store products in a dry, well ventilated area in accordance with manufacturer’s published product data sheets. Storage location shall have an ambient air temperature between 45 degrees F and 90 degrees F.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Ambient Air Temperature, Relative Humidity, Ventilation, and Surface Temperature: Comply with paint manufacturer’s published product data sheet or other printed product instructions.
   2. If paint manufacturer does not provide environmental requirements, use the following:
a. Ambient Air Temperature: Between 45 degrees F and .75 degrees F.
b. Relative Humidity: Below 75 percent.
c. Ventilation: Maintain the painting environment free from fumes and odors throughout the Work of this Section.
d. Surface Temperature: At least 5 degrees F above the surface dewpoint temperature.

3. Maintain environmental requirements throughout the drying period.

B. The following items are not to be painted unless otherwise specified, noted or directed:
   1. Exposed stainless steel, chrome, copper, bronze, brass, and aluminum.
   2. Steel to be encased in cast-in-place concrete.
   3. Top flanges of structural beams and girders in composite concrete-steel construction.
   4. Factory prefinished items.
   5. Exposed structural wood floor joists, subflooring, rafters, roof sheathing and other framing lumber.
   6. Galvanized items not exposed in finished spaces.

1.06 EXTRA MATERIALS

A. Provide extra finish paint materials, from the same production run as paints to be applied, in the following quantities for each color installed:
   1. Paint Type EAL-1 and IAL-1: Four gallons each type.
   2. Paint Types EAL-2 and IAL-2: Two gallons, each type.
   3. Other Paint Types: One gallon, each type.

PART 2 PRODUCTS

2.01 PAINT MANUFACTURERS

A. Where noted, the following finish paint manufacturers produce the paint types specified.
   1. Ameron Protective Coatings, 201 Berry St., Brea, CA 92621, (800) 926-3766.
   3. ICI Dulux Paints, 4000 Dupont Cr., Louisville, KY 40207, (800) 984-5444.
   5. PPG Architectural Finishes, One PPG Plaza, Pittsburgh, PA 15272, (800) 441-9695.
   7. Valspar Corp., 1401 Severn St., Baltimore, MD 21230, (800) 638-7756.
2.02 MISCELLANEOUS PRODUCTS

A. Bedding Compound: Water based pre-mixed gypsum wallboard joint compound.

B. Cleaning Solvents: Low toxicity with flash point in excess of 100 degrees F.

C. Color Pigments: Pure, nonfading, finely ground pigments with at least 99 percent passing a 325 mesh sieve.
   1. Use lime-proof color pigments on masonry, concrete and plaster.
   2. Use exterior pigments in exterior paints.

D. Galvanizing Compound, Cold: Single component compound with 93 percent pure zinc in the dried film and meeting the requirements of DOD-P-21035A (NAVY).

E. Glazing Compound: ASTM C 669.

F. Masking Tape: Removable paper or fiber tape, self-adhesive and nonstaining.

G. Metal Filler: Polyester resin base autobody filler.

H. Mineral Spirits: Low odor type recommended by finish paint manufacturer.


J. Paint Stripper: As recommended by finish paint manufacturer.

K. Spackling Compound: Water based pre-mixed plaster and gypsum wallboard finishing compound.

L. Stain Blocker, Primer-Sealer: As recommended by finish paint manufacturer.


N. Wood Putty: Water based pre-mixed wood filler.
   1. Color match putty to wood substrate beneath clear and semi-transparent finishes.

O. Wood Substrate Cleaner, Brightener, Conditioner, and Open-grain Sealer: As recommended by finish paint manufacturer.

2.03 FINISH PAINT TYPES

A. Physical Properties:
   1. Specified percent solids by weight and volume, pigment by weight, wet and dry film thickness per coat, and weight per gallon are minimum physical properties of acceptable materials.
a. Opaque Pigmented Paints: Physical properties specified are for white titanium dioxide base before color pigments are added.
b. Specified minimum wet and dry film thickness per coat are for determining acceptable finish paint products. Minimum wet and dry film thickness per coat to be applied shall comply with approved finish paint manufacturer’s product data sheets.

2. Gloss or Reflectance: The following ASTM D 523 specified light levels and angles of reflectance:
   a. Flat: Below 15 at 85 degrees.
   b. Eggshell: Between 5 and 20 at 60 degrees.
   c. Satin: Between 15 and 35 at 60 degrees.
   d. Semigloss: Between 30 and 65 at 60 degrees.
   e. Gloss: Over 65 at 60 degrees.

B. Exterior Finish Paint Types:
   1. Paint Type EAL-1: Exterior Acrylic Latex, Flat.
      a. Solids by Weight: 52.0 percent.
      b. Solids by Volume: 32.0 percent.
      c. Solvent: Water.
      d. Vehicle: 100 percent acrylic resin.
      e. Weight Per Gallon: 10.5 lbs.
      f. Wet Film Thickness: 4.0 mils.
      g. Dry Film Thickness: 1.3 mils.
      h. Manufacturers: ICI Dulux, PPG, Sherwin-Williams.
      a. Solids by Weight: 47.0 percent.
      b. Solids by Volume: 33.2 percent.
      c. Solvent: Water.
      d. Vehicle: 100 percent acrylic resin.
      e. Weight Per Gallon: 10.0 lbs.
      f. Wet Film Thickness: 4.0 mils.
      g. Dry Film Thickness: 1.3 mils.
      h. Manufacturers: ICI Dulux, PPG, Sherwin-Williams.
      a. Solids by Weight: 40.0 percent.
      b. Solids by Volume: 32.0 percent.
      c. Solvent: Water.
      d. Vehicle: 100 percent acrylic resin.
      e. Weight Per Gallon: 10.0 lbs.
      f. Wet Film Thickness: 3.4 mils.
      g. Dry Film Thickness: 1.2 mils.
      h. Manufacturers: Benjamin Moore, PPG, Sherwin-Williams.
      a. Solids by Weight: 47.0 percent.
      b. Solids by Volume: 34.0 percent.
      c. Solvent: Water.
      e. Weight Per Gallon: 10.0 lbs min.
      f. Wet Film Thickness: 4 mils.
      g. Dry Film Thickness: 1.4 mils.
5. Paint Type ESP: Exterior Steel Zinc-Rich Primer, Flat.
   a. Solids by Weight: 79.0 percent.
   b. Solids by Volume: 68.0 percent.
   c. Pigment by Weight: 90.0 percent zinc.
   d. Solvent: Water.
   e. Weight per Gallon: 24.6 lbs.
   f. Dry Film Thickness: 3.0 mils if finish coated, 4.0 mils if not finish coated.

C. Interior Finish Paint Types:
1. Paint Type IAL-1: Interior Acrylic Latex, Flat.
   a. Solids by Weight: 50.0 percent.
   b. Solids by Volume: 32.0 percent.
   c. Solvent: Water.
   d. Vehicle: Vinyl acrylic resin.
   e. Weight Per Gallon: 10.9 lbs.
   f. Wet Film Thickness: 3.8 mils.
   g. Dry Film Thickness: 1.3 mils.
   h. Manufacturers: Benjamin Moore, ICI Dulux, Sherwin-Williams.

   a. Solids by Weight: 51.0 percent.
   b. Solids by Volume: 35.0 percent.
   c. Solvent: Water.
   d. Vehicle: Vinyl acrylic resin.
   e. Weight Per Gallon: 11.0 lbs.
   f. Wet Film Thickness: 3.8 mils.
   g. Dry Film Thickness: 1.3 mils.
   h. Manufacturers: Benjamin Moore, ICI Dulux, Sherwin-Williams.

   a. Solids by Weight: 49.0 percent.
   b. Solids by Volume: 35.0 percent.
   c. Solvent: Water.
   d. Vehicle: Vinyl acrylic resin.
   e. Weight Per Gallon: 10.0 lbs.
   f. Wet Film Thickness: 3.8 mils.
   g. Dry Film Thickness: 1.2 mils.
   h. Manufacturers: Benjamin Moore, ICI Dulux, Sherwin-Williams.

   a. Solids by Weight: 40.0 percent.
   b. Solids by Volume: 32.0 percent.
   c. Solvent: Water.
   d. Vehicle: Vinyl acrylic resin.
   e. Weight Per Gallon: 10.0 lbs.
   f. Wet Film Thickness: 3.4 mils.
   g. Dry Film Thickness: 1.2 mils.
   h. Manufacturers: Benjamin Moore, PPG, Sherwin-Williams.
   a. Solids by Weight: 47.0 percent.
   b. Solids by Volume: 34.0 percent.
   c. Solvent: Water.
   e. Weight Per Gallon: 10.0 lbs min.
   f. Wet Film Thickness: 4 mils.
   g. Dry Film Thickness: 1.4 mils.
   h. Manufacturers: Benjamin Moore, PPG, Sherwin-Williams

   a. Solids by Volume: 50.0 percent.
   b. Solvent: Reducer.
   d. Weight Per Gallon: 9.0 lbs min.
   e. Wet Film Thickness: 6 mils.
   f. Dry Film Thickness: 3 mils.
   g. Manufacturers: Benjamin Moore, PPG, Sherwin-Williams

7. Paint Type ISP: Interior Steel Primer, Flat.
   a. Solids by Weight: 72.0 percent.
   b. Solids by Volume: 52.0 percent.
   d. Weight Per Gallon: 11.4 lbs.
   e. Wet Film Thickness: 3.0 mils.
   f. Dry Film Thickness: 1.5 mils.
   g. Manufacturers: PPG, Sherwin-Williams, Valspar.

D. Colors: Provide paint colors either shown on contract drawings or to be selected by the Director from finish paint manufacturers available color selections.
   1. Approved finish paint manufacturers to match designated colors of other manufacturers where colors are shown on contract documents.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be prepared, primed, or painted for compliance with contract documents, required environmental conditions, manufacturer’s product data sheets, product label instructions and other written requirements.
   1. Do not begin any phase of the work without first checking and verifying that surfaces and environmental conditions are acceptable for such work and that any earlier phase deficiencies and discrepancies have been properly corrected.
      a. The commencement of new work shall be interpreted to mean acceptance of surfaces to be affected.
3.02 PREPARATION

A. Protection: Cover and protect surfaces to be painted, adjacent surfaces not to be painted, and removed furnishings and equipment from existing paint removals, airborne sanding particles, cleaning fluids and paint spills using suitable drop cloths, barriers and other protective devices.

1. Adjacent exterior surface protections include roofs, walls, landscaping, driveways and walkways. Interior protections include floors, walls, furniture, furnishings and electronic equipment.

2. Remove and replace removable hardware, lighting fixtures, telephone equipment, other devices and cover plates over concealed openings in substrates to be painted.

a. Cover and neatly mask permanently installed hardware, lighting fixtures, cover plates and other devices which cannot be removed and are not scheduled for painting.

3. Schedule and coordinate surface preparations so as not to interfere with work of other trades or allow airborne sanding dust particle to fall on freshly painted surfaces.

4. Provide adequate natural or mechanical ventilation to allow surfaces to be prepared and painted in accordance with product manufacturer’s instructions and applicable regulations.

5. Provide and maintain “Wet Paint” signs, temporary barriers and other protective devices necessary to protect prepared and freshly painted surfaces from damages until Work has been accepted.

B. Clean and prepare surfaces to be painted in accordance with specifications, paint manufacturer’s approved product data sheets and printed label instructions. In the event of conflicting instructions or directions, the more stringent requirements shall apply.

1. Cleaners: Use only approved products manufactured or recommended by finish paint manufacturer. Unless otherwise recommended by cleaner manufacturer, thoroughly rinse with clean water to remove surface contaminants and cleaner residue.

C. Surfaces:

1. Existing Exterior Painted Surfaces: Thoroughly clean to remove dirt, soot, grease, mildew, chalkiness and stains using finish paint manufacturer’s recommended spray-on liquid cleaner.

a. Apply cleaner using hand-held wand applicator in accordance with product manufacturer’s instructions. Thoroughly rinse and remove all residue with clean water.

b. Remove loose, peeling, cracked and blistered paint by chipping, scraping, and sanding smooth with medium and fine sandpaper.

c. Fill surface holes and depressions with finish paint manufacturer’s recommended filler and sand smooth to adjacent undisturbed edges.

d. Touch-up bare spots on previously painted surfaces with finish paint manufacturer’s recommended primer.

e. Sand existing semigloss and gloss paint surfaces to a uniform smooth dull finish before painting.
f. Fill and sand smooth existing paint surface damages, depressions, ridges and other imperfections that will remain visible after new paints have been applied.

2. Concrete:
   a. Allow three months for poured concrete to dry before painting.
   b. Remove form release agents, laitance, efflorescence, dirt, grease, oils, slurry, chalk deposits, and other surface contaminants using a high-pressure power wash. Use mildewcide solution if mildew is present.
   c. Remove any remaining efflorescence by dampening surface with water and scrubbing with a 5 percent solution of muriatic acid. Rinse with clean water, neutralize with ammonia, rinse and allow to dry.
   d. Vacuum surface clean before painting.
   e. Sandblast to remove any existing deteriorated paint films, curing compounds, concrete sealers, and other substances that may prevent primer adhesion.
   f. Chip and grind surface projections smooth to adjacent surfaces.
   g. Open concealed voids and cracks, remove cement slurry by wire-brushing to expose clean aggregate substrate, and chip out surface honeycomb pockets to allow a neat cementitious patch with square corners and a uniform thickness.
   h. Inspect surfaces to be painted for exposed or rusted steel reinforcement and contact Director’s Representative for a survey of damages to be repaired before substrate can be painted. Do not paint over exposed steel reinforcement without first repairing both deteriorated reinforcement and protective coating.
   i. Use an electronic meter to determine moisture content compliance with finish paint manufacturer’s recommendations.

3. Concrete Masonry Units:
   a. Allow two months for mortar joints to dry before painting.
   b. Remove severe laitance, efflorescence, dirt, grease, slurry, chalk deposits and other surface contaminants using a low-pressure power wash. Use mildewcide solution if mildew is present.
   c. Remove less severe surface contaminants and contaminant residues by dampening surface with water and scrubbing with a 10 percent solution of muriatic acid.

4. Existing Structural Steel, Metal Decks and Stairs:
   a. Prepare existing steel to be painted by cleaning in accordance with Structural Steel Painting Council (SSPC) standards:
      2) SSPC-SP2: Remove loose rust, mill scale, and paint to the degree specified by hand chipping, scraping, sanding, and wire-brushing.
   b. Inspect for exposed or rusted steel reinforcement and contact Director’s representative for an on-site survey of repairs to be made before painting. Do not paint over exposed steel reinforcement without first repairing both deteriorated reinforcement and protective concrete covering.

5. Galvanized Metal:
a. Allow new galvanized surfaces to weather as long as possible before cleaning. Remove surface contaminants using clean rags and petroleum spirits.
b. Remove “white rust” using appropriate solvent and, if necessary, wire brushing or sanding.
c. Use appropriate Structural Steel Painting Council Standard SSPC-SP1 to SSPC-SP6 to clean steel substrates where galvanized protection has been removed.

6. Steel Doors and Frames: Fill indentations and cracks with metal filler; sand smooth to match adjacent undamaged surfaces. At existing steel doors remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than SSPC-SP3.

7. Aluminum:
   a. Non-corroded Surfaces: Rub with fine steel wool and wipe clean with mineral spirits.
   b. Corroded Surfaces: Sand smooth, rub with fine steel wool and wipe clean with mineral spirits.

8. Wood:
   a. Remove surface dirt, stains, markings, discolorations and other contaminants using finish paint manufacturer’s recommended cleaning methods and solvents.
   b. Sand raised grain, rough sawcut edges, planed mill glaze, old paint, and other surface imperfections clean and smooth using medium and fine sandpaper. Sand in the direction of grain.
   c. Fill open cracks, knot holes, countersunk fastener holes and other surface indentations with wood filler putty. Sand putty smooth and flush to adjacent unfilled surface.
   d. Seal knots, pitch streaks, sap spots, stains and graffiti with finish paint manufacturer’s recommended primer/sealer.

9. Cement Plaster, and Gypsum Wallboard:
   a. Fill cracks, holes, and other indentations smooth to adjacent surfaces using specified bedding, spackling, and finishing compounds.
   b. Cement Plaster: Coat surfaces to be patched with a bonding agent. Patch cement plaster with an approved mortar patching mix and finish to match adjacent surface and texture.
   c. Gypsum Wallboard: Fill and sand smooth minor bedding and finishing compound defects.
   d. Vacuum and wipe surfaces free of all sanding residue and dust.

10. Glazing Repairs: Cut out and replace dry, loose, and cracked glazing compound or putty.

11. Other Substrates: See finish paint manufacturer’s recommendations.

D. Painting Material Preparations:
1. Prepare painting materials in accordance with manufacturer’s approved product data sheets and printed label instructions.
a. Stir materials before and during application for a consistent mixture of density. Remove container surface paint films before stirring and mixing.

b. Slightly tint first opaque finish coat where primer and finish coats are the same color.

c. Do not thin paints unless allowed and directed to do so in writing within limits stated on approved product data sheets.

3.03 APPLICATION

A. Environmental Conditions:
   1. Water-based Paints: Apply when surface temperatures will be 50 degrees Fahrenheit to 90 degrees Fahrenheit throughout the drying period.
   2. Other Paints: Apply when surface temperatures will be 45 degrees Fahrenheit to 95 degrees Fahrenheit throughout the drying period.
   3. Apply exterior paints during daylight hours free from rain, snow, fog and mist when ambient air conditions are more than 5 degrees above the surface dewpoint temperature and relative humidity less than 85 percent.
      a. When exterior painting is allowed or required during nondaylight hours, provide portable outdoor weather recording station with constant printout showing hourly to diurnal air temperature, humidity, and dewpoint temperature.
   4. Exterior Cold Weather Protection: Provide heated enclosures necessary to maintain specified temperature and relative humidity conditions during paint application and drying periods.

B. Install approved paints where specified, or shown on the drawings, and to match approved field examples.
   1. Paint Applicators: Brushes, rollers or spray equipment recommended by the paint manufacturer and appropriate for the location and surface area to be painted.
      a. Approved minimum wet and dry film thicknesses shall be the same for different application methods and substrates.

C. Paint Type Coats To Be Applied: Unless specified otherwise by finish paint manufacturer’s product data sheet, the number of coats to be applied for each paint type are as follows:
   1. Paint Types EAL and IAL:
      a. New Unpainted Surfaces: Apply 1 coat of primer and 2 coats of finish paint.
      b. Existing Painted Surfaces:
         1) Apply 2 coats of finish paint when existing paint has a lower gloss.
         2) Apply one coat of primer and 2 finish coats when existing paint has a higher gloss.
      c. Paint Types IAL: Provide mildewcide additive for bathrooms, kitchens, janitor closets, laundry rooms, restrooms and other wet or damp areas.
d. Pitted Concrete & Concrete Masonry Surfaces: Use block filler as primer/sealer where allowed by finish paint manufacturer.

e. Existing Structural Steel:
   1) Primed Steel: Apply 2 coats of finish paint.
   2) Unprimed Steel: Apply 1 coat of Paint Type ESP or ISP, depending upon exterior or interior location.
      a) If topcoated, apply additional coat of finish paint manufacturer’s galvanized primer and 2 coats of finish paint.

f. Existing Steel Deck:
   1) Primer: Spot prime IAL-6.
   2) Apply one finish coat.

D. Surfaces: Unless otherwise specified or shown on the drawings, paint surfaces as follows:

1. Exterior Surfaces:
   a. Wood Substrates:
      1) Smooth Siding including Fiber Cement Siding and Trim: Paint Type EAL-1.
      3) Handrails: Paint Type EAL-3.
   b. Factory Finished Metal Substrates: Field painting not required.
   c. Factory Primed and Unprimed Ferrous Metal Substrates:
      2) Handrails: Paint Type EAL-4.
      3) Existing Unprimed Structural Steel: Paint Type EAL-4 over primer Paint Type ESP.
      4) New Primed Structural Steel: Paint Type EAL-4.

2. Interior Surfaces:
   a. Ceilings: Paint Type IAL-1 except as noted below:
      1) Toilets, Kitchens, Shower Rooms, Janitor Closets and Other Wet Areas: Paint Type IAL-3.
      2) Food Preparation and Clean Room Areas: Paint Type IAL-4.
   b. Walls: Paint Type IAL-2 except as noted below:
      1) Toilets and Kitchens: Paint Type IAL-3.
      2) Shower Rooms, Janitor Closets and Other Wet Areas: Paint Type IAL-4.
   c. Doors, Windows, Frames and Trim: Paint Type IAL-3 except as noted below:
      1) Use Paint Type IAL-4 where walls are Paint Type IAL-3.
   d. Steel and Concrete Surfaces indicated for High Performance Coatings: Paint Type IAL-5.
   e. Steel Deck Indicated for Aliphatic Urethane (AU): Paint Type IAL-6.

3. Unless otherwise noted, paint both exterior and interior exposed wall and ceiling air supply and return grilles; plumbing pipes; electrical panel and fuse boxes, raceways and conduits; heating convector cabinets,
radiators, radiator cabinets, unit heaters, and similar existing and installed devices and equipment by other trades.

a. Paint substrates to match adjacent wall or ceiling surfaces.
b. Paint exposed surfaces when any part of the surface is on or within 8 inches of ceiling or wall surface to be painted.
c. Paint visible interior surfaces behind grilles, guards and screens.

4. Doors and Frames: Unless otherwise noted, paint doors and frames the same color in the next highest gloss as adjacent wall surfaces.
   a. Where walls are not the same color on both sides of a door frame, change frame color at the inside corner of the frame stop.
   b. Prime and finish paint door faces and edges before installation.
      1) Paint door edges the same paint type color as the exterior side of the door.
   c. Do not paint door components which are clearly not intended to be painted such as non-ferrous hardware, frame mutes, and weather stripping.
   d. Do not allow doors and frames to touch until paint is thoroughly dry on both surfaces.

5. Window Frames and Sash: Unless otherwise noted, paint window frames and sash the same color as adjacent wall surfaces.
   a. Do not paint window components which are clearly not intended to be painted such as prefinished frames, sliding metal or plastic contacts, weatherstripping, and non-ferrous hardware.
   b. Do not allow operable doors, windows and frames to touch until paint is thoroughly dry on both surfaces.

6. Ferrous Metal Door and Window Hardware: Unless otherwise noted, prime and paint to match adjacent doors, windows and frames.

7. Case Work: Paint factory unfinished exposed and semiexposed surfaces when doors and drawers are either open or closed including:
   a. Both faces and edges of cabinet doors, shelving, dividers including interior side, rear, and bottom panel surfaces.
   b. Both faces and edges of drawer face, side, rear, and bottom panels.
   c. Exposed bottom or underside of case work more than 4 feet above the floor.
   d. Do not paint plastic laminate surfaces, special countertop materials, glazing, factory finished surfaces, finish hardware, and similar items clearly not intended to be painted.

3.04 FIELD QUALITY CONTROL

A. Paint Samples: Assist the Director’s Representative in obtaining random one quart paint samples for testing at any time during the Work.
   1. Notify the Director’s Representative upon delivery of paints to the Site.
   2. Furnish new one quart metal paint containers with tight fitting lids and suitable labels for marking.
      a. Furnish labor to thoroughly mix paint before sampling and provide assistance with sampling when required.
3.05 ADJUSTING AND CLEANING

A. Reinstall removed items after painting has been completed.
   1. Restore damaged items to a condition equal to or better than when removed. Replace damaged items that cannot be restored.

B. Touch up and restore damaged finish paints. Touch up and restoration paint coats are in addition to the number of specified finish paint coats.

C. Remove spilled, splashed, or spattered paint without marring, staining or damaging the surface. Restore damaged surfaces to the satisfaction of the Director’s representative.

D. Remove temporary barriers, masking tape, and other protective coverings upon completion of painting, cleaning and restoration work.

END OF SECTION
PART 1   GENERAL

1.01   REFERENCES

C.   19 NYCRR Part 1264 – Identification of Building Utilizing Truss Type Construction.

1.02   SUBMITTALS

A.   Shop Drawings: Show fabrication and mounting details for each sign type and copy specified. Include sign designs, dimensions, copy style, and copy heights.
   1.   For signs supported or anchored to permanent construction provide setting drawings for anchor bolts and other anchors to be installed under other sections.
B.   Product Data: Catalog sheets, specifications, and installation instructions for each sign type and mounting type specified.
C.   Samples:
   1.   Full size of each sign type and copy type specified including mounting accessories. These samples will be returned and, if approved, may be used in the Work.
   2.   Color Samples: Manufacturer’s standard colors for sign material and finishes specified.
D.   Quality Control Submittals:
   1.   Sign Fabricator Qualification Data: Certified statement from the fabricator indicating the capacity and number of years products similar to those specified for the Work have been produced.

1.03   QUALITY ASSURANCE

A.   Sign Fabricator Qualifications: The firm manufacturing the signs shall have been regularly producing signs similar to those specified for the Work, for a minimum of 5 years. The firm shall also have sufficient production capacity to produce the quantity of sign units required without causing delay in the Work.
B. Single-Source Responsibility: For each separate type of sign required, obtain signs from one source from a single manufacturer.

1.04 PROJECT CONDITIONS

A. Do not install the sign units until all other finishing operations, including painting, have been completed unless otherwise directed.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver sign units to Site with protective covering in place.

B. Leave protective covering on sign units until completion of installation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Engraved Stock (ES) Plastic: Scratch-resistant, non-static, high pressure laminate with contrasting inner core color.
   1. Finish and Color: As selected from manufacturer’s standard colors and finishes, unless otherwise indicated.
   2. Exposed Engraved Inner Core: White, unless otherwise indicated.
   3. Thickness: 1/8 inch, unless otherwise indicated.

B. Mounting Materials:
   1. Mechanical Mounting (MM): Sign manufacturer’s standard or recommended full threaded screws with tamper resistant heads.
      a. Concrete, Masonry, and Plaster Substrates: Furnish plastic anchors with screws.
   2. Tape Mounting (TM): Sign manufacturer’s standard or recommended double sided foam tape intended for substrates involved.
   3. Projecting Studs: stainless steels Threaded studs with sleeve spacer, screwed into back of sign assembly.

C. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

2.02 GRAPHIC PROCESS TYPES

A. Sand Carved (Sand Blasted) Process (SC): Sand carved (sand blasted) letters, numbers, symbols, Grade 2 Braille, and other graphic devices to produce precisely formed copy raised to a uniform height of 1/32 inch with sharply formed edges.
   1. Comply with ADA requirements.
2.03 PANEL CONFIGURATION

A. Comply with requirements indicated for each sign type and copy. Produce smooth, even, level, sign panel surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally.

B. Unframed Panel Signs: Fabricate sign units with edges mechanically and smoothly finished to conform with the following conditions:
   1. Edge Condition: Square Cut.
   2. Edge Color: Same as background.
   3. Corner Condition: Square.
   4. Border: None.

C. Copy Style:
   2. Style 3: Helvetica Medium, upper case, 3/4 inch height, with appropriate pictogram to match lettering, international handicapped accessibility pictogram, and Grade 2 Braille below copy.
   3. Style 9 (Truss Identification Sign): Roman Alphanumeric designation of the construction type of the building and alphabetic designation for the structural components. Comply with requirements of NEW YORK STATE DEPARTMENT OF STATE, DIVISION OF CODE ENFORCEMENT AND ADMINISTRATION “EXAMPLE TRUSS IDENTIFICATION SIGN” bound in the Appendix.
      a. Signs Applied to Doors or Sidelights: Permanent non-fading sticker or decal.
      b. Signs not Directly Applied to Doors or Sidelights: Sturdy, non-fading, weather resistant material.
      c. Place the construction type designation at the twelve o’clock position over the structural component designation. Place the structural component designation at the six o’clock position.

D. Copy Position:
   1. CC: Centered.

2.04 DIMENSIONAL CUTOUT LETTERS

A. Characters with uniform faces; square-cut, smooth edges; precisely formed lines and profiles; and as follows:
   1. Character Material: Sheet or plate aluminum.
   2. Character Height: Multiple heights, see Drawing A-1002.
   3. Thickness: 1/2 inch.
   4. Finish: Shop applied ultra-low VOC epoxy primer and 2 coats satin gloss low VOC two-part, professional polyurethane sign finish system, DFT 2 mils for each coat; Mathews Paint or equivalent.
      a. Color as selected by Director’s representative from paint manufacturer’s full color line.
   5. Mounting: Projecting studs.
6. Type Face: see Drawing A-1002.

2.05 FABRICATION

A. Fabricate sign units of graphic process, design, copy, dimensions and color indicated or specified.

B. Copy shall be as stated in MESSAGE SCHEDULE.
   1. Confirm “To Be Determined” information before fabrication.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification of Conditions: Examine surfaces to receive the signs for defects that will adversely affect the execution and quality of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Install the work of this Section in accordance with the sign manufacturer’s printed installation instructions, except as otherwise indicated or specified.

B. Coordinate sign units with MESSAGE SCHEDULE prior to installation.

C. Secure sign units to surfaces and locations shown on the Drawings with mounting location and utilizing both mounting method specified; seal perimeter of sign with Type 6 sealant.

D. Mounting Locations:
   1. Location A: Latch side of door, sign unit center 60 inches above finished floor and near edge of sign unit 2 inches from outside edge of door frame.
   2. Location B: Hinge side of door, sign unit center 60 inches above finished floor and near edge of sign unit 2 inches from outside edge of door frame.
   3. Location C: Center of door, sign unit center 60 inches above finished floor and centered on width of door.
   4. Location D: Specific location indicated, sign unit center 60 inches above finished floor.
   5. Location E: Specific location indicated, sign unit center at specific location above finished floor.
   6. Location F (Truss Identification Sign): Locate sign units in accordance with 19 NYCRR Part 1264, Table I-1264.

3.03 DIMENSIONAL CUT OUT LETTER INSTALLATION

A. General: Install signs using projected studs mounting methods and according to manufacturer's written instructions.
1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.:

   B. Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
      1. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.

3.04 CLEANING AND PROTECTION

   A. Do not remove protective coverings until directed.
   B. Clean sign units when directed.

3.05 SCHEDULE

   A. See Drawing for Signage Schedule
   B. Provide Truss Identification Signs At:
      1. Exterior building entrance doors, exterior exit discharge doors.
      2. Multiple contiguous exterior building entrance or exit discharge doors.
      3. Fire department hose connections.

END OF SECTION
SECTION 129344
RECREATION EQUIPMENT

PART 1  GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A.  Cast-In-Place-Concrete:  Section 033000.

1.02 SUBMITTALS

A.  Product Data:  Manufacturer’s catalog sheets, specifications, and installation
    instructions.

PART 2  PRODUCTS

2.01 MATERIALS

A.  Basketball Equipment:
    Patterson Williams Athletic Mfg. Co., 140 North Gilbert Road, Mesa, AZ 85203,
    2. Goal and Net:  Model No. 31.
    3. Post:  Model No. 1540.

PART 3  EXECUTION

3.01 INSTALLATION

A.  Install the Work of this Section in accordance with the manufacturer’s printed
    instructions, except as shown otherwise.

END OF SECTION
SECTION 213118

FIRE PUMP SYSTEM

PART 1   GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete Pads: Section 033000.

1.02 REFERENCES

A. Fire pump system components shall meet the following:
   2. Underwriters Laboratories Inc. 448 - Pumps for Fire-Protection Service.
   3. NEMA ICS-6 - Enclosures for Industrial Control and Systems.
   5. MBMA (Metal Building Manufacturers Association) "Recommended Design Practices Manual".

1.03 SYSTEM DESCRIPTION

A. Fire Pump System: The fire pump system shall consist of a heated building enclosure with fire pump, diesel fire pump engine, fire pump controller, jockey pump, jockey pump motor, jockey pump controller, backflow preventer assembly, associated valves, gauges, and test apparatus to supply water to the sprinkler system.
   1. The jockey pump maintains a minimum pressure in the sprinkler system.
   2. The fire pump starts in the event of a drop in pressure below the minimum pressure maintained by the jockey pump.

B. Provide all labor, materials, equipment, tools, incidental and appurtenances required to furnish and install, complete and ready for operation, a pre-fabricated, pre-engineered, diesel powered booster pump system, complete with support skid, controls, piping, valves, wiring and accessories, and structurally steel framed enclosure, as shown on the Drawings and as specified herein.

C. The Drawings are for the purpose of guidance and to show functional features and required external connections. They do not necessarily show all components necessary to accomplish the desired results nor do they necessarily show all components required to interface with the equipment. The Contractor shall provide all parts, equipment, wiring, piping and devices necessary to meet the functional requirements of the system.

D. The Drawings are intended to show the general arrangement of the equipment including, but not limited to, pumps, motors, piping, fittings, valves, and
supports. They are not intended to show exact dimensions. Connection piping may have to be modified in order to accommodate the actual equipment furnished. The costs of such modifications are considered as being in the bid price and, therefore, no payment will be made for such modifications.

E. Equipment and appurtenances vary by manufacturer. If modifications to the Drawings are required to change equipment configuration, piping, equipment supports or, appurtenances, the Contractor shall submit drawings stamped by a Professional Engineer who is licensed in the state where the project is located to the Engineer for approval. All related design and construction costs associated with any modifications will be the responsibility of the Contractor.

1.04 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Submittal Package: Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.

C. Shop Drawings:
1. Outline drawings showing equipment layout and dimensions.
2. Certified performance curve for each pump, shop tested, indicating GPM, bhp, and efficiency, from free delivery to shut off head.
3. Wiring diagrams for electrical power and control wiring.
4. Plans and calculations for the fire pump building stamped and signed by a Registered Professional Engineer in the State of New York.

D. Product Data:
1. Catalog sheets, specifications, and installation instructions.
   a. Indicate UL listing for the system.
   b. Certify that the products comply with NFPA 20.
2. Bill of materials.

E. Quality Control Submittals:
1. Warranty: A written warranty shall be provided for a minimum of one year meeting the criteria identified below.
2. Company Field Advisor Data: Include:
   a. Name, business address and telephone number of Company Field Advisor secured for the required services.
   b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
   c. Services and each product for which authorization is given by the Company, listed specifically for this project.

F. Contract Closeout Submittals:
1. System acceptance test report.
2. Certificates:
   a. Affidavit, signed by the Company Field Advisor and notarized certifying that the system meets the contract requirements and is operating properly:
   b. NFPA Contractor’s Material and Test Certificate For Underground Piping
   c. NFPA Contractor’s Material and Test Certificate for Fire Pump Systems
3. Operation and Maintenance Data:
a. Deliver 2 copies, covering the installed products, to the Director’s Representative. Include:
1) Operation and maintenance data for each product.
2) Certified pump curve.
3) Parts lists.
4) Lubrication charts.
5) Name, address, and telephone number of nearest fully equipped service organization.
6) Record drawings.
7) Warranty.

4. Provide test kit for backflow prevention device.
5. Following issuance of approval of plan submission and installation, provide testing by a certified tester. Submit test results and certification (DOH-1013 form) to approving agent for issuance of a completed works approval.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements:
1. The fire pump system shall be listed by Underwriters Laboratories Inc.
2. Unless otherwise specified herein, conform to the requirements and recommendations of NFPA 20 - Centrifugal Fire Pumps.
3. Comply with the State Department of Health Sanitary Code for Cross Connection Control.
4. Where conflicts occur between the referenced standards, the most stringent requirements shall apply.

B. Persons employed to perform the work of this section and their supervisor shall be personally experienced in sprinkler work and shall have been regularly performing such work for a minimum of 5 years while in the employment of a company or companies engaged in the installation of sprinkler systems.

C. Company Field Advisor: Secure the services of a Company Field Advisor for a minimum of 24 working hours for the following:
1. Render advice regarding installation and final adjustment of the system.
2. Witness final system test and then certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
3. Train facility personnel in operation, and routine maintenance of the system.

1.06 WARRANTY

A. The packaged fire pumping system shall be warrantied against defect in design, material, or construction for a period of one year minimum from the date of shipment.

1.07 MAINTENANCE

A. Special Tools (as furnished or recommended by the backflow preventer manufacturer). Deliver to the Director’s Representative:
1. Test Kit B: Sight tube, of required length, for testing backflow preventer for proper operation, and printed procedure for conducting test.

PART 2 PRODUCTS

2.01 FIRE PUMP

A. The fire pump shall be a Patterson model 4x3 ME or approved equal.
B. Quantity: 1 diesel engine driven fire pump
C. Pump Design and Construction:
   a. Pump shall be UL listed.
   b. Pump shall meet all requirements of NFPA 20.
   c. Location: Fire pump prefabricated building.
   d. Suction Size: 4”
   e. Discharge Size: 3”
   f. Bearings: L-10 rating of 5000 hours minimum.
D. Operating Conditions:
   b. Design Head: 45 psi / 105 feet
   c. Pump shall be capable of delivering 150% of rated capacity.
   d. Speed: 1750 RPM
E. Pump Type:
   a. Centrifugal, horizontal, split case, Class 40.
   b. Pump shall be mounted on a fabricated steel base, complete with coupling, OSHA approved coupling guard, and directly connected to the engine.
F. Pump Materials:
   a. Casing: Cast iron.
   b. Impeller: Bronze.
   c. Shaft: Steel.
   d. Shaft sleeves: Bronze.
   e. Connections: Flanged class 125, ASME B16.1.
   f. Bearings: Steel.
G. Pump Accessories: Provide pump accessories in accordance with NFPA 20 including but not limited to:
   a. One automatic air release valve.
   b. One pump discharge gauge with range appropriate for standard operating conditions of pump.
   c. One compound pump suction gauge with range appropriate for standard operating conditions of pump.
   d. One manufacturer’s nameplate for pump stating: pump capacity, total head, pump RPM, Manufacturer’s model and serial number, casing working pressure

2.02 JOCKEY (PRESSURE MAINTENANCE) PUMP

A. The jockey pump shall be a Grundfos CR1 Series or approved equal.
B. Quantity: One.
C. Configuration: Vertical.

D. Operating Conditions:
   b. Total head: 140 ft.
   c. Maximum Shutoff Head: 142 ft.
   d. Speed: 3600 RPM
   e. Voltage: 115 V, 1 Phase, 60 Hz.

E. Type: Direct drive by electric motor.

F. Materials:
   a. Pump Head: Cast iron.
   b. Shaft: Stainless steel.
   c. Impeller: Stainless steel.
   d. Chamber: Stainless steel.
   e. Outer sleeve: Stainless steel.
   f. O-ring for outer sleeve: EPDM.
   g. Base: Cast iron.
   h. Neck ring: PTFE.
   i. Shaft seal: Cartridge type.
   j. Bearing rings: Silicon carbide.
   k. Rubber Parts: EPDM.
   l. FGJ flange: Cast iron.

G. Provide accessories including but not limited to:
   a. Common structural steel baseplate for pump and drive elevated as required.
   b. Motor: 1.15 service factor, NEMA design B.
   c. One manufacturer’s nameplate stating pump capacity, total head, manufacturer’s model and serial number.

2.03 DIESEL ENGINE DRIVE

A. The diesel engine drive shall be a Clarke model JU4H Series Tier 4i or approved equal.

B. Quantity: One.

C. Configuration: Factory assembled unit specifically designed for fire service, and comprised of fire pump and fire pump engine mounted on steel drip rim base.

D. Type: Direct drive diesel engine that is UL labeled with standard cooling loop.

E. Horsepower Rating: 37 hp.

F. Speed: 1750 RPM.

G. Engine shall be wired for 12V operation.
H. Provide accessories including but not limited to:
   1. Heavy duty commercial lead acid batteries for dual operation.
   2. Battery rack.
   3. Battery cables and acid.
   4. Battery charger.
   5. Dual battery contactors capable of mechanical operation to energize the starting motor in the event of control circuit failure.
   6. Residential-type muffler.
   7. Flexible exhaust connector.
   8. Exhaust insulation.
   9. Heat exchange piping supplying water from the pump to the engine per NFPA 20.
  10. Engine “Hot Start”.
  12. Double wall carbon steel UL labeled fuel storage tank, with level gauge, low level fuel switch, vent with flame arrestor, and secondary containment basin.

2.04 FIRE PUMP CONTROLLER

A. The fire pump controller shall be a Firetrol Model 110 Series or approved equal.

B. The fire pump controller shall be a factory assembled, wired and tested unit and shall conform to all the requirements of NFPA 20 and NFPA 70.

C. The fire pump controller shall be 12V, UL listed.

D. The controller components shall be housed in a NEMA Type 2 drip-proof enclosure, mounted in a convenient location.

E. Operator interface:
   1. The fire pump controller shall feature an operator interface with user keypad.
   2. The interface shall monitor and display motor operating conditions, including all alarms, events, and pressure conditions.
   3. The display and interface shall utilize multiple levels of password protection for system security.

F. Battery Chargers:
   1. The fire pump controller shall have two fully automatic, 200 amp hour, 4 step battery chargers.
   2. The chargers shall feature a qualification stage, in which the batteries are examined by the charger to insure that they are not defective and are capable of accepting a charge.
   2. The battery chargers shall feature selectable AC power voltage, selectable battery voltage, selectable battery type, charge cycle reset push-button.
G. A solid state pressure transducer with a range of 0-300 psi ±1 psi shall be installed in a bulkhead in the enclosure bottom so that all plumbing connections are made external to the controller.

H. The controller shall indicate the status and alarm conditions of:
   a. Engine run.
   b. Minimum run time / Off delay time.
   c. Engine fail to start.
   d. Low suction pressure.
   e. Drive not installed.
   f. Disk error.
   g. Disk near full.
   h. Pressure error.
   i. Sequential start time.
   j. Crank/rest time – cycle.
   k. Remote start.
   l. System battery low.
   m. Printer error.

I. The controller shall send an alarm signal to the building fire alarm control panel if any of the alarm conditions in the fire pump controller have been met.

J. The controller shall record all operational and alarm events to system memory. All events shall be time and date stamped and include an index number.

K. The controller shall have a built-in USB Host Controller. A USB port capable of accepting a USB Flash Memory Disk shall be provided.

L. The controller shall feature a serial communications port for use with 2 or 4 wire Modbus RTU communications.

M. Controller Operation:
   1. A digitally set On Delay (Sequential Start) timer shall be provided as standard. Upon a call to start, the user interface shall display a message indicating the remaining time value of the On Delay timer.
   2. The controller shall be field programmable for manual stop or automatic stop. If set for automatic stopping, the controller shall allow the user to select either a Minimum Run Timer or an Off Delay Timer. Both timers shall be programmable through the user interface.
   3. The controller shall include an AC Power Loss start timer to start the engine in the event of AC Power failure.
   4. A weekly test timer shall be provided as standard. The controller shall have the ability to program the time, date, and frequency of the weekly test. In addition, the controller shall have the capability to display a preventative maintenance message for a service inspection. The message text and frequency of occurrence shall be programmable through the user interface.
   5. A Lamp Test feature shall be included. The user interface shall also have the ability to display the status of the system inputs and outputs.
6. An Audible Test feature shall be included to test the operation of the audible alarm device.

2.05 JOCKEY PUMP CONTROLLER

A. The jockey pump controller shall be a Firetrol FTA550F Series or approved equal.

B. Function: Cycling jockey pump to maintain system pressure.

C. Operator Interface:
   1. The fire pump controller shall feature an operator interface with user keypad.
   2. The interface shall monitor and display motor operating conditions including all alarms, events, and pressure conditions.
   3. The display and interface shall utilize multiple levels of password protection for system security.

D. The jockey pump shall have as a minimum but not limited to the following alarms:
   1. Power failure.
   2. Phase reversal.
   3. Pump running.
   4. Low system pressure.
   5. System overpressure.
   6. Pump fail to start.

E. The controller shall send an alarm signal to the building fire alarm control panel if any of the alarm conditions in the jockey pump controller have been met.

F. The jockey pump controller shall include:
   1. Fusible disconnect.
   2. HOA selector switch.
   3. Solid-state pressure transducer with a range of 0-300 psi ±1 psi.
   4. Run period timer.
   5. NEMA Type 3R, drip-tight enclosure.

G. Controller operation:
   1. A digitally set On Delay (Sequential Start) timer shall be provided as standard. Upon a call to start, the user interface shall display a message indicating the remaining time value of the On Delay timer.
   2. The controller shall include a Minimum Run Timer to allow the motor to run for a set period of timer after starting. The timer shall be programmable through the user interface.
   3. A pump restart delay timer shall be provided to allow the residual voltage of the motor to decay prior to restarting the motor and to prevent severe short cycling of the motor. The timer shall be programmable through the user interface.
   4. A Lamp Test feature shall be included. The user interface shall also have the ability to display the status of the system inputs and outputs.
5. An Audible Test feature shall be included to test the operation of the audible alarm device (if supplied).
6. The disconnect switch shall be mechanically interlocked so that the enclosure door cannot be opened with the handle in the ON position except by a hidden tool operated defeater mechanism. The disconnect switch shall be capable of being padlocked in the OFF position for installation and maintenance safety.

2.06 BACKFLOW PREVENTER ASSEMBLY

A. Type B: Double Check Valve device, conforming to ASSE Standard 1015, AWWA C-510, USC specifications manual for Cross Connection control, and listed as acceptable in the New York State Department of Health, Environmental Health manual.
   1. Performance: 150 psig, and 130 degrees F, maximum working conditions.
   2. Assembly: OS&Y gate valve on inlet and outlet side, and two test cocks, all as furnished or recommended by the backflow preventer manufacturer.
   3. Model: LF-709 by Watts or approved equal.

B. Check Valve: Materials:
   1. Check valve bodies: Epoxy coated cast iron.
   2. Seats: Stainless Steel.

C. Check valve shall feature modular check assemblies with center stem guiding. Each check module shall have a captured spring and be accessible through a bolted cover plate.

D. Seats shall be replaceable without special tools.

E. Backflow preventer shall be installed in suction piping a minimum of 10 pipe diameters before the pump inlet.

F. Gate Valves:
   1. Gate valves shall be iron body, bronze-mounted, double disc with parallel seats conforming to AWWA C500. Gland bolts shall be zinc-coated steel.
   2. All gate valves shall have a minimum operating pressure of 200 psi OWG, factory tested at 400 psi.
   3. Gate valves shall open left (counter clockwise). Valves shall be outside screw and yoke type with hand wheel and arrow cast on it showing direction of opening.
   4. Each gate valve shall be furnished complete with necessary nuts, bolts, studs, and gaskets.

2.07 PREFABRICATED BUILDING

A. All equipment listed in this specification (except the test header and muffler) shall be mounted on an open structural steel channel skid. All piping, pressure
sensing lines, bypass with check valve, and shut-off valves, as well as approved suction and discharge valves shall be firmly anchored to the steel base by means of structural steel supports.

B. The building shall be designed to meet all applicable codes and standards.

C. All electrical wiring shall be completed and tested at the factory.

D. The entire package shall require one power connection by the electrical contractor.

E. Station Base:
   1. All the equipment including but not limited to pumps, motor, engine, valves, instrumentation and controls shall be mounted on an open structural steel channel skid enclosed in a prefabricated, non-flammable building.
   2. Building base shall have a hot rolled steel angle framework, welded, primed and painted. Base shall be pre-drilled for anchoring to a steel skid.
   3. Base framework shall be fully cleaned, primed and painted with a self-priming, VOC compliant, catalyzed coating system suitable for heavy industrial environments.
   4. Structural steel supports shall be provided to anchor all equipment, piping and appurtenances to the skid.
   5. Weld standards shall, at a minimum, meet AWS recommended practices.
   6. The skid shall be designed to be anchored to a concrete pad (refer to structural drawings).
   7. Building floor shall be formed by pouring concrete flush with the framework, sloping towards the floor drain.
   8. Pour concrete pad for support of fire pump and diesel engine drive.

F. Building Framework:
   1. Framework shall have a complete, internal, self-supporting structural steel frame which does not rely on the exterior panels or roof cover panels for its structural strength or framing.

G. Insulation:
   1. Building insulation shall conform to NYS Energy Code
   2. Roof: R-19 plus R-11 liner system.
   4. Vapor barrier shall be installed on exterior walls and ceiling.

H. Roof:
   1. A roof pitched in inch in 12 or greater shall have a covering of overlapping, 26 gauge “Multi-Rib” ribbed steel panels with a baked-on, PVDF resin-based finish over a galvalume substrate, in manufacturer’s standard colors.
   2. Owner to select color during submittal review.
   3. Overlapping roof panels shall be installed with appropriate self-tapping fasteners with integral gaskets.
4. A roof with a pitch of less than 1 inch in 12 shall have a roof covering of mechanically seamed, 24 gauge, standing-seam roofing. Standing seam roof panels shall be of galvalume steel with a baked-on, PVDF resin-based coating and shall be no visible fasteners on main run.

5. Roof to include a matching, die-formed ridge cap, and a fully supported 3” overhang.

6. Properly sized attic space ventilation shall be provided.

7. Heavy duty steel lift eyes to be supplied and mounted to the roof trusses as needed for lifting the building.

I. Exterior Walls:
   1. The exterior walls shall be 26 gauge “Multi-Rib” ribbed steel panels with a PVDF resin-based finish over a galvalume substrate in manufacturer’s standard colors.
   2. Owner to select color during submittal review.
   3. Exterior siding panels to be overlapped and installed with appropriate self-tapping fasteners with integral gaskets, and shall be removable without any disturbance to interior panels.
   4. Butted seams are not allowed.
   5. All openings in walls are to be structurally framed, sleeved, trimmed, and provided with external drip caps.

J. Exterior Trim:
   1. The exterior trim package shall include stepped or boxed eave, rake, fascia, base, corner, jamb, and header trim in 26 gauge Galvalume material with owner’s choice of standard colors.

K. Interior Finish:
   1. The interior walls and ceiling shall be lined with flush-fit 22 gauge, roll-formed liner panels, with concealed fasteners and a baked-on White polyester finish over G-90 galvanized substrate. The building interior shall feature a complete matching trim system including base, jamb, head, and ceiling trim. Liner to be reinforced with 14 gauge hat channels mounted vertically as needed for heavy wall mounted items.

L. Interior Dimensions:
   1. Interior dimensions shall be as required to enclose the packaged fire pump system and provide access to all components.
   2. Clearances must be maintained around the backflow prevention device as shown on the Drawings.

M. Fasteners, Adhesives, and Sealants:
   1. The fasteners, adhesives and sealants utilized shall be of types approved for use on this type of structure as required by the appropriate agency or governing body.

N. Closures:
   1. Matching, pre-molded, closed cell elastomer closures provided by the siding and roof panel manufacturer shall be installed according to the manufacturer’s recommendations at the eave line, beneath the roof
panels, and where the trim meets the wall panels.

O. Door and Hardware:
1. Doors shall at a minimum comply with Steel Door Institute Directive SDI-100.
2. Doors to be constructed of no less than 18-gauge steel faced leafs with stiffeners and 16 gauge door frames. Door to have insulated core.
3. Doors and frames to be hot-dipped galvanized to ASTM designations A924 and A653, then factory primed and painted with epoxy enamel to match the building or the trim.
4. Sizes and quantity shall be 72” x 84” double type at a minimum or as indicated on the drawings.
5. Door hardware shall include:
   a. NRP stainless steel ball bearing hinges, minimum of three per door.
   b. Closer with hold open arm.
   c. Weatherstripping and sweep.
   d. Threshold.
   e. Watershed at top of door.
   f. Drip cap extending 3” past door edge.
6. Gutters that mount over the eave trim shall be provided.

P. Electrical:
1. All electrical equipment in the building shall be designed, assembled, and installed according to NEC (NFPA 70) and UL Standard 508A.
2. Each electrical equipment item in the station shall be properly grounded.
3. The following electrical components shall be provided:
   a. Electrical distribution panel, NEMA 1 enclosure, with main breaker rated for total electrical equipment provided.
   b. Two 5 kw heaters with thermostats set to maintain 50°F.
   c. Low temperature alarm.
   d. One 16” exhaust fan and thermostat.
   e. Two 4’ interior florescent lights.
   f. Emergency lighting.
   g. One wall mounted convenience outlet.
   h. One lighting panel box with appropriate transformer.
   i. Sufficient 20 amp single pole circuit breakers for the equipment provided.
   j. One exterior weatherproof sodium vapor light.
   k. One motorized damper.
   l. Emergency lighting.
   m. Tamper switches on valves where indicated on the drawings.

Q. Building fire protection: Provide interior sprinkler system fed from fire pump discharge piping as shown on the drawings.

2.08 FIRE PUMP SYSTEM PIPING

A. All piping valves and fittings shall be in accordance with NFPA 20.
B. All piping shall be constructed from ASTM A105 or ASTM A53 standard weight pipe.

C. The package piping shall consist of fabricated welded steel and/or cast iron fittings in and out of pumps.

D. All welded pressure bearing piping must be fabricated with full penetration welds. Use of backing rings will not be permitted.

E. Qualification of the welding procedures and performance of the welders shall comply with the requirements of ASME code, Section IX.

F. All frame welds shall be performed by ASME qualified welders per Section IX of the ASME Code.

G. Supports shall be provided for all suction and discharge piping. All pipe supports shall be designed to allow for the removal of any individual sections without adding additional stress to adjoining sections.

2.09 FIRE PUMP SYSTEM VALVES

A. Valves shall be UL listed with 175-psig minimum pressure rating.

B. OS&Y gate (indicating) valve:
   1. Listed indicating OS&Y gate valve with tamper switch.
   2. The OS&Y valve shall be rated for the maximum working water pressure of the system.
   3. Valve shall be manufactured out of ASTM A126 class B cast iron and have flanged ends.
   4. Valve shall have outside stem & yoke, full flow port, replaceable disc, fusion bonded epoxy coating and be operated by handwheel.

C. Check Valve: Provide valves rated for the maximum working pressure of the system.
   1. Fire pump: two-door wafer check valve
   2. Jockey pump: bronze, Y-pattern, renewable disc
   3. Bypass: Swing check, spring actuated

D. Butterfly Valve:
   1. UL listed fire protection valve
   2. Rated for maximum working pressure of the system
   3. Wafer or lug style

E. Main relief valve:
   1. The pressure relief valve shall be UL listed.
   2. The pressure relief valve shall be located between the pump and the pump discharge check valve and be installed so it can be readily removed for repairs without disturbing the piping.
   3. The pressure relief valve shall be pilot-operated diaphragm type.
4. The relief valve shall discharge into an open pipe or into a cone or funnel secured to the outlet of the valve. If a closed type cone is used, it shall be provided with means for detecting motion of water through the cone.

5. Manufacturer: Cla-Val or approved equal

F. Air release valve:
   1. Provide ½” automatic air release valve in bypass piping.

G. Tamper switches:
   1. Type and configuration shall match valve selections.
   2. SPST, normally closed contacts, designed to signal valve in closed state (for normally open valves), or open state (for normally closed valves).
   3. Provide tamper switches where indicated on the drawings.

2.10 FIRE PUMP SYSTEM ACCESSORIES

A. Fire Pump Bypass:
   1. System shall be equipped with a fire pump bypass sized in accordance with NFPA 20.
   2. Bypass piping shall include a check valve, air release valve, and a control valve at each end.

B. Fire Pump Test Header:
   1. System shall be equipped with a 4” fire pump test header with two 2-1/2” hose valves.

C. Floor drain:
   1. The system shall be provided with a floor drain per NFPA 20.
   2. The drain shall be installed flush with the floor level and routed through the skid peripheral structural members and terminated within 4 inches of the skid.

D. Gauges:
   a. Compound suction and discharge gauges (3.5 inch dials) supplied and sized per NFPA 20.

2.11 PAINTING

A. After fabrication and before shipping, paint all surfaces including, but not limited to: the main piping, mechanical equipment operators pipe fittings and valves, and structural members.

B. The following items will not be painted:
   1. Non-ferrous metals, unless specifically noted otherwise.
   2. Stainless steel components.
   3. Fuel lines.
   4. Enclosure fire sprinkler lines.
   5. Jockey pump piping.
C. All metal welds, blisters, etc., shall be ground and sanded smooth. All pits and dents shall be filled and all imperfections shall be corrected so as to provide a smooth surface for painting. All rust, loose scale, oil, grease, and dirt shall be removed by use of approved solvents, wire brushing or sanding.

D. Coat surfaces as follows:
   1. One (1) coat Series N69F Epoxoline Primer, or approved equal, on properly prepared unprimed metal or touch up (3.0-5 DFT).
   2. Two (2) coats Series N69F Epoxoline, or approved equal, (3.0-5.0 DFT) per coat.
   3. Color: Red

E. On metal surfaces apply each coat of paint at the rate specified by the manufacturer to achieve the minimum dry mil thickness required. Deficiencies in film thickness shall be corrected by the application of an additional coat(s).

F. All damaged surface of paint shall be cleaned and repainted as directed by the Engineer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Unless otherwise shown as specified, install the Work of this Section in accordance with NFPA 20, and the manufacturer’s printed instructions.

3.02 FIELD QUALITY CONTROL

A. Backflow Preventer Device Test:
   1. All requirements for testing and certifying the backflow prevention device per NYSDOH cross connection control regulations are the responsibility of the contractor.
   2. Operation Test: Test kit as specified under Part 1 of this section may be used. Condukt test in the presence of the Director’s Representative.
      a. Type B Backflow Preventer: Test the device with the test kit in accordance with the manufacturer’s test procedure.
   3. Re-testing: Repair or replace any device failing the operation test, and repeat the test.

B. Preliminary System Test:
   1. Preparation: Have the Company Field Advisor adjust the completed system and then operate it long enough to assure that it is performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in a suitable condition to conduct an acceptance test.
      b. Checking and adjusting equipment.
      c. Training facility personnel.
C. System Acceptance Test:
1. Preparation: Notify the Director’s Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
2. Make the following tests:
   a. Perform tests required by NFPA 20.
   b. Test each system function step by step as summarized in System Description.
3. Supply all equipment necessary for system adjustment and testing.
4. Submit written report of test results signed by Company Field Advisor and the Director’s Representative. Mount a copy of the final report in a plexiglass enclosed frame assembly adjacent to the fire pump controller.

END OF SECTION
Section 230523

Valves

Part 1 General

1.01 Abbreviations

A. IBBM: Iron body, bronze mounted.
B. WOG: Water, oil, gas.

1.02 Submittals

A. Product Data: Manufacturer’s catalog sheets and specifications for each valve type.
B. Valve Schedule: List type of valve, manufacturer’s model number, and size for each service application.

Part 2 Products

2.01 Valves - General

A. Valve Standardization: Valves from one or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one manufacturer.
B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating.
C. Valve parts of same manufacturer, size and type shall be interchangeable.
D. Manually operated gate valves shall be of rising stem type, unless otherwise specified.
E. Valves which use packing, shall be capable of being packed when wide open and under full working pressure.
F. Size valves the same size as the piping in which they are installed, unless specified otherwise.

2.02 Materials

A. Body:
2. Bronze: ASTM B 62
3. Cast Steel: ASTM A 216 Grade WCB.

B. Stem:
3. Rolled Silicon Brass: ASTM B 98 Alloy D.
7. Carbon Steel: As specified for particular type of valve.
8. Stainless Steel: As specified for particular type of valve.

C. Trim: As specified for particular type of valve.

2.03 GATE VALVES


2.04 CHECK VALVES

A. Type V: 125 psig WSP, 200 psig WOG, IBBM, horizontal swing, bolted bonnet, regrindable and renewable seat ring and disc, and threaded or flanged ends depending on size. Discs on valves 4 inch size and larger may be cast iron with bronze face. Acceptable Valves: Crane 372, & 373, Hammond IR1124, Jenkins 623CJ & 624CJ, Milwaukee F2974, Nibco F918, and Stockham G927 & G931.

2.05 PLUG VALVES

A. Type AB: 100 psig WOG, gas cock type with cast iron or bronze body, bronze plug, square head, wrench operator, and threaded ends. Acceptable Manufacturers: Crane, Eclipse Combustion, and McDonald.

2.06 WATER PRESSURE REDUCING VALVES

A. Main Water Service:
1. Valve shall be an adjustable, direct acting, spring loaded, diaphragm operated, single seat, bottom guided type suitable for dead end service; guaranteed not to stick and shall maintain a constant discharge pressure which will not vary more than 1 psig for each 10 psig decrease in inlet pressure. Valves shall have cast iron, mild steel or bronze bodies, with either flanged ends or screwed ends with unions. Valve trim shall be of stainless steel with renewable composition disc. Parts subject to wear shall be renewable.
2. Material of diaphragm and disc shall be suitable for an operating temperature to 150 degrees F. The control line, from diaphragm casing,
shall be connected to the discharge piping at least 10 feet downstream from pressure reducing valve. Control line shall be of same material as adjoining piping. Valves shall be standard weight for inlet pressures up to 125 psig, and extra heavy weight for inlet pressures in excess of 125 psig.


B. Cold Water Make-Up Service:
      a. Body: Brass or bronze construction.
      b. Wetted Parts: Brass, bronze, stainless steel, or nickel alloy construction.
      c. Renewable seat and removable composition disc.
      d. Integral low inlet pressure check valve.
      e. Operating Temperature Range: 33-160 degrees F.

   2. Pressure reducing valves with integral strainers may be substituted for approval, in lieu of separate valve and strainer, if integral strainer and valve meet individual valve and strainer specifications.

2.07 SAFETY AND RELIEF VALVES

A. General Requirements: Valves shall be as specified by ASME Code governing manufacture of such valves within scope of their particular usage, i.e., Heating Boilers, Unfired Pressure Valves, etc., shall be tested, rated and listed, unless otherwise specified. Valves for applications specified shall conform to the ASME Code, Section IV, Heating Boilers and the following:
   1. Valves for direct fired domestic hot water boilers shall conform to requirements of ASME Code, Section IV, Paragraph HG 400.2(a). Valves shall be of temperature-pressure type, rated at 125 psig test pressure. Thermostatic element shall, on rising temperature, cause the valve to open at 188 degrees F. and valve shall deliver its rated capacity at 208 degrees F. and close drip tight at 183 degrees F. Valves for use on gas fired heaters shall be AGA approved and shall be so stamped or marked.

2.08 BALL VALVES

A. Type BV: 150 psig WSP, 600 psig WOG, 2 piece bronze body, solid blow-out proof stem, teflon seats, chrome plated brass ball, teflon seals, corrosion resistant steel lever handles with vinyl grips, balancing stop, and threaded or solder ends. Acceptable Manufacturers: Conbraco, Hammond, Milwaukee, Nibco, and Watts.
2.09 BUTTERFLY VALVES

A. Type BF: Iron body, flangeless wafer or lugged type, (lug for each bolt hole, drilled and tapped for cap screws), with replaceable reinforced resilient EPT (EPDM) seats, bronze or nickel plated ductile iron discs, phosphate coated steel or stainless steel stems, and raised necks able to accommodate 2 inches of insulation. Acceptable Manufacturers: Crane, Demco, De Zurik, Hammond, Keystone, Milwaukee, Nibco, Stockham, and Watts.

1. Pressure Ratings:
   a. 12 inch size and Less: 200 psig WOG at 275 degrees F.

B. Operators:

1. 6 inch size and Less: Manual actuator handles with external indication of disc position, and suitable means of locking actuator in any fixed position.

PART 3 EXECUTION

3.01 INSTALLATION

A. General: Install valves at locations noted on the drawings or specified.

3.02 VALVE APPLICATION SCHEDULE

A. Schedule of valve applications for the different services is as follows:

1. Boiler Feed Pump, Suction and Discharge (BFS & BFD), 125 psig and Less:
   a. 4 inch and Less: A gates, J globes or angles, and S checks.
   b. 5 inch and Up: C gates, K globes or angles, and W or Z checks.

2. Cold Water In Buildings (CW) 125 psig and Less:
   a. 3 inch and Less: A or D gates or BV balls, O globes or angles, and S or U checks; or C gates, K globes or angles, and V checks, with solder joint companion flanges.

3. Gas - Natural (G) 125 psig and Less:
   a. 2 inch and Less: AB plug valves.

4. Hot Water (HWS & HWR) 125 psig and Less:
   a. 3 inch and Less: A or D gates or BV balls, J or O globes or angles, and S or U checks.

END OF SECTION
SECTION 230550
VIBRATION ISOLATION

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Vibration Isolation for Piping: Section 230529.

1.02 DEFINITIONS

A. Ground Floor: Floor or floor slab of building resting directly on earth.

1.03 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Shop Drawings:
   1. Details of intermediate structural steel members and method of attachment required for installation of vibration isolating devices.
   2. Design Calculations: Calculations for selection of vibration isolators, design of vibration isolation bases, and selection of seismic restraints.
   3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

C. Product Data:
   1. Catalog sheets, specifications, and installation instructions.
   2. Vibration isolator schedule showing usage.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES

A. Amber-Booth Co.

B. Korfund Dynamics Corp.

C. Mason Industries Inc.

D. Vibration Eliminator Co., Inc.

E. Vibration Mountings and Controls, Inc.

2.02 RUBBER-IN-SHEAR ISOLATORS
A. Provide molded mound shaped rubber or neoprene elements designed to provide the required deflection under imposed load. Furnish isolators properly housed, with steel top plate and base plate completely imbedded in rubber or neoprene, for bolting to equipment and foundations, of type as follows:
1. Single Rubber-In-Shear: Single element designed for static deflection of 1/4 inch.
2. Double Rubber-In-Shear: Two single elements assembled in series, to provide for a static deflection of 1/2 inch.

2.03 STEEL SPRING ISOLATORS

A. Types:
1. Free Standing Springs: Provide laterally stable units, without housing, with a minimum 1/4 inch thick rubber or neoprene sound deadening pad between spring and its support. Use for isolating equipment having a static deflection in excess of 1 inch, unless otherwise indicated.
2. Housed Springs: Provide units with telescoping cast iron or steel housings, containing one or more springs, complete with resilient alignment inserts and a minimum 1/4 inch thick rubber or neoprene sound deadening pad bonded to the base of housing.

B. Construction Features Required:
1. Provide limit stops for spring isolators with deflections of 2 inch or more so as to prevent undue motion during start and stop, but unrestrained movement during normal operation.
2. Hot dip galvanize all steel parts of isolators for outdoor use, with the exception of springs. Cadmium plate or neoprene coat springs.
3. Do not use isolator leveling bolts for jacking screws.

2.04 INTEGRAL STRUCTURAL STEEL OR RAIL TYPE BASES

A. Provide bases, factory fabricated from structural steel members of sufficient rigidity to maintain drive alignment and resist starting torque, without the use of restraining snubber devices. Provide bases complete with rubber-in-shear or spring type isolators, as specified for the particular equipment.

2.05 COMBINATION RUBBER AND SPRING ISOLATORS

A. Type: Combination rubber and spring type designed for insertion in a split hanger rod for isolating equipment from the overhead construction.
1. Approved isolators: Amber Booth Type BSSR, Korfund Type VX, Mason Industries, Type DNHS, Vibration Eliminator Co. Type SNRC and Vibration Mountings and Controls Type RSH.

PART 3 EXECUTION

3.01 INSTALLATION
A. Jack equipment bases or inertia bases into position and block or wedge before springs are loaded. After equipment is bolted in place and springs are loaded, by means of the leveling bolts, remove the temporary blocking or wedging.

B. Housekeeping Pads:
   1. Coordinate size and location of pads with the Work of related contracts.
   2. Coordinate house keeping pads with restraint manufacturer to provide minimum edge distance of 10 bolt diameters around the outermost anchor bolt to allow development of full drill-in wedge anchor ratings.
      a. If cast-in anchors are being used, size housekeeping pads in accordance with ACI requirements for bolt coverage and embedment.

C. Vibration Isolation Bases:
   1. Coordinate size and location of bases with the Work of related contracts.

3.02 APPLICATION

A. Provide vibration isolators or vibration isolation bases for mechanical equipment, piping and high velocity ductwork of type as specified.

B. Select isolation devices for uniform static deflection, in accordance with the distribution of weight and forces.
   1. Whenever rotational speed is the cause of disturbing frequency, utilize the lowest operating speed of the equipment in determining the type of isolation required.
   2. Selection shall result in uniform loading and deflection, even when equipment weight is not evenly distributed.
   3. Select springs for a total deflection greater than the selected static deflection, to provide an adequate safety factor.

C. Isolate floor mounted fan units, air handling units and self-contained air conditioning units, (with the exception of utility sets, fan units with wheels less than 27 inches and all equipment mounted on the ground floor), to obtain the following efficiencies:

<table>
<thead>
<tr>
<th>RPM</th>
<th>MINIMUM DEFLECTION</th>
<th>EFFICIENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 325</td>
<td>3.5</td>
<td>80</td>
</tr>
<tr>
<td>326 to 525</td>
<td>2.0</td>
<td>80-90*</td>
</tr>
<tr>
<td>526 to 575</td>
<td>1.5</td>
<td>90</td>
</tr>
<tr>
<td>576 to 1000</td>
<td>1.25</td>
<td>90-95*</td>
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<tr>
<td>1001 to 1200</td>
<td>0.75</td>
<td>95</td>
</tr>
<tr>
<td>1201 and over</td>
<td>.50</td>
<td>95</td>
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</tbody>
</table>

*Lower efficiency at lowest RPM - higher efficiency at highest RPM.

3.03 VIBRATION ISOLATION SCHEDULE

A. Fans and Air Handling Units:
   1. Floor Air Handling Units:
a. Provide unit isolators or steel rail type isolator bases.

2. Ceiling Suspended Fans: Provide combination rubber and spring type isolators, designed for insertion in a split hanger rod. Provide isolators with an efficiency as specified under the paragraph entitled “APPLICATION” of this Section, with no deflection greater than 1-1/2 inches required.

B. Remote Installed Refrigerant Compressor Units, Self Contained Belt Driven or Direct Driven Condensing Units and Floor Mounted Product Coolers: Provide steel rail type bases with built-in, metal housed, rubber-in-shear unit isolators, permanently fixed in place and provided with adjustable snubber devices. Provide rail bases on Ground Floor designed for 1/4 inch static deflection and above Ground Floor 1/2 inch static deflection.

3.04 FIELD QUALITY CONTROL

A. Provide equipment and apparatus required for performing inspections and tests.
   1. Notify Director’s Representative a minimum of 14 days prior to equipment sound, vibration, and seismic testing.
   2. Rebalance, adjust, or replace equipment with noise or vibration levels in excess of those given in the equipment specifications, or equipment manufacturer's data.

B. Field Inspections:
   1. Prior to initial operation, inspect the vibration isolators and seismic snubbers for conformance to drawings, specifications, and manufacturer's data and instructions.
      a. Check for vibration and noise transmission through connections, piping, ductwork, foundations, and walls.
      b. Check connector alignment before and after filling of system and during operation.
      c. Correct misalignment without damage to connector and in accordance with manufacturer's recommendations.

C. Spring Isolator Inspection
   1. After installation of spring isolators or protected spring isolators, and seismic restraint devices, the equipment shall rock freely on its spring isolators within limits of stops or seismic restraint devices. Eliminate or correct any interferences.

D. Tests
   1. Adjust, repair, or replace isolators as required to reduce vibration and noise transmissions to specified levels.
   2. Equipment Vibration Tests
      a. Perform vibration tests to determine conformance with vibration isolation schedule specified.

END OF SECTION
SECTION 230554

DUCT AND EQUIPMENT IDENTIFICATION

PART 1   GENERAL

1.01   RELATED WORK SPECIFIED ELSEWHERE

A. Mechanical Painting: Section 099103.

1.02   DELIVERY, STORAGE AND HANDLING

A. Deliver paint to the Site in original, new unopened containers, bearing manufacturers' printed labels.

B. Store materials at the site where directed. Keep storage space clean and accessible to the Director's Representative at all times.

PART 2   PRODUCTS

2.01   MATERIALS

A. Paint: Type IAL-3 specified in Section 099103.

B. Equipment Nameplates: Metal nameplate with operational data engraved or die-stamped; permanently fastened to equipment.
   a. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and similar essential data.


D. Access Panel markers: 1/16 inch thick, engraved plastic laminate markers, with abbreviated terms and numbers corresponding to concealed equipment.

E. Plastic Equipment Markers: ASME A13.1, color-coded, engraved plastic laminate markers. Include lettering identifying equipment name and service. Identifying names and/or abbreviations shall match those indicated on the contract documents.
PART 3 EXECUTION

3.01 PREPARATION

A. Protection: Cover and protect surfaces to be painted, adjacent surfaces not to be painted, and removed furnishings and equipment from existing paint removals, airborne sanding particles, cleaning fluids and paint spills using suitable drop cloths, barriers and other protective devices.
   1. Schedule and coordinate surface preparations so as not to interfere with work of other trades or allow airborne sanding dust particle to fall on freshly painted surfaces. Do not perform the Work of this Section until testing, insulation and finish painting Work have been completed.
   2. Provide adequate natural or mechanical ventilation to allow surfaces to be prepared and painted in accordance with product manufacturer’s instructions and applicable regulations.
   3. Provide and maintain “Wet Paint” signs, temporary barriers and other protective devices necessary to protect prepared and freshly painted surfaces from damages until Work has been accepted.

B. Clean and prepare surfaces to be painted in accordance with specifications, paint manufacturer’s approved product data sheets and printed label instructions. In the event of conflicting instructions or directions, the more stringent requirements shall apply.
   1. Cleaners: Use only approved products manufactured or recommended by finish paint manufacturer. Unless otherwise recommended by cleaner manufacturer, thoroughly rinse with clean water to remove surface contaminants and cleaner residue.

3.02 DUCT IDENTIFICATION

A. Identify exposed ductwork, bare or insulated, directly connected to air handling apparatus, in the following spaces or rooms, by means of painted stenciled legends:
   1. Mechanical Equipment.
   2. Steam Service.
   4. Boiler.
   5. Penthouse.
   7. Concealed air handling equipment and duct mounted coil spaces.
   8. Exterior air cooled condensing units.

B. Locate stenciled legends to be readily visible from any point of observation. Stencil identification along center line of duct, close to equipment. Where view is unobstructed from two directions, apply two sets of stenciling (both sides), visible from each direction.


D. Samples of Ductwork Identification:
1. Fresh Air Supply.
2. Air Cond. Supply Air.
3. Air Cond. Return Air.
5. Exhaust Air.

E. Colors: Paint stenciled letters black. Where the background color is dark, paint background white before stenciling.

3.03 EQUIPMENT IDENTIFICATION

A. Identify mechanical equipment, bare or insulated, installed in the following spaces or rooms, by means of painted stenciled legends:
   1. Mechanical Equipment.
   2. Steam Service.
   4. Boiler.
   5. Penthouse.

B. Paint stenciled legends black, a minimum of 1-1/2 inches in height, located to be readily visible from a reasonable point of view. Place identification along center line of equipment, if possible.

C. Samples of Equipment Identification:
   1. Air Cond. Unit AC 1.
   2. Supply Fan S 1.
   4. Reurn Fan R 1.

3.04 APPLICATION OF PAINT

A. Stencil Painting: Apply with a brush or aerosol type spray can.

3.05 CLEANING

A. Clean adjacent surfaces of paint spatters resulting from the Work of this Section.

END OF SECTION
SECTION 232003

THERMOMETERS AND GAUGES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE
   A. Valves: Section 230523.

1.02 SUBMITTALS
   A. Product Data: Manufacturer’s catalog sheets, specifications and installation instructions for each item specified.

1.03 QUALITY ASSURANCE
   A. Regulatory Requirements: Where Federal, NSF, ASME or other standards are indicated or required, products shall meet or exceed the standards established for material, quality, manufacture and performance.

PART 2 PRODUCTS

2.01 MANUFACTURERS/COMPANIES
   A. Dresser Instruments.
   B. Marsh Bellofram.
   C. Moeller Instrument Co.
   D. Taylor Precision Products.
   E. H.O. Trerice Co.
   F. Weksler Instruments Corp.

2.02 THERMOMETERS
   A. General Design Features:
      1. Scale Ranges: 1-1/2 times actual working temperature required for the particular application, as approved.
         a. Maximum of two degrees between graduations and ten degrees between numerals.
         b. When scale ranges are in excess of 100 degrees, maximum range between numerals may be 20 degrees, or as otherwise approved for the particular application.
2. Direct Reading Thermometers: Bimetallic actuated, dial type, straight pattern, angle pattern, or adjustable angle pattern as required.

   a. Sockets for Use in Insulated Piping, Insulated Tanks or Similar Equipment: Extension lagging neck type, of length as required to compensate for insulation thickness, and proper immersion.

2.03 THERMOMETERS FOR MEASURING LIQUID TEMPERATURE

A. Bimetallic Actuated Thermometers: Comply with ASME B40.3, Accuracy Grade A.
   1. Construction: Type 304 stainless steel, all welded construction, with clear acrylic plastic or shatterproof glass crystal.
   2. Dial: White enamel background with bold black figures and graduations.
   3. Head Size:
      a. Installation in Piping: 3 inch diameter.
      b. Installation in Tanks and Similar Equipment: 5 inch diameter.
   4. Stem: Length as required for proper immersion, and to compensate for insulation thickness, with threaded connection for socket.
   5. External Calibration Device.
   6. Separable Socket:
      a. Water Service: Brass or bronze.

2.04 PRESSURE AND COMPOUND GAUGES

A. Type: Adjustable dial type with micrometer type pointer, or external calibration device, bronze bourdon tube, and bronze bushed rotary movement.

B. Dial: White enameled background, and bold black graduations, numerals and pointer; 3-1/2 inch diameter.
   1. Scale Range:
      b. Compound Gauges: From 30" Hg vacuum to double normal operating pressure.
   
C. Case: Cast aluminum, brass, or black finished phenolic.

D. Accuracy: Guaranteed of within 1 percent in middle third of dial range.

PART 3 EXECUTION

3.01 INSTALLATION

A. Thermometers:
   1. Install in accordance with the manufacturer's printed installation instructions.
   2. Install direct reading thermometers, when the application requires installation 6 feet or less above the floor or bottom of space in which installed, and remote reading type when the installation is over 6 feet.
   3. Install air temperature reading thermometers for measuring duct, plenum and other air temperature applications of type as specified under sections

B. Pressure and Vacuum Gauges:
   1. Install in accordance with the manufacturer's printed installation instructions.
   3. For Measuring Liquid Pressure: Install gauges complete with stop cocks and drain cocks.

END OF SECTION
SECTION 233113
METAL DUCTWORK

PART 1 GENERAL

1.01 REFERENCES

A. American Conference of Governmental Industrial Hygienists (ACGIH).
B. National Fire Protection Association (NFPA).
C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.02 SUBMITTALS

A. Shop Drawings:  
   1. Layouts for areas in which it may be necessary to deviate substantially from layout shown on the Drawings. Show major relocation of ductwork and major changes in size of ducts. Minor transitions in ductwork, if required due to job conditions, need not be submitted as long as the duct area is maintained.

B. Product Data: Material, gage, type of joints, sealing materials, and reinforcing for each duct size range, including sketches or SMACNA plate numbers for joints, method of fabrication and reinforcing. Include ACGIH figure numbers for hoods if applicable.

1.03 QUALITY ASSURANCE

A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals, unless otherwise shown or specified:  
   1. HVAC Duct Construction Standards.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sheet Metal:  
   1. Stainless Steel: AISI Types 302, 304 and 316, as specified.
B. Duct Hangers:
1. Strap Hangers: Same material as ducts, except that hangers for stainless steel ducts in unfinished spaces may be galvanized steel.
2. Rod Type Hangers: Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with 2 removable nuts each end for positioning and locking rod in place. Unless stainless steel, galvanized or cadmium plated; shop coat with metal primer.

C. Miscellaneous Fasteners and Upper Hanger Attachments:
1. Sheet Metal Screws, Machine Bolts and Nuts: Same material as duct, unless otherwise specified.
2. Concrete Inserts: Steel or malleable iron, galvanized; continuously slotted or individual inserts conforming with MSS SP-58, Types 18 & 19, Class A-B.
4. Metal Deck Ceiling Bolts: B-Line Systems, Inc.’s Fig. B3019.

D. DUCT LINER: Comply with NFPA 90A or NFPA 90B
1. Materials: ASTM C 534, Type II with closed-cell non-fibers.
   a. Thickness: 1 inch (25 mm).
   b. Thermal Conductivity (k-Value): 0.26 at 75°F mean temperature.
   c. Fire-Hazard Classification: Maximum flame-spread rating of 25 and smoke-developed rating of 50, when tested according to ASTM E 84.
   d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
   e. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
      1). Tensile Strength: Indefinitely sustain a 50-lb- (23-kg-) tensile, dead-load test perpendicular to duct wall.
      2). Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into airstream.
      3). Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.02 FABRICATION - GENERAL

A. Fabricate ductwork from galvanized sheet metal.

B. Dissimilar Metals: Separate dissimilar metals used for ductwork with 12 oz vinyl coated woven fiberglass duct connector fabric, such as Duro Dyne’s Glasseal.
No separation is required between screws or rivets and the materials in which they are inserted.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL
A. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Dimensions may be changed as approved, if cross sectional area is maintained.
B. Provide necessary transformation pieces, and flexible fabric connections for ductwork connected to air handling equipment or air inlet and outlet devices.

3.02 HANGERS FOR DUCTS, UNDER 2 INCHES W.G.
A. Install hangers for ducts as specified in the SMACNA Manual, with the following exceptions:
   1. Rectangular ducts up to 42 inches wide, not having welded or soldered seams, and supported from overhead construction; extend strap hangers down over each side of the duct and turn under bottom of duct a minimum of 2 inches. Secure hanger to duct with 3 full thread sheet metal screws, one in the bottom and 2 in the side of the duct.
   2. Prime coat plain steel rods threaded at the site immediately after installation with metal primer.

3.03 SEALING SEAMS, JOINTS, AND PENETRATIONS
A. Seal ductwork in accordance with the SMACNA Manual except for the following:
   1. Ductwork Specified to be Insulated: Conform with Seal Class A for all pressure classes.

B. Duct Sealants: Water based, non-fibrated: Foster 32-19, Childers CP-146, Duro Dyne SAS.

END OF SECTION
SECTION 233300

DUCTWORK ACCESSORIES

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Metal Ductwork: Section 233113.

1.02 REFERENCES

A. ACGIH: American Conference of Governmental Industrial Hygienists.
D. SMACNA: Sheet Metal and Air Conditioning Contractors National Association, Inc.
E. UL: Underwriters Laboratories, Inc.

1.03 SUBMITTALS

A. Product Data: Catalog sheets, diagrams, standard schematic drawings, and installation instructions for each manufactured product. Submit SMACNA Figure Numbers for each shop fabricated item.
B. Samples: When directed, submit one complete unit for each type of proposed air inlet and outlet device. Approved samples will be delivered to the job site for installation.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Unless otherwise shown or specified, comply with the applicable requirements of the following:
      a. SMACNA: Gages of materials, fabrication, sealing, and installation shall be in accordance with the SMACNA Manuals.
         1) HVAC Duct Construction Standards.
         2) Round Industrial Duct Construction Standard.
         3) Rectangular Industrial Duct Construction Standard.
      c. AMCA: Certify damper and/or louver ratings in accordance with AMCA 511.
1.05 MAINTENANCE

A. Special Tools:
   1. One bar deflection key for every five supply grilles and/or every five return grilles.
   2. One operator key for every five supply registers and/or every 5 return or exhaust registers.
   3. Two keys or socket wrenches for each type of damper adjustment screw or device on manual damper regulators.
   4. One tool for each type and size security fastener.

PART 2 PRODUCTS

2.01 DAMPERS

A. Control Dampers (Galvanized Steel):
   1. Types:
      a. Standard Damper: 40 cfm/sq ft maximum leakage rate at 1500 fpm and 1 inch wg for 48 inch wide damper (based on AMCA 500).
      b. Low Leakage Damper: 3.7 cfm/sq ft maximum leakage rate at 1500 fpm and 1 inch wg for 48 inch wide damper (based on AMCA 500).
   2. Frame: 16 gage galvanized steel hat channel with corner braces, and welded joints.
      a. Frame Size:
         1) Dampers 13 inches high and under: 3-1/2 inch x 3/8 inch top and bottom frames.
         2) Dampers over 13 inches high: 5 inch x 1 inch.
   3. Blades:
      a. Standard Damper: Single skin, 16 gage galvanized steel with longitudinal reinforcing grooves. Single blade dampers are acceptable for ducts up to 14 inches high.
      b. Low Leakage Damper: Single skin, 16 gage galvanized steel with longitudinal reinforcing grooves, and PVC coated polyester blade edge seals mechanically locked into blade edge.
      c. Blade Action:
         1) Modulating Dampers: Opposed blade.
         2) Fully Open/Fully Closed Dampers: Parallel blade.
      d. Single blade dampers are acceptable for ducts up to 14 inches high.
   4. Axles: 1/2 inch plated steel hex positively locked to blade, and connected to frame through extruded hole with molded synthetic sleeve bearings.
   5. Extended Shaft Assembly: Consisting of outboard support bracket, extended shaft rod, extended shaft.
      a. Suitable for 2 inches of insulation.

7. Damper Operation:
   b. Low Leakage Dampers: Electric motor operated. Weld actuator mounting bracket to frame.

8. Linkage:
   a. Single Section Dampers: In-frame fixed type with removable 1/2 inch dia control shaft extending 6 inches from damper frame, and outboard support bearing.
   b. Multiple Section Dampers: On-blade fixed type with factory installed jackshaft.


B. Control Dampers (Aluminum):
1. Types:
   a. Standard Damper: 3.2 cfm/sq ft maximum leakage rate at 2000 fpm and 1 inch wg for 48 inch wide damper (based on AMCA 500).
   b. Low Leakage: 2.7 cfm/sq ft maximum leakage rate at 4000 fpm and 1 inch wg for 48 inch wide damper (based on AMCA 500).

2. Frame: Extruded aluminum hat channel, 1/8 inch thick, and mounting flanges, and welded joints.
   a. Frame Size:
      1) Dampers 12 inches high and under: 5 inches x 1/2 inch top and bottom frames.
      2) Dampers over 12 inches high: 5 inches x 1 inch

3. Blades:
   a. Standard Damper: Constructed of 1/8 inch thick extruded aluminum with replaceable extruded vinyl double edge blade seals mechanically locked into extruded blade slots.
   b. Low Leakage Damper: Airfoil type constructed of 0.71 thick extruded aluminum, with integral reinforcing tube running full length of blade, and replaceable extruded vinyl double edge blade seals mechanically locked into extruded blade slots.
   c. Blade Action:
      1) Modulating Dampers: Opposed blade.
      2) Fully Open/Fully Closed Dampers: Parallel blade.
   d. Single blade dampers are acceptable for ducts up to 14 inches high.

4. Axles: 1/2 inch plated steel hex positively locked to blade and connected to frame through extruded hole with molded synthetic sleeve bearings.

5. Extended shaft Assembly: Consisting of outboard support bracket, extended shaft rod, and extended shaft.
   a. Suitable for 2 inches of insulation.


7. Damper Operation:
b. Low Leakage Dampers: Electric motor operated. Weld actuator mounting bracket to frame.

8. Linkage:
   a. Single Section Dampers: In-frame fixed type with removable 1/2 inch dia control shaft extending 6 inches from damper frame.
   b. Multiple Section Dampers: On-blade fixed type with factory installed jackshaft.


C. Insulated Control Dampers:
1. Frame: 16 gage galvanized steel hat channel, minimum 4 inches wide, with corner braces, and welded joints.
2. Blades: Double skin, 16 gage galvanized steel insulated with one inch thick fiberglass, with vinyl edge seals, and longitudinal reinforcing grooves.
3. Blade Action:
   b. Fresh Air and Make-up Air Control Dampers Interlocked with Exhaust Fans: Parallel blade.
4. Axles: Minimum 7/16 inch plated steel hex positively locked to blade, and connected to frame through extruded hole with molded synthetic sleeve bearings.
5. Extended Shaft Assembly: Consisting of outboard support bracket, extended shaft rod, extended shaft.
   a. Suitable for 2 inches of insulation.
8. Linkage:
   a. Single Section Dampers: In-frame fixed type with removable 1/2 inch dia control shaft extending 6 inches from damper and outboard support bearing.
   b. Multiple Section Dampers: On-blade fixed type with factory installed jackshaft.

2.02 DAMPER ACTUATORS


B. Electric/Electronic Type:
1. Positive positioning, spring return, and sized in accordance with actuator manufacturer’s printed recommendations for each damper size.
2. Actuators for outdoor dampers shall fail closed upon loss of electric power.
3. Actuator Response: Linear in response to sensed load.
4. Voltage: 120 VAC or 24 VAC.
5. Actuator Timing:
   a. Open Damper: 90 seconds.
b. Spring Return: 30 seconds.
c. Spring Close: 30 seconds.

C. Pneumatic Piston Type: Sized in accordance with actuator manufacturer’s printed recommendations for each damper size.
1. Operating Pressure: 3-15 psig.
2. Two-way swivel connection on cylinder.
3. Swivel ball joint and slotted crank arm.

D. Hydraulic, thermodynamic and battery type actuators are not acceptable.

E. Auxiliary End Switches: Required on electric/electronic actuators for the following applications:
1. 100 percent Outside Air Systems: Outside air damper switch delays start of unit until damper is open. Set switch to start unit when damper is 50 percent open.
2. In-line Exhaust Fan Systems (Over 500 cfm): Exhaust damper switch delays start of fan until damper is open.

F. Dampers associated with diesel alternators shall be spring open, power closed.

2.03 TURNING VANE ASSEMBLIES

A. Fabricate vane assemblies of same material as ductwork in which installed.
1. Vanes: Individual hollow airfoil type, rigidly connected to vane rails.
2. Weld, screw, or rivet rails to ductwork.

2.04 FLEXIBLE CONNECTIONS – FABRIC

A. Static Pressures under 6 inches WG: Woven Fiberglass fabric with Hypalon coating; similar to Duro Dyne Corp.’s Durolon.

B. Static Pressures 6 inches and Above: Single ply neoprene reinforced with 14 oz duck fabric; Style 3210 by Uni Rubber Inc., 11 Park Place, New York, NY 10007, (212) 962-0980.
1. Attach fabric to minimum one inch wide 11 gage stiffener, and seal with duct sealant.

C. Direct Fired Heating Equipment with Temperatures up to 500 Degrees F: Woven fiberglass fabric with silicone rubber coating; similar to Duro Dyne Corp.’s Thermofab.

D. Factory prefabricated and pre-assembled connectors of fabric materials specified above are acceptable with minimum 24 gage galvanized steel edges similar to Duro Dyne Corp.’s Metal-Fab or Super Metal-Fab as required by free fabric length.

2.05 GASKET MATERIAL
A. Registers, Grilles, and Diffusers Installed in Exposed, Uninsulated Ductwork: 1/4 inch thick felt or sponge rubber material, of width as required by flange.

B. Flanged Joints in Ducts: 1/8 inch thick reinforced inert plastic of the self-conforming type, of same width as flange.
   1. Exception: Where flanged connections in cooking equipment exhaust ductwork is allowed by NFPA 96, make up joints with Fibrefrax Grade 110 Paper by Carborundum Co.

2.06 SEALANTS


B. U.L. Listed adhesives (liquid or mastic), scrim, tapes, or combinations thereof, as required for pressure class; suitable for system operating temperatures; compatible with media conveyed within, insulation (if any), and ambient conditions.

2.07 DUCT ACCESS DOORS

A. Prefabricated or Fabricated at Site: Minimum 12 x 12 inch size, of same material and finish as duct unless otherwise shown or specified.
   1. For uninsulated duct designed for under two inches wg: Fabricate single panel door of same gage as duct, with all edges folded, size door to overlap opening perimeter by one inch.
   2. For insulated duct and duct designed for two inches wg and over: Fabricate hollow metal doors in accordance with the SMACNA Manual. Fill void in doors for insulated duct with thermally equivalent insulation.
      a. Exception: Where access doors are required by NFPA 96 in cooking equipment exhaust ductwork, gasket with Fibrefrax Grade 110 paper by Carborundum Co.

B. Access Door Hardware:
   1. Piano Hinges: Galvanized steel with brass pins, continuous type, full height of door.
   2. Butt Hinges: Galvanized steel with brass pins, approximately 2 inches x 1-9/16 inches wide for doors under 24 inches high and 3 inches x 2 inches wide for doors over 24 inches and higher.
   3. Sash Locks: Galvanized, cadmium plated, or aluminized steel or cast aluminum.

2.08 FASTENERS

A. Security Fasteners: Torx head with center pin.
PART 3  EXECUTION

3.01  INSTALLATION - GENERAL

A. Unless otherwise shown or specified, install the Work of this Section in accordance with the manufacturer’s printed installation instructions and the SMACNA Manual.

3.02  FLEXIBLE FABRIC CONNECTORS (INSTALLATION)

A. Make ductwork connections to air handling equipment with flexible fabric connectors. Install connectors with sufficient slack to prevent vibration transmission.

B. Free Fabric Length: Install fabric connectors a minimum of three inches in length for ducts having a maximum diameter of 18 inches, or maximum side dimension of 30 inches, and a minimum of five inches in length for duct diameters over 18 inches or side dimensions over 30 inches.

C. Secure fabric connectors to fans, casings and ducts as follows:
   1. Round Connectors: Secure with No. 12 USS gage x 1 inch wide galvanized steel draw bands. Secure bands with bolts and nuts.
   2. Rectangular Connectors: Secure with 1 inch x 1/8 inch thick flat galvanized steel bars, with screws or bolts on maximum 8 inch centers, or with approved sheet metal slip joints. Tightly crimp fabric into sheet metal joint and secure complete joint with sheet metal screws on maximum 6 inch centers.

D. Fabric connectors may be factory pre-fabricated pre-assembled units, with minimum No. 24 USS gage metal edges, secured to fabric with double lock seams.

E. Do not paint fabric connectors.

3.03  ACCESS DOORS

A. Install gasketed access doors in ductwork at each of the following:
   1. Major changes of direction in horizontal ducts connected to cooking equipment hoods.
   2. Motor operated dampers.
   4. Fire dampers.
   5. Combination fire/smoke dampers.
   6. All locations where operating parts of any kind are installed and elsewhere as indicated.
   7. In-line damper actuators installed in air stream.
B. Access doors are not required, where a manually operated damper has an exposed damper regulator, with an indicating quadrant.

3.04 CONCEALED DAMPER REGULATORS

A. Imbed box in, and secure to back-up construction in ceiling or wall, so cover plate is flush with final surface.

END OF SECTION
SECTION 234100
AIR FILTERS

PART 1   GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE
A. Air Handling Units: Section 237313.

1.02 REFERENCES
B. UL 900 - Test Performance of Air Filter Units.
C. ASHRAE 52.2 - Method of Testing Air Cleaning Devices used in General Ventilation for Removing Particulate Matter.
D. IEST: Institute of Environmental Science & Technology, Recommended Practice, IEST-RP-CC001.4, Testing HEPA/ULPA Filters.

1.03 DEFINITIONS
A. MERV: Minimum Efficiency Reporting Value.

1.04 SUBMITTALS
A. Product Data: Catalog sheets and specifications for each type filter.

1.05 QUALITY ASSURANCE
A. Regulatory Requirements: Supply air filters that conform to UL900.

1.06 MAINTENANCE
A. Extra Materials: One spare set of air filters for each air handling unit utilizing air filters. Deliver spare filters to the Director’s Representative in the manufacturer’s original boxes, labeled as to filter usage.

PART 2   PRODUCTS

2.01 AIR FILTER TYPES
A. Pleated Air Filters: UL 900, extended surface medium efficiency air filter having a MERV of 7 or higher when tested in accordance with ASHRAE Standard 52.2.  
   1. Maximum Initial Pressure Drop:
2. Construction
   a. Filter Media: Non-woven blend of cotton and synthetic fibers bonded on the air exiting side to welded wire support grid formed to maintain pleat configuration.
   b. The wire grid support treated for corrosion resistance.
   c. Enclosing Frame: Constructed of high wet-strength moisture resistant beverage board or chipboard, with diagonal support members bonded the apex of each pleat on the air entering and air exiting sides of filter pack.
   d. Filter pack bonded to enclosing frame around the entire periphery of the frame.
3. Acceptable Filters
   b. American 300X.
   c. Camfil Farr 30/30.
   d. Flanders/Precisionaire Pre-Pleat HV.
   e. Glasfloss Z-Line HV.
   f. Purolator Mark 80.

B. HEPA Filters: UL 586.
   1. The filter shall have a tested efficiency of (99.97% on 0.3 micron when evaluated according to IEST Recommended Practice.
      a. Maximum Initial Resistance to Airflow: 1.0” wg at rated capacity.
   2. The filter shall be capable of withstanding 10” wg without failure of the media pack.
   4. The filter shall be labeled as to tested efficiency, rated/tested cfm, pressure drop and shall be serialized for identification.
   5. Construction:
      a. Filter Pack: Filter media shall be one continuous pleating of micro glass fiber media.
      b. Media Separators: Pleats shall be uniformly separated by tapered corrugated aluminum separators incorporating a hemmed edge to prevent damage to the filter media.
      c. Filter Pack Sealant: The media pack shall be potted into the enclosing frame with a fire-retardant urethane sealant.
      d. Enclosing Frame: 16-gauge steel, with a zinc-aluminum alloy finish, and shall be bonded to the media pack to form a rugged and durable enclosure.
      e. The filter shall be assembled without the use of fasteners to ensure no frame penetrations.
         1) Overall dimensional tolerance shall be correct within - 1/8” ± 0”, and square within 1/8”.
f. A sealing gasket shall be included on the downstream side of the filter enclosing frame to form a positive seal upon installation (50% gasket compression).

6. Acceptable Filters:
   a. Airguard Microguard 99.
   b. American Air Filter AstroCel 1.
   c. Camfil Farr XS Absolute.
   d. Flanders/Precisionaire Alpha Cell.
   e. Glasfloss Magna Series 1000.
   f. Purolator Ultra-Cell.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this section in accordance with the manufacturer’s printed installation instructions, unless otherwise specified.

B. Filter Application Schedule: Install set of filters in each air-handling unit listed below:

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>FILTER TYPE</th>
<th>FILTER THICKNESS/DEPTH (inches)</th>
<th>UL STD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-Stage Filtration: Factory packaged air conditioners, heating and ventilating units, filter banks, and filter housings.</td>
<td>Pleated 2</td>
<td></td>
<td>UL900</td>
</tr>
<tr>
<td></td>
<td>HEPA 12</td>
<td></td>
<td>UL586</td>
</tr>
<tr>
<td>Three-Stage Filtration: Factory packaged air conditioners, heating and ventilating units, filter banks, and filter housings.</td>
<td>Pleated 2</td>
<td></td>
<td>UL900</td>
</tr>
<tr>
<td></td>
<td>Rigid 6 or 12</td>
<td></td>
<td>UL 900</td>
</tr>
<tr>
<td></td>
<td>or V-Bank 12</td>
<td></td>
<td>UL 900</td>
</tr>
<tr>
<td></td>
<td>HEPA 12</td>
<td></td>
<td>UL586</td>
</tr>
</tbody>
</table>

END OF SECTION
SECTION 237313
AIR HANDLING UNITS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Vibration Isolation: Section 230550.
B. Air Filters: Section 234100.
C. Motors and Motor Controllers: Section 260221.

1.02 PERFORMANCE REQUIREMENTS

A. Design air handling unit and supports to withstand all seismic loads. Refer to seismic loading criteria on the Contract Drawings.
B. Seismic Performance: Design and install air handling units to assure continued performance of their intended function when subjected to the specified seismic forces.
C. Seismic Performance: Design and install air handling units to assure that they remain in place with no separation of any parts when subjected to the specified seismic forces.

1.03 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.
B. Product Data:
   1. Catalog sheets, brochures, performance charts, standard schematic drawings, specifications and installation instructions for each air handling unit.
C. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative.

1.04 QUALITY ASSURANCE

A. Source Quality Control: Factory test units in accordance with ARI Standard 430 - Central-Station Air-Handling Units.

PART 2 PRODUCTS
2.01 AIR HANDLING UNITS

A. General Design: Sectional constructed unit which is structurally self supporting, gasketing between adjoining sections, sections consisting of:
   1. Fan section.
   2. Coil section(s).
   3. Filter section.
   4. Base Rail.
   5. Accessory sections as indicated on drawings.

B. Casing:
   1. Gage:
      b. Double Wall Interior:
         1) Solid: Minimum No. 22 USS sheet steel.
   2. Accessibility:
      a. Removable panels and insulated double wall inspection doors to all internal parts.
      b. Inspection Doors:
         1) Exterior: Minimum No. 22 USS sheet steel.
         2) Interior: Minimum No. 22 USS sheet steel.
         3) Minimum 1 inch thick unexposed insulation.
         4) Continuously gasketed perimeter.
         5) Stainless or chrome plated steel hinges.
         6) Two latching handles.
      c. Sections shall maintain structural integrity upon removal of panels.
   3. Unit Insulation:
      a. Double Wall: Minimum 2 inch thick insulation material.
      b. Insulation minimum 1-1/2 pound density.
      c. No insulation edges exposed.
      d. Materials: Comply with requirements of NFPA Bulletin 90A.

C. Fan Section:
   1. Fan: Double width, double inlet, multi-blade centrifugal type, designed for low operating speeds. Fan to be of ECM type, direct drive, statically and dynamically balanced. Fan shall bear AMCA Seal indicating that fan complies with AMCA 211, Certified Rating Program – Air Performance, and AMCA 311.
   4. Motor: Mounted internally or externally.
      a. Adjustable motor base.
      b. Adjustable sheave V-belt drive.
      c. Belt Guard (For external only).
      d. See Section 260221 - MOTOR AND MOTOR CONTROLLERS.
   5. Vibration Isolation:
b. Externally Mounted Motor: See Section 230550 - VIBRATION ISOLATION.
c. Flexible connection between fan and casing.
6. Control Signal: 0-10V.

D. Coil Section:
1. Seamless copper or red brass tubing, leak tested at minimum 200 psig air pressure under water.
2. Aluminum flat plate fins with formed collar permanently bonded to tubing by means of mechanical expansion.
3. Coil header(s) of cast iron, copper or steel.
4. Built in pitch between headers, or pitch coils to permit drainage. Extend drainage connections to exterior of unit casing.
5. Gasketing or saiming to prevent air by-pass or infiltration between coil channels, finned surfaces, and casing.
6. Steam coils non-freeze double tube type.
7. Easy top of side removal of coil(s) without disassembly of adjacent coil(s) or coil section.
8. Staggered coils are not acceptable.
9. Direct expansion coil to be provided with Thermostatic Expansion valves.
10. Rated in accordance to ARI 410.

E. Condensate Drain Pan:
1. Insulated double wall galvanized steel construction.
2. Sloped to drain connection.
3. Inspection door to allow for cleaning.
4. Separate drain pans for each tier of cooling coils.

F. Filter Section:
1. Easy filter removal and replacement.
2. Flat, V or Z pattern arrangement.
3. Filter Type:
   a. 2 inch pleated Merv 8.
4. See Section 234100 - AIR FILTERS.

G. Factory Finish:
1. All Exposed Surfaces: Factory applied baked enamel, or galvanized finish in accordance with ASTM A 653, coating designation G90.

H. Base Rail: Factory installed by manufacturer.
1. Minimum 6 inch height (to elevate condensate drain).
2. Galvanized steel.
3. Structurally capable of supporting unit on floor or by ceiling suspension.

I. Electrical:
1. V/Ph/HZ: per schedule.
2. Single power energy with main disconnect switch.
PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer’s printed instructions.

END OF SECTION
SECTION 238126

DUCTLESS SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for recessed ceiling or surface wall mounting.

1.2 SUBMITTALS

A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Diagram power, signal, and control wiring, dimensional drawings, weights, and accessories.

C. Field quality-control test reports.

D. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

E. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."


1.4 COORDINATION

A. Coordinate size, location, and connection details with roof supports, equipment supports, and roof penetrations.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Carrier Air Conditioning; Div. of Carrier Corporation.
   2. Mitsubishi Electronics America, Inc.; HVAC Division.
   3. LG Electronics; HVAC

2.2 CEILING RECESSED EVAPORATOR-FAN COMPONENTS

A. Chassis: High-strength molded plastic, removable panels for servicing.
   1. Drain Pans: Polycarbonate plastic, with connection for drain; insulated.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Fan: Direct drive centrifugal; double inlet, forward curve.
   1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

D. Permanent, Cleanable Filters: 1/2 inch (25 mm) thick plastic screen.

E. Wiring Terminations: Connect motor to chassis wiring with plug connection.

F. Condensate Pump: Integral with unit.

G. Unit to provide cooling and heating.

2.3 WALL SURFACE EVAPORATOR-FAN COMPONENTS

A. Chassis: High-strength molded plastic, removable panels for servicing.
   1. Drain Pans: Polycarbonate plastic, with connection for drain; insulated.

B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

C. Fan: Direct drive centrifugal; double inlet, forward curve.
   1. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

D. Permanent, Cleanable Filters: 1/2 inch (25 mm) thick plastic screen.

E. Wiring Terminations: Connect motor to chassis wiring with plug connection.

F. Condensate Pump: Integral with unit.
2.4 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS

A. Casing: Galvanized steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
   1. Compressor Type: Scroll.
   2. Inverter controlled compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
   3. Refrigerant: R-410A.

C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.

D. Fan: Polycarbonate plastic-propeller type, directly connected to motor.

E. Motor: Permanently lubricated, with integral thermal-overload protection.

2.5 ACCESSORIES

A. Low ambient operation control: Provide winter start, wind baffles as recommended by manufacturer, liquid line solenoid valve, isolation relay.

B. Roof equipment rails (for condensing unit) 18 gauge galvanized steel; fully welded construction, internally reinforced with integral base plate and factory installed 2 by 4 wood nailer; fully mitered and welded corners; provide 3” cant beginning minimum of 1-1/2” above base plate of assembly and as required to match thickness of deck insulation; base plate pitch so as to maintain flat top; 20 gauge counterflashing. 18” high.

C. Pipe penetration roof curbs, 18 gauge galvanized steel roof curbs with integral base plate, continuously welded corners for piping and conduit. Self-flashing without a cant strip, with mounting flange. Piping covers shall feature ABS thermoplastic UV and ozone resistant acrylic cover, graduated boots molded of weather-resistant, UV and ozone resistant rubber and (2) stainless steel pipe clamps per boot. 18” high.

D. Controls: Hard wired, 12 volt DC functioning to remotely control compressor and evaporator fan, with the following features:
   1. Compressor time delay.
   2. 24-hour time control of system stop and start.
   3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
   4. Fan-speed selection, including auto setting.
   5. For Walkway units provide locking wall mounted steel thermostat guard.
   6. Automatic-reset timer to prevent rapid cycling of compressor

E. Fresh Air Intake Kits: Accessory collars and baffles to permit introduction of fresh air into unit housing.

F. Control adapter to allow unit to enable/disable through the Building Automation System.
PART 3 - EXECUTION

3.1 INSTALLATION
A. Install units level and plumb.
B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
C. Install roof-mounting compressor-condenser components on equipment supports. Anchor units to supports with removable, cadmium-plated fasteners.
D. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.
E. Connect condensate drain tubing from integral condensate pump discharge to termination point indicated.

3.2 CONNECTIONS
A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
B. Install piping adjacent to unit to allow service and maintenance.

3.3 FIELD QUALITY CONTROL
A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including connections. Report results in writing.
B. Perform the following field tests and inspections and prepare test reports:
   1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
   2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
   3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
C. Remove and replace malfunctioning units and retest as specified above.

3.4 STARTUP SERVICE
A. Engage a factory-authorized service representative to perform startup service.
   1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION
A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION
SECTION 238127

AIR COOLED CONDENSING UNITS

PART 1   GENERAL

1.01   SUBMITTALS

A. Product Data: Manufacturer’s catalog sheets, brochures, performance charts, test data, standard schematic drawings, specifications and installation instructions for each type unit.

B. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative.

1.02   QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Unit shall be rated in accordance with AHRI Standard 360.
   2. Unit construction shall comply with ANSI/ASHRAE 15 safety code latest revision and comply with NEC.
   3. Unit shall be constructed in accordance with UL 1995 standard and shall carry the UL label.
   4. Air-cooled condenser coils shall be leak tested at 150 psig, and pressure tested at 650 psig.

1.03   MAINTENANCE

A. Maintenance Service: A full equipped authorized service organization capable of guaranteeing response within 8 hours to service calls shall be available 24 hours a day, 7 days a week to service the completed Work.

PART 2   PRODUCTS

2.01   EQUIPMENT

A. General: Outdoor-mounted, air-cooled condensing unit. Unit shall consist of a hermetic scroll air-conditioning compressor(s) assembly, an air-cooled coil, propeller-type condenser fans, and a control box. Unit shall discharge supply air upward as shown on contract drawings. Unit shall be used in a refrigeration circuit matched with a packaged air-handling unit.

B. Unit Cabinet:
   1. Unit cabinet shall be constructed of galvanized steel, bonderized and coated with a prepainted baked enamel finish.
   2. A heavy-gauge roll-formed perimeter base rail with forklift slots and lifting holes shall be provided to facilitate rigging.

C. Condenser Fans:
1. Condenser fans shall be direct driven, propeller type, discharging air vertically upward.
2. Fan blades shall be balanced.
3. Condenser fan discharge openings shall be equipped with PVC-coated steel wire safety guards.
4. Condenser fan and motor shaft shall be corrosion resistant.

D. Compressor: Compressor shall be of the hermetic scroll type mounted on rubber grommets, with overload protection, crankcase heater and internal high pressure and high temperature protection.
   1. Units 15 ton and above shall use two scroll compressors manifold together; below 15 tons one refrigerant circuit with one 2-stage compressor.

E. Condenser Coils:
   1. Standard Aluminum fin - Copper Tube Coils:
      a. Standard condenser coils shall have aluminum lanced plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
      b. Condenser coils shall be leak tested to 150 psig, pressure tested to 650 psig, and qualified to UL 1995 burst test at 1980 psig.

F. Refrigeration Components
   1. Refrigeration circuit components shall include liquid line service valve, suction line service valve, a full charge of compressor oil, and a partial holding charge of refrigerant.

G. Controls and Safeties:
   1. Minimum control functions shall include:
      a. Control wire terminal blocks.
      b. Compressor lockout on auto-reset safety until reset from thermostat.
      c. Each unit shall utilize a diagnostic board that provides:
         1) System Pressure Trip fault code indication
         2) Short Cycling fault code indication
         3) Locked Rotor fault code indication
         4) Open Circuit fault code indication
         5) Reverse Phase 3 fault code indication
         6) Welded Contactor fault code indication
         7) Low Voltage fault code indication
         8) Anti-short cycle protection
         9) Phase reversal protection
   2. Minimum safety devices which are equipped with automatic reset (after resetting first at thermostat), shall include:
      a. High discharge pressure cutout.
      b. Low pressure cutout.
H. Electrical:
1. Single point power connection.
2. 24V control transformer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install air cooled condensing units in accordance with the manufacturer’s printed installation instructions. Provide concrete pad to contain each building’s air cooled condensing units.

B. Route refrigerant piping maintaining required unit access.

C. Charge systems with refrigerant and oil, and test for leaks. Repair leaks and replace lost refrigerant and oil.

3.02 FIELD QUALITY CONTROL

A. Preliminary Requirements: Provide the services of a Company Field Advisor for the following:
1. Inspect air conditioning system installations prior to start-up.
2. Supervise initial start-up of equipment.
3. Instruction of State Personnel.
4. Service.

B. Air Cooled Condensing Unit System Pre-Start-Up and Start-Up:
1. Upon completion of the air cooled condensing unit system installations, the Company Field Advisor shall visit the site, inspect the installations and notify the Director’s Representative of any Work which must be done or modified prior to start-up.
2. Upon completion of required Work, or modifications to installed Work and miscellaneous testing, all as required by the particular air conditioning system or apparatus, the Company Field Advisor shall supervise the air cooled condensing unit system start-up.
3. Start-up the system and conduct a preliminary test, for the purpose of checking the general operation of the air cooled condensing unit system, proving mechanical and electrical controls and making necessary adjustments.
4. Provide pre-start-up check list, start-up list and operating instructions for the air cooled condensing unit system, and deliver to the Director’s Representative.

C. Instruction of State Personnel: The manufacturer’s representative shall instruct authorized State Personnel in the operation and maintenance of the air cooled condensing unit system equipment and all accessories. Provide a minimum of 8 hours for instruction purposes, exclusive of all pre-start-up, start-up and service call time.

END OF SECTION
SECTION 238216

COILS

PART 1  GENERAL

1.01  SUBMITTALS

A. Product Data: Submit manufacturer’s catalog sheets, performance charts, test data, standard schematic drawings, specifications and installation instructions for each coil.

1.02  QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:
1. Heating coils shall meet the applicable fabrication and testing requirements of the Safety Code for Mechanical Refrigeration ASHRAE 15. Ratings of coils, with the exception of the direct expansion refrigerant type, shall be in accordance with ARI Standard 410, “Forced Circulation Air Cooling and Air Heating Coils”.

PART 2  PRODUCT

2.01  DUCT MOUNTED COILS

A. Fabricate duct mounted coils of seamless copper with aluminum fins with formed collars permanently bonded to the tubes by mechanical expansion of the tubes, or equivalent method. Coil extensions shall pass through ends of casing and shall be air and water tight. Design coils for use with water for a minimum working pressure of 200 psig WSP, 200 psig OWG and factory test at 250 psig air under water.

PART 3  EXECUTION

3.01  APPLICATION

A. Install duct mounted coils as scheduled, plumb, level and secured to ductwork, in accordance with the manufacturer’s instructions.

END OF SECTION
SECTION 238223
UNIT VENTILATORS

PART 1   GENERAL

1.01   PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Outside air intake box and louver.

1.02   RELATED WORK SPECIFIED ELSEWHERE

A. Air Filters: Section 234100.

B. Wiring for Motors and Controllers: Section 260523.

C. Motors and Motor Controllers: Section 260221.

1.03   SUBMITTALS

A. Product Data: Catalog sheets, specifications, and installation instructions for each unit ventilator.

B. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative.

1.04   MAINTENANCE

A. Extra Material: Furnish 2 spare sets of filters for each unit ventilator. Box and label spare filters. Store at the site where directed.

PART 2   PRODUCTS

2.01   MATERIALS

A. Galvanized Sheet Steel: Zinc coated carbon steel, commercial quality, ASTM A 653, coating designation G90.

B. Cold Rolled Steel: Carbon steel, commercial quality - ASTM A 366. Degrease, clean and phosphatize sheet steel in the factory of the unit manufacturer or use mill phosphatized.

2.02   UNIT VENTILATORS
A. General: Provide combination heating-cooling-ventilating units complete with an outlet air intake box. Furnish units complete with return and outlet air grilles, dampers and required duct connections.

B. Unit Casing: Fabricate casing from No. 14 gage sheet steel, formed, reinforced and braced for rigidity, with removable ends and front panel to allow access for installation and servicing. Provide fixed discharge air grilles integral with the casing and removable air grilles for access to filters. In addition, provide openings in the bottom and knockouts where required for piping and electrical connections. Provide security type heads (Allen head wrench type or equivalent as approved) on all exposed cabinet fasteners and leveling legs under both ends of the unit.

C. Fan Assembly:
   1. Fan Board Assembly: Provide assembly of the blow through design, complete with multiple centrifugal fans with steel or non-ferrous wheels and acoustically treated fan scrolls, mounted on a solid steel shaft supported on lubricated type bearing assemblies, Vee belt connected to an electric motor located outside the air stream. Mount fan and shaft assembly on a formed No. 12 gage sheet steel fan board. Provide isolation devices between fan board and unit casing.
   2. Electric Motor: Provide constant speed capacitor type motor with built-in thermal overload protection. Provide isolation devices between motor and support.

D. Coil: Provide heating coil and dx cooling coil of the plate fin type, designed for a working pressure of 200 psig and a 300 psig air pressure test underwater. Pitch coils to insure proper drainage of condensate from coil surface to drain pan. Provide minimum No. 18 gage galvanized steel drain pans, insulated on the inside surfaces with a corrosion resistant material and pitched for complete drainage to a drain opening. Provide an auxiliary drain pan under valving.

E. Filter Section: Provide a built-in filter frame installed in front of unit, allowing easy removal of disposable type filters without removal of front panel.

F. Dampers: Provide factory installed dual blade mixing dampers, with a continuous divider plate between the blades, to positively separate the fresh air compartment from the return air. In addition, provide tight sealing by-pass dampers.

G. Outside Air Intake Box: Furnish each unit complete with a louvered fresh air intake box, unless otherwise indicated. Fabricate from sheet steel, formed, reinforced and braced for rigidity, complete with a built-in birdscreen. Provide steel boxes with a factory applied baked enamel finish, of color as directed.

H. Factory Finish: Furnish all exposed surfaces of units with a factory applied two coat baked enamel finish, unless otherwise indicated. Select colors from the unit manufacturer’s standard color charts.
I. Accessories: Provide accessories as noted on the drawings, the products of the same manufacturer as the ventilators. Furnish accessories fabricated of the same materials and with a finish to match the ventilators.

PART 3  EXECUTION

3.01  INSTALLATION

A. Floor Mounted Units: Install, level and align units as required by the particular installation.

B. Ceiling Mounted Units: Support from overhead construction by means of approved hangers, in number and size as recommended by the manufacturer.

C. Air Intake Box: Deliver wall boxes to others for installation. Coordinate with installer in locating and sizing all openings. Provide complete detailed dimensional data to installer.

D. Accessories: Install accessories of type, quantity and in location indicated on drawing.

3.02  CONTROL

A. Thermostatic.

END OF SECTION
PART 1    GENERAL

1.0    SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Submittals Package: Submit the product data and the shop drawings specified below all at the same time as a package.

C. Product Data: Catalog sheets, specifications, and installation instructions.

D. Shop Drawings: Show switches, controls, motors, and other electrical components. Include wiring diagrams of the complete system as proposed to be installed (standard diagrams will not be acceptable).

E. Contract Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative. Include:
      a. Operation and maintenance data for each product.
      b. Complete point to point wiring diagrams of entire system as installed. Number all conductors and show all terminations. (Numbers shall correspond to numbered tags installed on each conductor.)

PART 2    PRODUCTS

2.01    RACEWAYS, FITTINGS AND ACCESSORIES

A. Rigid Ferrous Metal Conduit: Steel, hot dipped galvanized on the outside and inside, UL categorized as Rigid Ferrous Metal Conduit (identified on UL Listing Mark as Rigid Metal Conduit - Steel or Rigid Steel Conduit), by Allied Tube & Conduit Corp., LTV Copperweld, or Wheatland Tube Co.

B. Flexible Metal Conduit: Galvanized steel strip shaped into interlocking convolutions, UL categorized as Flexible Metal Conduit (identified on UL Listing Mark as Flexible Steel Conduit or Flexible Steel Conduit Type RW), by AFC Cable Systems Inc., Anamet Electrical Inc., Electri-Flex Co., or International Metal Hose Co.

C. Liquid-tight Flexible Metal Conduit: UL categorized as liquid-tight flexible metal conduit (identified on UL Listing Mark as Liquid-Tight Flexible Metal Conduit, also specifically marked with temperature and environment application
D. Insulated Bushings: Threaded, malleable iron/zinc electroplate with 105 degrees C (minimum) plastic insulated throat; Appleton Electric Co.’s BU50I Series, Cooper/Crouse-Hinds’ 1031 Series, OZ/Gedney Co.’s IBC-50 Series, Raco Inc.’s 1132 Series, Steel City/T & B Corp.’s BI-901 Series, or Thomas & Betts Corp.’s 1222 Series.

E. Plastic Bushings for 1/2 and 3/4 Inch Conduit: 105 degrees C minimum temperature rating; Appleton Electric Co.’s BBU50, BBU75, Blackburn (T & B Corp.’s) 50 BB, 75 BB, Cooper/Crouse-Hinds’ 931,932, or OZ/Gedney Co.’s IB-50, IB-75, Raco Inc.’s 1402, 1403, Steel City/T & B Corp.’s BU-501, BU-502, or Thomas & Betts Corp.’s 222, 223.

F. Connectors and Couplings:
   1. Locknuts: UL, steel/zinc electroplate; Appleton Electric Co.’s BL-50 Series, Cooper/Crouse-Hinds’ 11 Series, OZ/Gedney Co.’s 1-50S Series, Raco Inc.’s 1002 Series, Steel City/T&B Corp.’s LN-101 Series, or Thomas & Betts Corp.’s 141 Series.
   2. Couplings (For Rigid Metal Conduit): Standard galvanized threaded couplings furnished by conduit manufacturer, or Allied Tube & Conduit Corp.’s Kwik-Couple.
   3. Flexible Metal Conduit Connectors: Arlington Industries Inc.’s Saddle-Grip, OZ/Gedney Co.’s C-8T, 24-34T, ACV-50T Series, or Thomas & Betts Corp.’s Nylon Insulated Tite-Bite Series.
   4. Liquid-tight Flexible Metal Conduit Connectors:
      a. Dry Locations: Steel, malleable iron, zinc electroplate, insulated throat; Appleton Electric Co.’s STB Series, Cooper/Crouse-Hinds’ LTB Series, OZ/Gedney Co.’s 4Q-50T Series, Raco Inc.’s 3512 Series, Steel City/T & B Corp.’s LT-701 Series, or Thomas & Betts Corp.’s 5332 Series.
      b. Wet Locations: OZ/Gedney Co.’s 4Q-TG Series (hot-dip/mechanically galvanized), or Thomas & Betts Corp.’s 3322 Series (PVC coated).

G. Conduit Bodies (Threaded): Malleable iron or cast iron alloy bodies and covers with hot dipped galvanized or other specified corrosion resistant finish; Cooper/Crouse-Hinds’ Condulets (Corro-free epoxy powder coat), or OZ/Gedney Co.’s Conduit Bodies (hot dipped galvanized). Stainless steel cover screws, covers gasketed to suit application.

H. Expansion Fittings: Cooper/Crouse-Hinds XJG (Corro-free epoxy powder coat), or OZ Gedney Co.’s AX, EXE (end type), hot dipped galvanized.

2.02 OUTLET, JUNCTION AND PULL BOXES

A. Galvanized Steel Boxes For Concealed Work: Standard type galvanized steel boxes and covers by Appleton Electric Co., Raco/Div. of Hubbell, or Steel City/T&B Corp.
B. Galvanized Steel Junction and Pull Boxes For Exposed Work: Code gage, galvanized steel screw cover boxes by Hoffman Enclosures Inc., Hubbell/Wiegmann, or Rittal/Electromate.

C. Threaded Type Boxes for Exposed Work:
   1. Outlet Boxes:
      a. For Dry, Damp Locations: Zinc electroplate malleable iron or cast iron alloy boxes by Appleton Electric Co., Cooper/Crouse-Hinds Co., or OZ/Gedney Co., with zinc electroplate steel covers to suit application.
      b. For Wet Locations: Malleable iron or cast iron alloy boxes with hot dipped galvanized or other specified corrosion resistant finish as produced by Cooper/Crouse-Hinds (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws, and malleable iron covers gasketed to suit application.
   2. Junction And Pull Boxes:
      a. For Dry, Damp Locations: Zinc electroplate cast iron boxes by Appleton Electric Co., Cooper/Crouse-Hinds, or OZ/Gedney Co., with zinc electroplate steel or cast iron cover.
      b. For Wet Locations: Cast iron boxes by Cooper/Crouse-Hinds’ (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws and cast iron cover gasketed to suit application.
   3. Conduit Bodies, Threaded (Provided with a Volume Marking):
      a. For Dry, Damp Location: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.’s Unilets, Cooper/Crouse-Hinds’ Condulets, or OZ/Gedney Co.’s Conduit Bodies.
      b. For Wet Locations: Malleable iron or cast iron alloy bodies with hot dipped galvanized or other specified corrosion resistant finish; Cooper/Crouse-Hinds’ Condulets (hot dipped galvanized or Corro-free epoxy power coat), or OZ/Gedney Co.’s Conduit Bodies (hot dipped galvanized) with stainless steel cover screws and malleable iron covers gasketed to suit application.

D. Specific Purpose Outlet Boxes: As fabricated by equipment manufacturers for mounting their equipment thereon.

2.03 CONDUCTORS (600 VOLTS AND UNDER) AND ACCESSORIES

A. Date of Manufacture: No insulated conductor over one year old when delivered to the site will be acceptable.


C. Conductors: Annealed uncoated copper or annealed coated copper in conformance with the applicable standards for the type of insulation to be applied on the conductor.
D. Types:

1. Power Wiring:
   a. General: Rated 600V, NEC Type FEP, RHH, RHW, RHW-2, THHN, THW, THW-2, THWN, THWN-2, XHH, XHHW, XHHW-2.

2. Class 1 Wiring:
   a. No. 18 and No. 16 AWG: Insulated copper conductors suitable for 600 volts, N.E.C. types KF-2, KFF-2, PAFF, PF, PFF, PGF, PGFF, PTFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF.
   b. Larger than No. 16 AWG: Insulated copper conductors suitable for 600 volts, in compliance with N.E.C. Article 310.
   c. Conductor with other types and thickness of insulation may be used if listed for Class 1 circuit use.

3. Class 2 Wiring:
   b. Other types of cables may be used in accordance with N.E.C. Table 725-61 “Cable Uses and Permitted Substitutions”, as approved.

4. Class 3 Wiring:
   a. Single Conductors No. 18 and No. 16 AWG: Same as Class 1 No. 18 and No. 16 AWG conductors, except that:
      1) Conductors are also listed as CL3.
      2) Voltage rating not marked on cable except where cable has multiple listings and voltage marking is required for one or more of the listings.
   c. Other types of cables may be used in accordance with N.E.C. Table 725-61 “Cable Uses and Permitted Substitutions”, as approved.

E. Terminal Blocks and Connectors:

1. Terminal Blocks: Barrier type double screw terminals rated 300 V minimum, meeting UL94 requirements for materials Classed 94V-0.
2. Connectors: Plug and socket style, meeting UL94 requirements for materials classed 94V-0.


G. Insulation Tapes:

1. Plastic Tape: Electrical Products Div./3M’s Scotch 88, Plymouth Rubber Co.’s Plymouth/Bishop Premium 85CW.
2. Rubber Tape: Electrical Products Div./3M’s Scotch 23, or Plymouth Rubber Co.’s Plymouth/Bishop W963 Plysafe.

H. Cable Clamps and Clips, Cable Ties, Spiral Wraps, etc.: Wire management products by Catamount/T&B Corp., or Ideal Industries Inc.
2.04 SUPPORTING DEVICES

A. Channel Support System:
   1. Channel Material: 12 gage steel.
   2. Finish: Hot dipped galvanized.
   3. Fittings: Same material and finish as channel.
   4. UL Listed Systems:
      a. B-Line Systems Inc.’s B-22 (1-5/8 x 1-5/8 inches), B-12 (1-5/8 x 2-7/16 inches), B-11 (1-5/8 x 3-1/4 inches).
      b. Kindorf/T&B Corp.’s B-900 (1-1/2 x 1-1/2 inches), B-901 (1-1/2 x 1-7/8 inches), B-902 (1-1/2 x 3 inches).
      c. Unistrut Corp.’s P-3000 (1-3/8 x 1-5/8 inches), P-5500 (1-5/8 x 2-7/16 inches), P-5000 (1-5/8 x 3-1/4 inches).
      d. Versabar Corp.’s VA-1 (1-5/8 x 1-5/8 inches), VA-3 (1-5/8 x 2-1/2 inches).

B. Fastening Fittings for Existing Masonry: Kindorf/T&B Corp.’s E-243, E-244, E-245, or E-170, or Versabar Corp.’s VX-4310, VX-2308, VX-4308, or VX-4309.

C. Pipe Straps: Two-hole steel conduit straps; Kindorf/T&B Corp.’s, C-144 Series.

D. Pipe Clamps: One-hole malleable iron clamps; Kindorf/T&B Corp.’s HS-400 Series, or OZ/Gedney Co.’s 14-50 Series.

2.05 MARKERS

A. Markers:
   2. Flexible sleeve markers; Plastic Extruded Parts Inc.’s FS series.
   3. Snap-on markers; Plastic Extruded Parts Inc.’s RS series.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Provide power wiring and raceway system to the control consoles/cabinets.

B. Provide power and control wiring and raceway system from the control consoles/cabinets to the operating devices and appurtenances.

3.02 RACEWAYS INSTALLATION

A. Raceway Types and Locations:
   1. Conduit: Run conduit concealed or exposed as indicated on drawings:
      a. Install rigid ferrous metal conduit in all locations unless otherwise specified.
      b. Flexible Metal Conduit:
1) Use for short runs to equipment such as interlocks, limit switches or other items requiring adjustments (dry locations).

2) Use 1 to 2 feet of flexible metal conduit for final connection to equipment subject to vibration (dry locations).

c. Liquid-tight Flexible Metal Conduit:
   1) Use for short runs to equipment such as interlocks, limit switches or other items requiring adjustment (damp and wet locations).
   2) Use 1 to 2 feet of liquid-tight flexible metal conduit for final conduit connection to equipment subject to vibration (damp and wet locations).

2. Gate System Equipment Construction as Raceway: Track boxes, steel structural tubing, or steel plates may be utilized as raceways where designed expressly for the purpose by the gate system equipment manufacturer.

B. Conduit Ends:
   1. Use 2 locknuts and insulated bushing on end of each conduit entering console/cabinet or galvanized steel box (plastic bushing may be used on 1/2 inch & 3/4 inch conduit).
   2. Use insulated grounding bushings on the ends of conduits, which are not directly connected to the enclosure (such as stub-ups under equipment, etc.) and bond between bushings and enclosure with equipment grounding conductor.

C. Expansion Joints: Use expansion joint fittings where conduits cross expansion joints.

3.03 OUTLET, JUNCTION AND PULLBOX INSTALLATION

A. Boxes For Concealed Conduit System:
   1. Install boxes of depth to suit job conditions and also comply with Article 370 of the National Electrical Code.
   2. Use galvanized steel boxes with flush covers for junction and pull boxes.

B. Boxes For Exposed Conduit System:
   1. Use threaded type boxes for all Work with conduit sizes 1/2, 3/4 and 1 inch.
   2. Use threaded type boxes for all Work with conduit sizes over 1 inch in wet locations.
   3. Use galvanized steel junction and pull boxes for Work with conduit sizes over 1 inch in dry locations and damp locations.

C. Specific Purpose Outlet Boxes: Use specific purpose outlet boxes to mount equipment when available and suitable for job conditions.

3.04 CONDUCTOR INSTALLATION

A. Install wiring in raceways.
B. Wiring shall be continuous (no splices) except for plug-in connectors or terminal blocks for connections to motors, limit switches, and other electrical components to facilitate removal and replacement of these items.

C. Protect wiring in track boxes with wire trough or chase. Encase wiring in plastic sheathing or rubber grommets when passing through metal components and near moving parts.

3.05 SUPPORTING DEVICE INSTALLATION

A. Attachment of Conduit System:
   1. Masonry Construction: Attach conduit to masonry construction by means of pipe straps or pipe clamps and masonry anchorage devices.
   2. Channel Support System: Attach conduit to channel as indicated on drawings.

3.06 IDENTIFICATION, LABELING AND MARKING

A. Identify conductors with markers at terminal strips, cabinets, consoles and pullboxes (designations shall correspond with point to point wiring diagrams).

END OF SECTION
PART 1   GENERAL

1.01   SUBMITTALS

A.  Product Data: Catalog sheets, specifications and installation instructions.

PART 2   PRODUCTS

2.01   SWITCHES

A.  Local Switches, Single Pole:
   2.  30A, 120/277 V ac; Bryant’s 3001, Crouse-Hinds/AH’s 3991, Hubbell’s 3031, Leviton’s 3031, or Pass & Seymour’s 30AC1.

B.  Local Switches, Double Pole:
   2.  30A, 120/277 V ac; Bryant’s 3002, Crouse-Hinds/AH’s 3992, Leviton’s 3032, or Pass & Seymour’s 30AC2.

C.  Local Switches, Three-Way:
   2.  30A, 120/277 V ac; Bryant’s 3003, Crouse-Hinds/AH’s 3993, Leviton’s 3033, or Pass & Seymour’s 30AC3.

D.  Local Switches, Four-Way:
   2.  30A, 120/277 V ac; Crouse-Hinds/AH’s 3994.

E.  Local Switches, Key-Operated: Heavy Duty Industrial series from: Leviton model 1221-2KL.
   1.  Similar to toggle type local switches (e.g., single pole, double pole, 3-way, 4-way, 20amp) except operated by removable key instead of lever. Furnish 2 keys with each switch.
   2.  Removable, straight key, Leviton WS-35.
F. Lighted Toggle Switches:
1. Ivory toggle lighted in off position, 15A, 120 V; Bryant’s 4801-GLI, Crouse Hines/AH’s 1891IL, General Electric’s SL112-2G, Hubbell’s 1201-IL, Leviton’s 1201 LHI, or Pass & Seymour’s 15AC11SL.

G. Momentary Contact Switches:
1. Three position, center off, toggle, 15A, 120/277 V ac, single pole; Bryant’s 4821, Crouse-Hinds/AH’s 1895, Hubbell’s 1556, Leviton’s 1256, or Pass & Seymour’s 1250.
2. Three position, center off, key operated, 15A, 120/277 V ac, single pole; Bryant’s 4821-L, Crouse-Hinds/AH’s 1895-L, Hubbell’s 1556-L, or Pass & Seymour’s 1250-L.

2.02 RECEPTACLES

A. Federal Spec./NEMA Grade Receptacles:
   1. Duplex receptacle, NEMA 5-20R (20A, 125 V, 2P, 3W); Bryant’s 5362, Crouse-Hinds/AH’s 5739-S, Hubbell’s 5362, Leviton’s 5362, Pass & Seymour’s 5362, or Daniel Woodhead’s 5362 DW.

B. Tamper-Resistant Receptacles:
   1. “Hard Use” Duplex receptacle, NEMA 5-20R (20A, 125 V, 2P, 3W); Hubbell’s _HBL5362, Leviton’s _5362-SG, or Pass & Seymour’s _TR-5362.

C. Ground Fault Interrupter Receptacles:
   1. Tamper Resistant Duplex GFCI receptacle rated 20A (NEMA 5-20R), circuit ampacity 20A; Hubbell’s GFR 5362S, Leviton’s GFTR2, Pass & Seymour’s PT1597HG,.

D. Weather Resistant Ground Fault Interrupter Receptacles:
   1. Duplex receptacle rated 20A (NEMA 5-20R), circuit ampacity 20A; Cooper’s WRVGF20W or Leviton’s 002-W7899-00W.

E. Special Purpose Receptacles: Furnish matching nylon, polycarbonate or armored plug with each receptacle. Furnish matching wall plate with each receptacle (.040” brass, Type 302 stainless steel, weatherproof, threaded box type, as required):
   1. Type A: NEMA 14-20R (3P, 4W, 20A, 125/250 V, W/G); Crouse-Hinds/AH’s 5759, General Electric’s 1420, or Hubbell’s 8410
   2. Type B: NEMA 14-30R (3P, 4W, 30A, 125/250 V, W/G); Bryant’s 9430FR, Crouse-Hinds/AH’s 5744N, Hubbell’s 9430A, Leviton’s 278, or Pass & Seymour’s 3864.
   3. Type C: NEMA 14-50R (3P, 4W, 50A, 125/250 V, W/G); Bryant’s 9450FR, Crouse-Hinds/AH’s 5754N, Hubbell’s 9450A, Leviton’s 279, or Pass & Seymour’s 3894.
4. Type D: NEMA 14-60R (3P, 4W, 60A 125/250 V, W/G); Bryant’s 9460FR, Crouse-Hinds/AH’s 9460N, Hubbell’s 9460A, or Pass & Seymour’s 3871.

5. Type E: NEMA 10-20R (3P, 3W, 20A, 125/250 V); Bryant’s 9326, Crouse-Hinds/AH’s 9140, Hubbell’s 6810, or Pass & Seymour’s 6810.

6. Type F: NEMA 10-30R (3P, 3W, 30A, 125/250 V); Bryant’s 9303, Crouse-Hinds/AH’s 9344N, Hubbell’s 9350, Leviton’s 5207, or Pass & Seymour’s 3860.

7. Type I: NEMA L5-20R (2P, 3W, 20A 125 V, W/G); Bryant’s 70520FR, Crouse-Hinds/AH’s 6200, Hubbell’s 2310A, or Pass & Seymour’s L520-R.

8. Type J: NEMA L5-30R (2P, 3W, 30A, 125 V, W/G); Bryant’s 70530FR, Crouse-Hinds/AH’s 6330, Hubbell’s 2610A, or Pass & Seymour’s L530-R.


10. Type L: NEMA L6-20R (2P, 3W, 20A, 250 V, W/G); Bryant’s 70620FR, Crouse-Hinds/AH’s 6210, Hubbell’s 2320A, or Pass & Seymour’s L620-R, or Slater’s L620R.

11. Type M: NEMA L6-30R (2P, 3W, 30A, 250 V, W/G); Bryant’s 70630FR, Crouse-Hinds/AH’s 6340, Hubbell’s 2620, or Pass & Seymour’s L630-R.

12. Other Types: As produced by Bryant, Crouse-Hinds/AH, Hubbell, or Pass & Seymour. NEMA configuration and ratings to suit requirements.

2.03 WALL PLATES

A. Stainless Steel Wall Plates: Type 302 stainless steel with satin finish; of the same manufacture of provided wiring device.

B. Weatherproof While In Use Covers:
   1. Polycarbonate: Cooper Crouse-Hinds TP7488W or Pass & Seymour’s (Legrand) WIUC10C.

C. Covers for Threaded Type Boxes: Stamped sheet steel, gasketed device covers as produced by Crouse-Hinds Co., or OZ/Gedney Co.

2.04 EMERGENCY SHUTDOWN SWITCHES

A. Emergency Shutdown Pushbutton Switch: Square D. Co.’s Class 9001, Type K, pushbutton operator with the following:
   1. Red mushroom button.
   2. Transformer type red pilot light.
   3. Legend red plate with words “Emerg. Stop”.
   4. NEMA 13 oil tight enclosure with cover riveted to boy.

B. Emergency Shutdown Key Operated Switch: Square D. Co.’s Class 9001, Type K, key operated selector switch with the following:
   1. Key removable in both “ON” and “OFF” position.
   2. NEMA 13 oil tight enclosure with cover riveted to box.
2.05 NAMEPLATES

A. Phenolic Type: Standard phenolic nameplates with 3/16 inch minimum size lettering engraved thereon.

B. Embossed Aluminum: Standard stamped or embossed aluminum tags, 3/16 inch minimum size lettering, as produced by Seton Name Plate Corp. or Tech Products Inc.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install wiring devices in outlet boxes.

B. Local Switches:
1. Install local switches rated, 120/277 V ac for switches unless otherwise shown on the drawings or specified.
2. Install switches indicated Sa, Sb, Sc, etc, for control of outlets, with corresponding letters on the same circuit.
3. Where more than one switch occurs at same location in a 120 volt system, arrange switches in gangs and cover with one face plate.
4. Install switches in a 277 volt system in separate single boxes if voltage between exposed live metal parts of adjacent switches exceeds 300 volts.
5. Install single and double pole switches so that switch handle is up when switch is in the “On” position.
6. Install key operated switches where shown on the drawings.

C. Receptacles:
1. Install Specification Grade receptacles, NEMA 5-20R, 20A, 125 V, 2P, 3W, for duplex receptacles and single receptacles unless otherwise shown on the drawings or specified.
2. Install receptacles with ground pole in the down position.
3. Install tamper resistant receptacles in all client areas.
4. Install Weather Resistant Ground Fault Interrupter Receptacles in wet and damp locations.
5. Prior to ordering confirm wiring device color with Directors Representative.

D. Wall Plates:
1. Install wall plates on all wiring devices in dry locations, with finish to match wiring device.
2. Install blank wall plates on outlet boxes which are for future equipment except telephone outlets.
3. Install 5/8 inch bushed wall plates on telephone outlets.
4. Fasten wall plates with vandal resistant screws in patients’ area. Deliver 10 screw keys to the facility.
5. Fasten wall plates with vandal resistant screws (torx-center-pin type) in offices, public access areas, and areas accessible to residents. Deliver 10 screw keys to the facility.
E. Weatherproof Covers: Install weatherproof covers on wiring devices in damp locations.

F. Weatherproof While In Use Covers: Install weatherproof while in use covers on wiring devices in wet locations.

G. Nameplates: Provide phenolic or embossed aluminum nameplate for each special purpose receptacle indicating phase, ampere and voltage rating of the circuit. Attach nameplate with rivets or tamperproof fasteners to wall plate or to wall above receptacle. Wall plates may be engraved with required data in lieu of separate nameplates.

H. Mats: Where flush plates are required over outlet boxes that cannot be set deep enough for the plates to fit closely over the finished wall surfaces, provide oak mats to fill the space between the finished wall surface and the plate.

END OF SECTION
SECTION 262812
SAFETY SWITCHES

PART 1  GENERAL

1.01  SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 0133 does not apply to this Section.

B. Product Data: Catalog sheets, specifications and installation instructions.

PART 2  PRODUCTS

2.01  SAFETY SWITCHES (SINGLE THROW)

A. NEMA 1, 4X (Stainless Steel), 12: Eaton/ Cutler-Hammer Inc.'s Heavy Duty Series, General Electric Co.'s Heavy Duty Series, Siemens Inc,’s Heavy Duty Series, or Square D Co.’s Heavy Duty Series; having:
   1. Fuses, or unfused as indicated on drawings.
   2. Fused switches equipped with fuseholders to accept only the fuses specified in Section 262813 (UL Class RK-1, RK-5, L).
   3. NEMA 1 enclosure unless otherwise indicated on drawing.
   4. 240V rating for 120V, 208V, or 240V, circuits.
   5. Solid neutral bus when neutral conductor is included with circuit.
   6. Ground bus when equipment grounding conductor is included with circuit.
   7. Current rating and number of poles as indicated on drawings.

2.02  NAMEPLATES

A. General: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
   1. Phenolic: Two color laminated engravers stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
   2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
   3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.
PART 3 EXECUTION

3.01 INSTALLATION

A. Install switches so that the maximum height above the floor to the center of the operating handle does not exceed 6’-6”.

B. Identify each safety switch, indicating purpose or load served:
   1. NEMA 1 Enclosures: Rivet or bolt nameplate to the cover.
   2. NEMA 12 Enclosures: Rivet or bolt and gasket nameplate to the cover.
   3. NEMA 4X Enclosures: Attach nameplate to the cover using adhesive specifically designed for the purpose, or mount nameplate on wall or other conspicuous location adjacent to switch. Do not penetrate enclosure with fasteners.

END OF SECTION
SECTION 265100

INTERIOR LIGHTING FIXTURES

PART 1 GENERAL

1.01 SUMMARY

A. Description of Work: Provide lighting fixtures and all accessories as indicated or required.

B. Procure any or multiple light fixtures specified in drawings from NYS Preferred Source Contractors/Supplies should any or all specified fixtures be available through sources including:
   1. Department of Correctional Services Industries Program (CORCRAFT)
   2. Disabled persons’ organization such as Herkimer Industries
   3. Veterans workshop organizations operated by the US Department of Veterans Affairs

1.02 LIGHTING FIXTURE TYPES

A. A lighting fixture type is indicated adjacent to each lighting fixture shown on the Drawings. (e.g., “L1,” “L2,” “H1,” etc.). Where all the fixtures in a room or area are identical, the type may be indicated only once. Refer to the Lighting Fixture Schedule. Request fixture type for any lighting fixture without a type indicated.

1.03 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Prove separate submittal packages per building for review.

C. Driver manufacturer and model number or series to be indicated for each fixture type

D. Submittal Package: Submit the product data items specified below at the same time as a package.

E. Product Data:
   1. Catalog sheets, specifications and installation instructions.

F. Project Closeout Submittals:
1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative. Include name, address and telephone number of the nearest fully equipped service organization.

PART 2 PRODUCTS

2.01 LIGHTING FIXTURES - GENERAL

A. Types: As described in the Lighting Fixture Schedule. Lighting fixture manufacturers’ series or catalog numbers listed indicate “Basis of Design” as well as general quality, type, and style, but may not cover all required design features and details. Provide lighting fixtures having all features details and accessories as noted in the fixture descriptions and in this specification section.

B. Design and Construction: Free of light leaks and so as to provide adequate ventilation for lamp(s) and ballast(s).

C. Lampholders: Shall make positive contact with lamp base or pins and shall securely hold lamps in place.

D. Light Control: Reflectors, diffusers, lenses, louvers, baffles, etc., as indicated in the Lighting Fixture Schedule.

E. Accessories: As indicated and as required.

2.02 LED FIXTURES

A. General: LED fixtures are to meet requirements as set forth in the latest of the following standards:

1. Reference Standards:
   a. LM-79-08, IESNA Approved Method for the Electrical and Photometric Measurements of Solid-State lighting Products.
   b. LM-80-08, IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources.
   c. IES TM-21-01: Projecting Long Term Lumen Maintenance of LED Light Sources
   d. UL 8750
   e. ANSI: C78.377A, C82.77-2002
   f. NEMA-SSL-1-2010, SSL-3-2010
   g. Color Binning: LED’s Shall utilize a maximum of three (2) MacAddam Ellipses
   h. Labels for product testing and listing must include ISO 9001:2008, ETL and DLC

B. Independent testing Data, LED fixtures photometrics shall be produced by an independent testing company. LED fixture photometrics produced by Photopia is not acceptable.
2.03 CEILING MOUNTED FIXTURES

A. Fixtures, in general, have been specified for the particular type of ceiling where they are being installed. However, the Contractor shall verify all ceiling construction types prior to ordering light fixtures, and order lighting fixtures accordingly. Verify the exact ceiling system construction types and provide lighting fixtures, fittings, hangers, clamps, brackets, yokes, plaster flanges and miscellaneous devices as required for a complete installation to suit the ceiling construction.

2.04 PENDANT MOUNTED FIXTURES

A. Provide all necessary hardware, single-piece stems and miscellaneous components for a complete installation. When necessary for sloped ceilings, provide swivel type pendant hangers. For continuous row installations provide alignment hardware which spans adjacent fixtures.

2.05 CHAIN SUSPENDED FIXTURES

A. Install outlet box directly above fixture. Provide three conductor type SJO cord with NEMA L5-15 (120 volt) or NEMA L7-15 (277 volt) connecting plug and receptacle for each fixture.

2.06 DAMP AND WET LOCATION FIXTURES

A. UL Damp (or Wet) label, with corrosion resistant, weatherproof enamel or epoxy finish, and stainless steel or anodized aluminum fasteners.

2.07 LAMPS AND BALLASTS

A. Refer to Section Lamps and Ballasts and the Lighting Fixture Schedule.

PART 3 EXECUTION

3.01 GENERAL

A. Install lighting fixtures as described in the Lighting Fixture Schedule, complete with lamps and ballasts. Install all necessary accessory fittings, hangers, clamps, brackets, yokes, plaster flanges, outlet boxes, and miscellaneous devices required for a complete installation as recommended by the manufacturer.

3.02 FIXTURE MOUNTING AND SUPPORT

A. General: Securely support and/or suspend all lighting fixtures as indicated in specification section 260529 as well as the following: from structural members or the building. Lay-in, flanged, and recessed downlight fixtures may be supported by the framing members of the suspended ceiling system, where secured per NEC 410-16c. Secure troffers to ceiling tees at least twice along each long side of troffer.
B. Mounting Heights: Suspend pendant mounted lighting fixtures at heights indicated, measured from finished floor to bottom of fixture enclosure or reflector unless noted otherwise. Install wall mounted fixtures at heights indicated measured from finished floor to center of fixture outlet box unless noted otherwise.

C. Recessed Lighting Fixtures: Provide flexible connections to all recessed lighting fixtures as required by the code and in accordance with approved wiring methods.

3.03 LAMPS

A. Install specified lamps as recommended by the lamp and lighting fixture manufacturers. Follow lamp manufacturer’s recommendations for handling and installing lamps.

3.04 BALLASTS/DRIVERS

A. Make all field connections necessary for factory-installed ballasts/Drivers and install all special ballasts as recommended by the manufacturer.

3.05 FINAL ACCEPTANCE

A. Coordinate with settings with Owner’s representative and make all aiming adjustments for applicable fixtures.

3.06 OPERATION

A. Verify all fixtures are operational per specifications and manufacturers recommendations.

END OF SECTION
PART 1 GENERAL

1.01 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Prove separate submittal packages per building for review.

C. Driver manufacturer and model number or series to be indicated for each fixture type

D. Submittal Package: Submit the product data items specified below at the same time as a package.

E. Product Data:
   1. Catalog sheets, specifications and installation instructions.
   2. Battery warranty.
   3. Name, address and telephone number of nearest fully equipped service organization.

F. Project Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative. Include name, address and telephone number of the nearest fully equipped service organization.

1.02 QUALITY ASSURANCE

A. List of Completed Installations: If brand names other than those specified are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations which can prove the proposed products have operated satisfactorily for 3 years.

B. Service Availability: A fully equipped service organization shall be available to service the completed Work.

1.03 SUMMARY

A. Procure any or multiple light fixtures specified in drawings from NYS Preferred Source Contractors/Suppliers should any or all specified fixtures be available through such sources including:
1. Department of Correctional Services Industries Program (CORCRAFT)
2. Disabled persons’ organization such as Herkimer Industries
3. Veterans workshop organizations operated by the US Department of Veterans Affairs.

PART 2 PRODUCTS

2.01 EMERGENCY LIGHTING UNITS

A. Type LA: Dual-Lite Co.’s AS-BC, Emergi-Lite’s ILC Series, or Exide Electronics’ Emergency Lighting L-100, with:
   1. Six volt maintenance free battery (sealed lead-calcium free electrolyte or sealed pure lead cells); Eagle-Picher Industries Inc.’s Carefree/Carefree Magnum, Exide’s LEC, or Gates Energy Products Inc’s BC Cell. Batteries shall be of suitable rating and capacity to supply and maintain at not less than 87-1/2 percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 3 hours. Exception: Capacity not less than 24Ah at 77 degrees F (25 degrees C), 8 hour rate, to 87-1/2 percent nominal battery voltage (1.75 volts per cell).
   2. Low battery voltage cut-off (not less than 80 percent of nominal battery voltage).
   3. Electronic or sealed dust-tight transfer relay.
   4. Six volt, 12 watt integral tungsten halogen lighting heads.
   5. Input circuit suitable for operation on 120 volt, 60 Hz circuit.
   6. Cabinet door having vandal resistant fasteners or lockable device and continuous piano hinge.
   7. Voltmeter to indicate battery voltage.
   8. Mounting shelf or bracket.
   9. Time delay device for units installed in areas illuminated with high intensity discharge lighting fixtures. Emergency lighting units shall remain illuminated 15 minutes after normal power is restored.
   10. Wire guard to cover unit, where indicated on drawings.

B. Type NC: Dual-Lite Co.’s AS, Emergi-Lite’s NV Series, or Exide Electronics’ Emergency Lighting N-100, with:
   1. Six volt nickel-cadmium battery, wet cell, pocket plate type. Batteries shall be of suitable rating and capacity to supply and maintain at not less than 87-1/2 percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 3 hours. Batteries shall deliver full ampere-hour capacity at 0 degrees F ambient temperature.
   2. Electronic or sealed dust-tight transfer relay.
   3. Six volt, 12 watt integral tungsten halogen lighting heads.
   4. Input circuit suitable for operation on 120 volt, 60 Hz circuit.
   5. Cabinet door having vandal resistant fasteners or lockable device and continuous piano-hinge.
   6. Voltmeter to indicate battery voltage.
   7. Mounting shelf or bracket.
8. Time delay device for units installed in areas illuminated with high intensity discharge lighting fixtures. Emergency lighting units shall remain illuminated 15 minutes after normal power is restored.

9. Wire guard to cover unit, where indicated on drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer’s printed instructions.

B. Insert a copy of the battery warranty in each unit and mark on batteries the date placed in service.

END OF SECTION
PART 1 GENERAL

1.01 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittals Requirements” in Section 013300 does not apply to this Section.

B. Prove separate submittal packages per building for review.

C. Driver manufacturer and model number or series to be indicated for each fixture type

D. Product Data: Catalog sheets, specifications and installation instructions.

E. Samples: One of each product if different from Company or catalog number specified.

F. Project Closeout Submittals:
   1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Director’s Representative. Include name, address and telephone number of the nearest fully equipped service organization.

1.02 QUALITY ASSURANCE

A. List of Installations: If brand names other than those specified are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations which can prove the proposed products have operated satisfactorily for one year.

1.03 MAINTENANCE

A. Special Tools: Furnish 2 tools to remove and install fasteners on fixtures equipped with vandal resistant fasteners.

1.04 SUMMARY

A. Procure any or multiple light fixtures specified in drawings from NYS Preferred Source Contractors/Suppliers should any or all specified fixtures be available through such sources including:
   1. Department of Correctional Services Industries Program (CORCRAFT)
   2. Disabled persons’ organization such as Herkimer Industries
3. Veterans workshop organizations operated by the US Department of Veterans Affairs.

PART 2 PRODUCTS

2.01 EXIT LIGHT FIXTURES

A. Type EX1: Lithonia Lighting’s LV series or approved equal:
   1. White finish.
   2. Directional arrows where indicated on drawings.
   3. Red light emitting diodes (L.E.D.s) with protective polycarbonate clear lens to protect L.E.D.s. Fixtures shall not contain optical or light diffusing panels.
   4. Vandal resistant fasteners.
   5. Mounting designed for wall or ceiling depending on fixture location.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer’s printed instructions.

END OF SECTION
SECTION 265533

SECURITY FENCE LIGHTING SYSTEM

PART 1   GENERAL

1.01   SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Submittals Package: Submit the product data, samples, and photometric data specified below at the same time as package.

C. Product Data: Catalog sheets, specifications and installation instructions.

D. Samples: One of each product if different from Company or catalog number specified.

E. Photometric Data: For each luminaire if different from company or catalog number specified, submit complete photometric data in accordance with Illuminating Engineers Society (IES) recommendations for laboratory tests. Photometric data shall include candlepower distribution curves and iso footcandle diagrams (or computer printouts) showing initial horizontal footcandles on grade for individual luminaire and also for row of luminaires with spacing, mounting height and adjustment as indicated on drawings.

1.02   MAINTENANCE

A. Spare Parts:
   1. Two complete luminaires.
   2. Two driver assemblies complete with all electrical components.

1.03   SUMMARY

A. Procure any or multiple light fixtures specified in drawings from NYS Preferred Source Contractors/Suppliers should any or all specified fixtures be available through such sources including:
   1. Department of Correctional Services Industries Program (CORCRAFT)
   2. Disabled persons’ organization such as Herkimer Industries
   3. Veterans workshop organizations operated by the US Department of Veterans Affairs.
PART 2 PRODUCTS

2.01 LUMINAIRES

A. Type SL-1: NJZ Lighting Technologies SLC, 150RL or equal, having:
   1. Driver shall be multiple tap for use on 120 and 208 volt circuits.
   2. IES type 3 light distribution pattern with luminaire adjusted as shown on drawings.
   3. Enclosed in-line fuseholder, accessible inside fixture, in each ungrounded leg. Fuse at ampere rating recommended by fixture manufacturer.
   4. Tenon mounting fitter for single or dual installation as required.

B. Type SL-2: NJZ Lighting Technologies SLC, 250RL or equal having:
   1. Driver shall be multiple tap for use in 120 and 208 volt circuits.
   2. IES type 3 light distribution pattern with luminaire adjusted as shown on the drawings.
   3. Enclosed in-line fuseholder, accessible inside fixture, in each ungrounded leg. Use at ampere rating recommended by fixture manufacturer.
   4. Tenon mounting fitter for single or dual installation as required.

C. Refer to lighting schedule on bid documents for additional information and fixtures.

2.02 RIGID FERROUS METAL CONDUIT

A. Steel, galvanized on the outside and inside (conduit enameled on the inside will not be accepted), UL categorized as Rigid Ferrous Metal Conduit (identified on UL Listing Mark as Rigid Metal Conduit-Steel or Rigid Steel Conduit), by Allied Tube & Conduit Corp., Midwest Electric, Occidental Coating Co., Robroy Industries Inc., Steelduct Conduit Products, Triangle PWC Inc., or Wheatland Tube Co.

2.03 FITTINGS AND ACCESSORIES

A. Connectors and Couplings:
   1. Couplings (For Rigid Metal Conduit): Standard threaded couplings as furnished by conduit manufacturer.
   2. Watertight Conduit Hubs: Efcor Inc.’s Spec-Guard finish 19-40-50B Series or 40-50 Series, or OZ/Gedney Co.’s Type CH-T (Hot dipped galvanized finish).

B. Conduit Bodies (Threaded): Hot dipped galvanized malleable iron or cast iron alloy bodies with gasket, hot dipped malleable iron or cast iron alloy covers and stainless steel cover screws; Crouse-Hinds Co.’s Condulets (hot dipped galvanized or Corro-free epoxy powder coat), Efcor Inc.’s Efcorlets, or OZ/Gedney Co.’s Conduit Bodies.

C. Expansion Fittings: Malleable iron heads and steel body with hot dipped galvanized finish, external copper bonding jumper with hot dipped galvanized clamps and U-bolts, OZ Gedney Co.’s AX; or cast iron alloy end fittings with zinc electroplate and aluminum cellulose lacquer finish, hot dipped galvanized steel body, and external copper bonding jumper with brass strap clamps, Crouse Hinds
2.04 JUNCTION BOXES

A. Galvanized cast iron boxes, gasketed cover, size as indicated on drawings; Crouse-Hinds Co.’s WCB, OZ Gedney’s Type YL (NEMA 4). Fasten cover with vandal resistant, stainless steel screws.

2.05 CLAMPS FOR ATTACHING CONDUIT AND JUNCTION BOXES TO FENCES

A. General: All parts hot dipped galvanized with galvanizing complying with ASTM-A153 unless otherwise indicated.

B. Fences Constructed with Round Fence Members:
   1. One Hole Pipe Clamp: OZ/Gedney’s 14-50G Series.
   2. Conduit Spacers: OZ/Gedney’s 141-G Series.
   3. Conduit Nest Backs: OZ/Gedney’s 141-NG Series.
   4. Shim (to allow conduit movement): Type and design determined to be adequate by actual test sample installation.
   5. U-Bolts: OZ/Gedney’s HU Series.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install luminaires and raceway system on the chain link fence.

B. Raceways on Fence: Use rigid ferrous metal conduit in all locations.

C. Wiring: Insulated conductors shall meet the requirements of Section 260519 and the following:
   1. Use type THWN insulated conductors for wiring within raceways on fence.
   2. Use type XHHW, THWN, or USE insulated conductors for wiring in underground raceways.

3.02 FITTINGS AND ACCESSORIES SCHEDULE

A. General:
   1. Use malleable iron or cast iron alloy fittings and accessories having hot dipped galvanized finish or other specified corrosion resistant finish in conjunction with ferrous raceways.
   2. Use watertight hub on end of each conduit entering junction boxes that are not constructed with integral threaded hubs

END OF SECTION
PART 1   GENERAL

1.01   REFERENCES:
   A.   NFPA and UL 50.

1.02   RELATED WORK SPECIFIED ELSEWHERE:
   A.   Video Surveillance System: Section 282304.
   B.   Door Control System: Section 284601.

1.03   SYSTEM DESCRIPTION:
   A.   The dedicated intercom system equipment shall interface with the Touchscreen Control System, which provides the control functions for each system.
   B.   Dedicated Intercom: The dedicated intercom system provides two-way communication between the master stations and the selected field intercom station.
   C.   See Drawings for a schedule that identifies the intercom stations associated with each of the control stations.
   D.   The Programmable Logic Controllers shall provide outputs to the video switcher via a data communications link to display the appropriate video camera on the control station's monitor while an intercom link is connected.
      1.   Video Follow Event (VFE). There is a column titled “Camera” which indicates the CCTV camera(s) that is/are to be switched to the monitor(s) upon acknowledging a call-in request of the specified intercom station at the console.
   E.   Intercom stations shall be transferred when control and monitoring is transferred via the Security Monitoring and Control System.

1.04   DEFINITIONS:
   A.   The definition below supersedes the definition in Section 014216 for Technical Advisor and Field Advisor.
   B.   Manufacturers’ Technical Advisor:
      1.   An employee of the company producing the system (or a company which lists and markets the primary components of the system under their name) who is certified in writing by the company to be technically qualified in
design, installation and servicing of the required products. Personnel involved solely in sales do not qualify.

C. Integrator’s Field Advisor:
   1. An individual employee by an organization (other than the company producing the system) certified in writing by the company producing the system, that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as a field advisor in their behalf. Personnel involved solely in sales do not qualify.

D. Company Field Advisor: An employee of the Company which lists and markets the primary components of the system under their name who is certified in writing by the Company to be technically qualified in design, installation, and servicing of the required products or an employee of an organization certified by the foregoing Company to be technically qualified in design, installation and servicing of the required products. Personnel involved solely in sales to not qualify.

1.05 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Packaging of Submittals: Submittals required by this section are to be submitted (by contractor) in packages as follows: Submit (4) sets of shop drawings, product data and quality control submittals specified below as a complete package. SUBMITTALS NOT COMPLYING WITH ALL OF THE OUTLINED REQUIREMENTS WILL BE REJECTED.
   1. Submittals Package 1: Submit seven (7) Shop drawings, Product Data and Quality Control Submittals specified below at the same time as a package.
      a. Submit Submittals Package 1 within 30 days of contract award.
   2. Submittals Package 2: Submit Point to Point Wiring Diagrams and Training Submittals specified below at the same time as a package.
      a. Submit Submittals Package 2 within 30 days of receipt of approval of Submittals Package 1.
   3. Submittals Package 3: Submit Contract Closeout Submittals specified below at the same time as a package.
      a. Submit Submittals Package 3 upon physical completion, when directed by the Director’s Representative.

C. Seismic Qualification Certificates: for security equipment racks from manufacturer.
   1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
   2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions. Base certification on the maximum number of components capable of being mounted in each equipment rack along with rack type. Identify components on which certified is based.
   3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
D. Shop Drawings (Submittals Package 1):
1. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be accepted), including video signal integrity equipment, etc. required for a complete system.
2. Scale drawings showing mounting of video door station components.
3. Scaled elevation drawings showing location and mounting of components to be mounted in the security equipment racks in Security equipment rooms.

E. Product Data (Submittals Package 1):
1. Catalog sheets, specifications and installation instructions.
2. Bill of materials showing proposed quantities of all equipment to be used on this project.
3. Detailed description of system operation (format similar to SYSTEM DESCRIPTION).
4. State number of video inputs and outputs used specifically for this project and number of video inputs and outputs available for future use if system is expanded to maximum capacity.
5. Name, address and telephone number of nearest fully equipped service organization.
6. Include calculations used to size UPS’s for a fifteen-minute back-up time.

F. Quality Control Submittals (Submittals Package 1):
   a. Also include copy of identification card issued by the Licensee for each person who will be performing the Work.
2. Installers’ Qualifications Data: Include a completed INSTALLER’S QUALIFICATION DATA FORM for each person who will be performing the Work.
   a. Forms must be completely filled out.
   b. Forms must include all information required, showing that the experience criteria have been met.
   c. Each Form must be signed by the installer.
3. Company Field Advisor Data:
   a. Secure the services of a Company Field Advisor:
      1) Include the name, business address and telephone number of the Company Field Advisor.
   b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
   c. Services and each product for which authorization is given by the Company, listed specifically for this project.
4. Letter from the Company Field Advisor stating that the Company Field Advisor has reviewed the Submittals Package for accuracy and completeness and approves all materials and installation methods included in the Submittals Package.
5. System Qualifications: Submit System Qualification information if proposing a system other than that specified.
6. Project Work Plan:
   a. Include a detailed work guideline listing the OCFS requirements as they apply to this specific site.
   b. Include a detailed project work scheduling plan.
c. Include a set of detailed project installation drawings compiled specifically for this project.
d. Include training schedules for this specific project.
e. Include personnel contacts for this specific project.
f. Include direction for proper handling and storage for all equipment.

G. Point to Point Wiring Diagrams (Submittals Package 2):
1. Submit complete point to point wiring diagrams of the entire system as it is to be installed.
   a. Point to Point wiring diagrams shall show the following:
      1) All components in the system.
      2) All cables and conductors between each component.
      3) Identify all cables and conductors and show all terminations and splices (identification shall correspond to markers to be installed on each conductor).
   b. Point to Point wiring diagrams shall have an accompanying letter from the Company Field Advisor(s) stating that the Company Field Advisor(s) has reviewed the Point to Point wiring diagrams for accuracy and completeness and approves the Point to Point wiring diagrams for use.

H. Contract Closeout Submittals (Submittals Package 3):
1. System acceptance test report.
2. Certificate: Affidavit, signed by the Company Field Advisor(s) and notarized, certifying that the system meets the contract requirements and is operating properly.
3. Operation and Maintenance Data:
   a. Deliver 2 copies, covering the installed products, obtain a signed receipt from the Director's Representative. Include:
      1) Operation and maintenance data for each product.
      2) Complete point to point wiring diagrams (As-Built Drawings) of entire system as installed. Identify all conductors and show all terminations and splices (identification shall correspond to markers installed on each conductor).
      3) Name, address, and telephone number of nearest fully equipped service organization.
      4) Show all “as installed” cable paths.
      5) Identify all conductors including cat6a cable and power cables.
      6) Show all terminations and splices. Identification shall correspond to marker installed on each conductor.

1.06 QUALITY ASSURANCE

A. Equipment Qualifications For Products Other Than Those Specified:
1. At the time of submission provide written notice to the Director of the intent to propose an “or equal” for products other than those specified. Make the “or equal” submission in a timely manner to allow the Director sufficient time to review the proposed product, perform inspections and witness test demonstrations.
2. If products other than those specified are proposed for use furnish the name, address, and telephone numbers of at least 5 comparable
installations that can prove the proposed products have performed satisfactorily for 3 years. Certify in writing that the owners of the 5 comparable installations will allow inspection of their installation by the Director's Representative and the Manufacturer Technical Advisor.

a. Make arrangements with the owners of 2 installations (selected by the Director) for inspection of the installations by the Director's Representative. Also obtain the services of the Manufacturer Technical Advisor for the proposed products to be present. Notify the Director a minimum of 3 weeks prior to the availability of the installations for the inspection, and provide at least one alternative date for each inspection.

b. Only references from the actual owner or owner’s representative (Security Supervisor, Maintenance Supervisor, etc.) will be accepted. References from dealers, system installers or others, who are not the actual owners of the proposed products, are not acceptable.

1) Verify the accuracy of all references submitted prior to submission and certify in writing that the accuracy of the information has been confirmed.

3. The product manufacturer shall have test facilities available that can demonstrate that the proposed products meet the contract requirements.

a. Make arrangements with the test facility for the Director's Representative to witness test demonstrations. Also obtain the services of the Manufacturer Technical for the proposed product to be present at the test facility. Notify the Director a minimum of 3 weeks prior to the availability of the test facility, and provide at least one alternative date for the testing.

. Provide written certification from the manufacturer that the proposed products are compatible for use with all other equipment proposed for use for this system and meet all contract requirements.

B. Test Facility: The Company producing the system shall have test facilities available that can demonstrate that the proposed system meets contract requirements.

C. Manufacturer Technical Advisor: Secure the services of a Manufacturer Technical Advisor for a minimum of 24 working hours for the following:

1. Render advice regarding installation and final adjustment of the system.
2. Witness final system test and then certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
3. Train facility personnel on the operation and maintenance of the system (minimum of two 1 hour sessions).
4. Explain available service programs to facility supervisory personnel for their consideration.

1.07 MAINTENANCE

A. Service Availability: A fully equipped service organization shall be available to service the completed Work.
B. Spare Parts:
   1. (2) Intercom Substations
   2. (1) Audio Relay Board
   3. (2) Speakers

1.08 WARRANTIES

A. Base equipment and installation warranty shall be 1 year from date of final system acceptance.

B. Special Warranty: The one year period required by paragraph 9.8 of the General Conditions is extended to (2) years for the Work of this Section when approved. Refer to supplementary Conditions.

C. Manufacturer's Warranty: Product and component specific manufacturer's standard warranty where greater than the 2 years required by the special warranty.

D. Equipment integrator and contractor shall respond to warranty service requests within 4 hours of initiation of call to the facility location.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Intercom Master Stations: Each dedicated intercom master station shall be equipped and wired as required to affect the functions as described in 284601 Door Control System. Each system shall include the following:
   1. Programmable Logic Controller (PLC) based audio switching system to perform the functions described herein.
   2. Equipment necessary to effect balanced audio switching.
   3. All software and programming necessary to perform the functions described herein.
   4. All power supplies and amplifiers required.
   5. Each Master Intercom Station shall consist of a remote intercom amplifier with separate microphone and speaker, volume up & down, and push-to-talk buttons.
   a. At graphic panel locations, the intercom master shall be integrated into the control panel.
      1) Intercom condenser microphone Manufacturer:
         i) Specified: Tech Works HM-1-SUB
         ii) Acceptable: Dukane, Rauland
      2) Microphone with cardioid pattern, permanently mounted.
         i) Microphone manufacturer:
            1. Specified: Astatic Conneaut Technologies, Inc. 827-13
            2. Acceptable: Dukane, Rauland
b. At Touchscreen locations a separate intercom master station shall be provided.
   1) Construction shall be of 16-gauge stainless steel. Momentary pushbuttons shall be provided for volume up, volume down, and push-to-talk functions. The gooseneck microphone shall be removable, low impedance, electret condenser type. The speaker shall be 2 watt, 8 ohm. An internal circuit board shall be provided with all necessary terminals and relays. All terminals shall be "quick disconnect" type such that no tools are required to disconnect wiring for board replacement. Receptacles shall be provided on the exterior of the station for a foot operated push-to-talk switch and a headset with microphone. Upon inserting the headset plug into its receptacle all talk and listen functions shall transfer to the headset. The master station shall contain no active circuitry or control logic. All control functions shall be performed by a Programmable Logic Controller
   i) Manufacturer:
       1. Specified: TechWorks DODC-4

c. Master intercom amplifiers
   1) Manufacturer:
      i) Specified: Tech Works ICA-202D
      ii) Acceptable: Rauland, Dukane
   2) All functions of the intercom amplifier shall be accessed through PLC outputs. (Push-to-talk, volume up & down, page mode relay, audio enable)

B. Intercom Substation:
   1. Each intercom substation shall be Surface mounted where shown on the drawings with push button call origination to the master station.
      a. Water and flame resistant
      b. Momentary call-in switch
      c. Surface mounted with tamper-resistant hardware
      d. 11-guage stainless steel;
      e. Exterior Substations to have 2-gang stainless steel back box with hood
      f. Interior Substations to have 2-gang stainless steel back box
      g. Manufacturer:
         1) Specified Dukane 4A1485A
         2) Acceptable: Rauland, Quam

C. General Paging:
   1. The paging system shall be configured into zones, refer to riser diagrams for additional information.
   2. Power Amplifiers:
a. Power output shall be as required to support the zones specified herein. Amplifiers shall be loaded to no more than 75 percent of their rated power output.

b. Amplifier shall be 19” rack mount type.

c. Amplifier shall be TOA, Bogen, or approved equal.

3. Speakers:
   a. Secure Specified:
      1) Back box - Atlas Soundolier 193-8-5
      2) Speaker - Atlas Soundolier C5T72
      3) Baffle - Atlas Soundolier VP161-R8

4. Horn/loid Speakers:
   a. Bosch SPT15A Series or approved equal.

D. Interface Boards. All intercom stations and Paging zones shall be connected to interface boards. Interface Boards shall utilize PLC manufacturers' style of input/output cables for connections to the PLC input & output modules. All field terminations inside the equipment enclosures shall be made to Interface Boards. Terminations shall not be made directly to PLC modules.

1. Termination Boards shall be UL Listed or Recognized.
2. Each control point on each interface board shall have an LED to indicate if the point is currently active.
3. Interface boards shall be provided with a power LED for each power type supplied to the board that will indicate power is being supplied to the board.
4. Interface boards' control power busses shall be fused.
5. Interface Boards shall provide proper separation of Class 1 and Class 2 circuits as defined by Article 725 of the National Electric Code.
6. Interface boards shall contain no active circuitry or control logic.
7. All board terminations shall be pluggable to facilitate board replacement.
8. Termination boards shall be warranted for 10 years from the date of shipment.

9. BOARD TYPES:
   a. Audio Relay Board
      1) 16 relays per board.
         i) Relays shall be rated at 2 amps each.
            1. Omron
         2) Manufacturer:
            i) Specified: Creative Technologies # ARB-16
            ii) Acceptable: Dukane, Rauland

E. Audio Level Monitoring Equipment: Circuit designed to detect audio levels higher than pre-set level and initiate a call-in to the Master Control panel. Circuit shall have day and night sensitivity settings with adjustable controls for each. Excessive audio shall be indicated through a set of dry contacts. Circuit shall be compatible with the dedicated intercom Master Station and associated equipment. One circuit shall be provided for each intercom station requiring audio level monitoring.

1. Audio Level Monitoring Equipment inputs and outputs shall be wired to interface boards and not directly to the PLC modules.
2. Day and night sensitivity settings shall be controlled via the Touchscreen Control System.

3. Manufacturer:
   a. Specified: Creative Technologies
   b. Acceptable: Dukane

F. Lightning Protection: All cables entering or leaving a building shall be protected Silicon Avalanche Diode protection devices. These devices shall be installed in the appropriate enclosure and grounded to the grounding system.

2.02 OPTICAL FIBER MEDIA CONVERTER (OFMC)

A. FM AUDIO TRANSMISSION

B. 20Hz - 20kHz

C. (2) single-mode fiber optic ports

D. Audio in and Audio out.

E. Operating Temp -40 degrees Celsius – 74 degrees Celsius

F. As manufactured by GE Security AR2025

2.03 WIRING

A. Conductors: Number of conductors, size and type as recommended by the Company producing the system.

2.04 SIGNS AND LABELS

A. Zone Locator: Card holder with aluminum or stainless steel frame, plexiglass front and sheet aluminum card backing plate. Minimum size card 3 x 5 inches. Type on card the zone numbers and description of area encompassed by each zone.

2.05 ACCEPTABLE MANUFACTURERS:

A. Manufacturer’s names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as “acceptable” may only be substituted for approval provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the “specified” manufacturer. Listing of a manufacturer as specified or acceptable does not relieve the manufacturer of the responsibility to comply with the complete specification.

B. Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as
necessary to show compliance with the specification. Information must be submitted at least twenty one (14) days prior to bid due date and be approved by addendum.

C. Contact Rob Johnson at Secured State for product information based on products listed in this specification: (618) 664-4292 x101.

PART 3 EXECUTION

3.01 GENERAL

A. Furnish all cables necessary to support the specified system.

B. Programmable Logic Controllers (PLC) shall be utilized to perform functions as specified. PLC’s shall be as specified in Section 284601 Door Control System.

C. All equipment shall be rack mounted in Type 1, Equipment Racks unless otherwise noted.

D. All components/equipment shall be fabricated into racks conforming to the UL 508A standard. (Enclosure and all internal equipment and wiring as a single entity)

E. Installation shall comply with the National Electric Code. Provide proper separation of all wiring and circuit types

F. Install all equipment in accordance with manufacturer’s recommendations.

3.02 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools, and the like and leave premises clean, neat and orderly. Vacuum clean all equipment and enclosures to remove any dirt, dust, or foreign matter that may have accumulated during installation.

B. After complete installation, test system and correct all problems prior to acceptance testing. Once the Contractor is satisfied that the system is operating satisfactorily, operation of the entire system shall be demonstrated to the Owner.

3.03 INTERCOM SCHEDULE LEGEND (See Drawings).

3.04 CABLE AND CONDUCTOR INSTALLATION

A. Provide all signal cables and power conductors in raceways.

B. Signal cables and power conductors shall not be run in same raceway.

C. All signal cables and power conductors shall be continuous (no splices, except at terminal cabinet and video door station).
3.05 SYSTEM START UP

A. Power shall only be applied to the system after re-checking for proper grounding of 
   the system and measuring all loops for lack of shorts, grounds, and open circuits.

3.06 IDENTIFICATION, LABELING AND MARKING

A. Identify conductors with markers at intercom master station, door video stations, 
   and terminal cabinet (designations shall correspond with point to point wiring 
   diagrams).

3.07 INSTALLATION

A. Install system in accordance with the Company’s printed instructions unless 
   otherwise indicated.

B. Provide Surge Arresters on DC power line and signals going to the exterior door 
   intercom substations.

C. Equipment shall be firmly secured, plumb, and level.

D. Wiring shall be uniform and in accordance with national electric codes and 
   manufacturers’ instructions.

E. Coordinate all work with other effected trades and contractors.

F. Zone Locator: install adjacent to each master station.

3.08 FIELD QUALITY CONTROL

A. Preliminary System Test:
   1. Preparation: Have the Company Field Advisor adjust the completed 
      systems and then operate them long enough to assure that they are 
      performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the systems are in a suitable condition to 
         conduct an acceptance test.
      b. Checking and adjusting equipment.
      c. Training facility personnel.

B. System Acceptance Test:
   1. Preparation: Notify the Director's Representative at least three working 
      days prior to the test so arrangements can be made to have a Facility 
      Representative witness the test.
   2. Make the following tests:
      a. Individually test each master station and each door video station. 
         Verify proper volume levels and freedom from noise and 
         distortion.
      b. Test each system function step by step as summarized under 
         SYSTEM DESCRIPTION.
c. Include schedule with all components installed and tested. Schedule shall include the following:
   1) Date of test
   2) Name of tester
   3) Verification of all camera call ups
   4) Pass or fail of test
   5) Corrective action required

d. Simulated utility power failure at full load to prove uninterruption of load power supply.

e. Simulated UPS failure at full load to prove transfer to utility power upon malfunction of UPS (disconnect batteries with temporary disconnect switch or other methods to temporarily disable unit).

f. Full load test for 15 minutes to prove capacity of system (utility power source disconnected). Record battery voltage and current at start and end of period. Record AC output voltage at start and end of period. Battery cell voltage under full load at the end of 15 minutes shall not be less than 1.75V.

3. Supply all equipment necessary for system adjustment and testing.
   a. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
   b. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:
      1) Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
      2) Repeat test for each separately controlled zone of loudspeakers.
      3) Minimum acceptance ratio is 50 dB.
   c. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.
   d. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.
   e. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.
f. Signal Ground Test: Measure and report ground resistance at public address equipment signal ground. Comply with testing requirements specified in Division 26 Section “Grounding and Bonding for Electrical Systems.”

g. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

4. Submit written report of test results signed by Company Field Advisor and the Director's Representative. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistant measurement.

END OF SECTION
PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, specifications and installation instructions.

PART 2 PRODUCTS

2.01 METAL DETECTOR

A. CEIA Metal Detection System Model SMD600 Plus.
   1. 3 Levels of security
   2. Complies with the requirements of NIJ-0601.02
   3. 4 Multi0Zone Display Bars, each programmable as entry stop/go and/or local alarm indication
   4. Flexible Acoustic Alarm Signaling System
   5. 10 Acoustic Intensity Levels

2.02 HANDHELD METAL DETECTOR

A. CEIA Handheld Metal Detection System Model PD240
   1. Complies with the requirements of NIJ-0602.02
   2. Indoor and Outdoor Operations.
   3. High Immunity to floor rebars allows Lower-Body Screening without Sensitivity Reduction.
   5. Full Digital Design.
   6. Provide (3) hand held metal detectors

PART 3 EXECUTION

3.01 INSTALLATION

A. Install metal detector in accordance with manufacturer’s printed instructions.

END OF SECTION
SECTION 281604
MICROWAVE DETECTION SYSTEM

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Perimeter Alarm System: Section 281605.

B. Fence Accessory Stations For Perimeter Security Systems: Section 281602.

C. Division 26: Associated Electrical materials.

1.02 DEFINITIONS

Note: The definition below supercedes the definition in section 014216 for Technical Advisor and Field Advisor.

A. Manufacturers’ Technical Advisor
   1. An employee of the company producing the system (or a company which lists and markets the primary components of the system under their name) who is certified in writing by the company to be technically qualified in design, installation, and servicing of the required products. Personnel involved solely in sales do not qualify.

B. Integrator’s Field Advisor
   1. An individual employed by an organization (other than the company producing the system), certified in writing by the company producing the system, that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as a field advisor in their behalf. Personnel involved solely in sales do not qualify.

1.03 SYSTEM DESCRIPTION

A. The microwave detection system shall operate as a zoned, outdoor perimeter protection system integrated with the perimeter alarm system (Section 281605) which detects movement and causes an alarm to be sounded at the perimeter alarm system’s Zone Monitor when an intrusion occurs in the microwave zone.
   1. The microwave transmitter and receiver combination (zone) can be remotely tested from the console by activating a "zone test" function via the perimeter alarm system.
   2. Tampering with the microwave transmitter unit, receiver unit, and associated control box causes a "tamper alarm" condition at the main security console (this condition is independent of a "perimeter zone alarm" condition.)
   3. Operation of the zone test feature at the Zone Monitor of the perimeter
alarm system will activate a relay output of the Stand Alone Transponder (which monitors the microwave zone) which will initiate a zone test of the microwave zone.

1.04 SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 013300 does not apply to this Section.

B. Submittal Requirements: Submittals required by this section are to be submitted in Submittal Packages as follows:
   1. Submittals Package 1: Submit Product Data and Quality Control Submittals specified below at the same time as a package.
      a. Submit Submittals Package 1 within 30 days of contract award.
   2. Submittals Package 2: Submit Contract Closeout Submittals specified below at the same time as a package.
      a. Submit Submittals Package 2 upon physical completion, when directed by the Director’s Representative.
   3. It is the Contractor's responsibility to review and verify that all information required for each submittal package is included in the submittal package. Errors or omissions found by the Contractor are to be corrected prior to the Submittals Package submission for approval. Incomplete Submittal Packages submitted for review and approval will be returned.
      a. It is the Contractor's responsibility to verify that portions of the submittal packages provided by a Sub-Contractor are complete as well as portions of the submittal packages being provided directly by the Contractor.

C. Product Data (Submittals Package 1):
   1. Submit catalog sheets, specifications, and installation instructions for each item being proposed.
      a. At the top of each catalog sheet, specification or installation instruction that is being submitted indicate the Specification Section, Article, Paragraph and Subparagraph of the item is being submitted.
   2. Bill of Materials: Provide a Bill of Materials identifying each system device or component proposed to be used for this system as listed in PART 2 PRODUCTS of this section.
      a. The Bill of Materials shall provide the following information:
         1) Identify each item by name and model number.
         2) Indicate the page number(s) in the Submittal Package where information required for that item can be found.
         3) Identify the appropriate specification section, Article number, paragraph and subparagraph where that item is listed in the project manual.
   3. Name, address and telephone number of nearest fully equipped service organization.
D. Quality Control Submittals (Submittals Package 1):

1. Work Schedule:
   a. Submit a work schedule of how the installation of the system shall be performed. Schedule shall include:
      1) A brief description of the work to be performed at each phase.
      2) Estimated time durations required to perform each phase of the work.
      3) Date that Pre-installation Training Meeting will be held.  
         a) Pre-installation Training Meeting should not be held more than 2 weeks prior start of the installation of any system component listed PART 2 PRODUCTS for this system unless an earlier time is agreed upon by the Director’s Representative.
      4) Delivery dates that materials being provided under this contract will be required to be at the contract site.
      5) Delivery dates that materials being furnished by others will be required to be at the contract site.
      6) Dates that services being furnished by others will be required to be performed.
   b. Certification from the contractor stating that the contractor has verified with the manufacturers (and/or distributors) of the materials the Contractors proposes for this contract, that the manufacturers (and/or distributors) of the materials guarantees delivery of the materials no later than the date indicated in the Contractor’s work schedule.

2. Installers' Qualifications Data: Include a completed INSTALLER'S QUALIFICATION DATA FORM for each person who will be performing the Work.
   a. Forms must be completely filled out.
   b. Forms must include all information required, showing that the experience criteria have been met.
   c. Each Form must be signed by the installer.

3. Integrator’s Field Advisor Data, Include:
   a. Name, business address and telephone number of Integrator’s Field Advisor(s) secured for the required services.
   b. Certified statement (letter) from the Companies producing the system listing the qualifications of the Integrator’s Field Advisor. The certification statements from the Companies shall include the following:
      1) Information stating that the Integrator’s Field Advisor is experienced in the engineering, design and installation of the Equipment being used for this project.
      2) Each product for which the Company gives authorization for the Integrator’s Field Advisor to oversee installation of and each service the Integrator’s Field Advisor can perform in their behalf, listed specifically for this project.
   c. Listing of similar projects that the Integrator’s Field Advisor has worked on in the past 3 years.
d. Listing of training that the Integrator’s Field Advisor has received on the equipment being proposed for this project.

E. Contract Closeout Submittals (Submittals Package 2):
   2. Certificate: Affidavit, signed by the Integrator’s Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
   3. Operation and Maintenance Data:
      a. Deliver 2 copies, covering the installed products, to the Director's Representative. Include:
         1) Operation and maintenance data for each product.
         2) Complete point to point wiring diagrams (As-Built Drawings) of entire system as installed. Identify all conductors and show all terminations and splices (identification shall correspond to markers installed on each conductor).
         3) Name, address, and telephone number of nearest fully equipped service organization.

1.05 QUALITY ASSURANCE

A. Installers' Qualifications: The persons installing the Work of this Section and their supervisor shall be personally experienced in security systems and shall have been engaged in the installation of security systems for a minimum of 3 years.
   1. Qualifying experience must be in the installation of security systems similar in operation and construction of the system being specified by this section.
   2. Furnish to the Director completed INSTALLER'S QUALIFICATION DATA FORM for each person who will be performing the Work. Each form shall include:
      a. Installer's name.
      b. Employer's Name and Address.
      c. Qualifying Experience: Project information of 5 similar projects, which the installer, had worked on during the past 3 years.
         Information shall include for each project:
         1) Name and Address of project.
         2) Dates installer worked on project.
         3) Name and telephone Number of installer's supervisor for the project.
         4) Types of security installation work installer performed on project.

B. Integrator’s Field Advisor: The Integrator’s Field Advisor will be responsible to perform the following:
   1. Provide the information required for the Submittals Packages as listed in this specification section.
      a. The Integrator’s Field Advisor shall compile one complete set of submittal information to the Contractor for copying by the Contractor and inclusion in the Contractor’s six copies of the
submittal package.

2. Conduct a pre-installation training meeting at the contract site with the installers (and their supervisor) who will be performing the work, the Director's Representatives and facility supervisory and maintenance personnel. The meeting shall be a minimum of 2 hours in duration or longer as required to cover required topics. The topics covered shall include, but shall not be limited to the following:
   a. Integrator’s Field Advisor shall present an overview of the system as it is to be installed.
   b. Integrator’s Field Advisor shall lead a discussion of installation concerns and coordination issues on this system and related systems and related work being installed under this project.
   c. Integrator’s Field Advisor shall provide training on procedures for installing system components and precautionary measures installers should be aware of while performing the work.
      1) Integrator’s Field Advisor shall review wiring requirements for each component of the system with the installers and provide training on termination, bonding and grounding procedures required for proper installation of the system wiring.
   d. Provide all materials necessary for training (samples of all equipment being installed, training aides, handouts, overhead projector, etc.).

3. Render advice and technical support regarding installation and integration with other systems.
   a. Render advice and technical support regarding interconnections between this system, the Indoor and Outdoor Surveillance CCTV System (Section 281605).

4. Assist in coordination of the installation of this system as it relates to the installation other systems being provided under this contract and related contracts.

5. Provide technical advice and inspection of the installation at the contract site at all times during the installation of the system equipment and for the following:
   a. Provide daily inspection the installation of the system.
   b. Render advice and guidance regarding installation of the system.
   c. Render advice and guidance on final adjustments of the system.
   d. Render advice regarding installation of the system as it relates with the work with the other systems.
   e. Perform preliminary tests of the system.
   f. Perform the final systems test and certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
   g. Train facility security personnel, security supervisory personnel and maintenance personnel in operation and in routine (weekly and annual) testing of the system (minimum of four 2-hour sessions).
1.06 MAINTENANCE

A. Service Availability: A fully equipped service organization capable of guaranteeing response time within 4 hours to service calls shall be available 24 hours a day, 7 days a week to service the completed system.

B. Spare Parts:
   1. One of each type of surge protection units.
   2. Three of each size fuse.

PART 2 PRODUCTS

2.01 MICROWAVE DETECTION SYSTEM

A. Microwave Transmitter and Receiver Units: Southwest Microwave Inc.’s Model 300B series Microwave Transmitter and Receiver Units, having:
   1. Remote test function (activated by the closing of momentary contacts in transponder).
   2. Suitable for operation on 12 volts DC.
   3. Three field changeable detection patterns (antennas).

B. Field Test Unit: Southwest Microwave Inc.’s Model RM82.

C. Surge Protection: Equip system with surge suppressors to protect equipment from voltage transients and lightning surges.
   1. Surge Protection Units for Data and Audio conductors: Ditek Corp.’s DTK-2MHLP-12 Surge Protection Units with Ditek Corp.’s MB10 mounting base.
   2. Surge Protection Units for DC power conductors: Ditek Corp.’s DTK-2MHLP-24 Surge Protection Units with Ditek Corp.’s MB10 mounting base.

D. Interconnection Cable:
   1. Type MCC: Multi-conductor cable with 3 individually shielded twisted pairs of insulated 18 AWG stranded copper wires enclosed in a overall shield in a jacket suitable for direct burial.

2.02 MOUNTING POSTS

A. Mounting Post: Galvanized steel pipe (Schedule 40), 4 inch (outside) diameter with length as indicated on drawings.
   1. Provide galvanized steel post cap.

B. Concrete Bases as detailed on drawings and poured in place, having:
   1. Type III Portland Cement, air-entrained concrete having minimum compressive strength of 5,000 psi at 28 days (and having minimum compressive strength of 2,000 psi at 1 day). Maximum water-cement ratio 0.40.
C. Termination Box: 6” x 6” x 4” (minimum size) NEMA 4X stainless steel enclosure, Hoffman’s CHNFSS series enclosure. Secured to post with hot dipped galvanized or stainless steel fasteners.

D. Grounding:
   1. Ground Electrodes:
      a. Rod Electrodes: Copper clad (min. .010 jacket) ground rods minimum 5/8 inches diameter by 8’-0” long.
   2. Grounding Electrode Conductors and Bonding Conductors: # 6 AWG Copper conductors, bare or insulated with RHW, THW, XHHW, THWN or THHN insulation.

E. Microwave Reflector: Size and construction as indicated on drawings. Material of reflector plate-(Aluminum).

2.03 MARKERS

A. Markers:
   1. Premarked self-adhesive; W.H. Brady Co.’s B940, Thomas and Betts Co.’s E-Z code WSL self-laminating, Ideal Industries' Mylar/Cloth wire markers, or Markwick Corp.’s permanent wire markers.
   2. Flexible sleeve markers; Plastic Extruded Parts Inc.’s FS series.
   3. Snap-on markers; Plastic Extruded Parts Inc.’s RS series.

2.04 ACCESSORIES

A. Contractor shall include all materials (conduits, enclosures, fasteners, etc) as required for installing the system equipment as indicated on the drawings.

2.05 ACCEPTABLE MANUFACTURERS:

A. Manufacturer’s names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as “acceptable” may only be substituted for approval provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the “specified” manufacturer. Listing of a manufacturer as specified or acceptable does not relieve the manufacturer of the responsibility to comply with the complete specification.

B. Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as necessary to show compliance with the specification. Information must be submitted at least fourteen (14) days prior to bid due date and be approved by addendum. Product substitution will not be accepted during the submittal process.
PART 3 EXECUTION

3.01 INSTALLATION

A. Pre-installation Training Meeting.
   1. Make arrangements through the Director’s Representative and the Integrator’s Field Advisor to have the Integrator’s Field Advisor conduct the Pre-installation Training Meeting for this system.
      a. Provide a minimum of one week notice to the Director’s Representative, so that a Pre-Installation Training Meeting schedule can be set up with facility personnel and arrangements can be made for a location to hold the meeting.
      b. The Integrator’s Field Advisor shall provide all materials necessary for training (samples of all equipment being installed, training aides, handouts, overhead projector, etc.).
      c. Training shall be schedule so to avoid conflict with any other training required by this contract.
      d. Contractor shall have all installers (and their immediate supervisor) who will be performing the work attend this training.
         1) Only persons who have attended this training meeting will be allowed to install or work with any of the products specified in PART 2 in this specification section.

B. Install microwave detection system in accordance with Company's printed instructions and interconnect with Perimeter Alarm System (Section 281605) for a complete integrated system.
   1. No mounting, terminations and/or connections of devices specified in this section are to be made until the Pre-installation Training Meeting has been performed.

C. Exact location of microwave transmitter/receiver units post and base and the exact location of microwave reflector shall be as recommended by the Integrator’s Field Advisor.
   1. Locate units so that the microwave beam crosses perpendicular to the sides of the vehicle compound and perpendicular to reflector panel.
   2. Locate units far enough away from the sides of the vehicle compound so to assure the entire width of the vehicle compound is protected by the microwave zone and the “dead space” in front of the microwave units are outside the vehicle compound.
   3. Locate units to facilitate snow removal from detection zone.
   4. Have the Integrator’s Field Advisor mark exact location of posts at the site.

D. Install a ground rod electrode at each microwave receiver and transmitter location.

E. Make cable connections, terminations, and splices in fence accessory station, and microwave transmitter and receiver units. Splices will not be permitted at any other locations.
   1. Identify conductors with markers at terminal strips, pullboxes and security
equipment racks (designations shall correspond with point to point wiring diagrams).

2. Install surge protection on each conductor entering and leaving fence accessory station.

F. Upon completion of the installation of the microwave receiver and transmitter units have the Integrator’s Field Advisor operate, adjust and test the microwave zone utilizing the Field Test Unit.
   1. The Integrator’s Field Advisor shall confirm that the antenna being used is appropriate for site conditions and change the antenna as required for optimal performance of the microwave zone.
   2. The Integrator’s Field Advisor shall adjust the alarm contact closure durations to coincide with parameters required for the stand-alone-transponder of the perimeter alarm system.
   3. The Integrator’s Field Advisor shall select the channel the microwave zone is operating for optimal performance of the microwave zone.
   4. The Integrator’s Field Advisor shall confirm that the signal bandwidth jumper is set for fast moving objects or slow moving objects as required by the Facility’s Security Supervisor.
      a. Provide testing as required to assist the facility in determining the correct setting.

3.02 SYSTEM TRAINING

A. After the system is substantially complete and operational, provide on-site training of facility security, security supervisory, and maintenance personnel.
   1. Provide a minimum of 1 week notice to the Director’s Representative, so that a training schedule can be set up with facility personnel and arrangements can be made for a location to hold the training.
   2. Provide all materials necessary for training (training aides, handouts, overhead projector, etc.).

B. System Operation Training: Training shall be set-up so that at the end of training, facility (security, security supervisory, and maintenance) personnel shall have a complete understanding of:
   1. How the system operates.
      a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system.
   2. Knowledge of all components in the system and their function.
   3. How the system is interconnected with other security systems and how the system operates in conjunction with the other systems.
   4. Weekly testing procedures for the system required to be performed by the Department.
      a. Each microwave zone shall be tested weekly as follows:
         1) Test the microwave zone by walking in a zigzag pattern through the entire zone. Detection should occur approximately 3 to 5 seconds after entering the zone. Detection should cause the perimeter alarm system to go into alarm and switch the appropriate CCTV camera to
the alarm monitor and cause the system video recorder to record the camera viewing the zone in alarm.
a) Check to see that, upon alarm pan/tilt/zoom cameras automatically move to view the zone in alarm.

(1) Prior to performing a test on a perimeter zone monitored by pan/tilt/zoom cameras, so to confirm proper functioning of the camera stations, perform the following:
(a) Pan the camera stations 90 degrees away from the zone that is to be tested.
(b) Tilt the camera stations to an angle other than what will be called up when the zone goes into alarm.
(c) Adjust the lens’ field of view to a setting other than what will be called up when the zone goes into alarm.

2) Where the microwave zone intersects with adjacent zone (another microwave zones or a zone of another type of detection system) check to make sure that detection occurs in: either the zone you are testing, the adjacent zone, or both zones.

3) Check the entire zone for environmental conditions that could effect the operation of the zone. Specifically check for:
(a) Debris.
(b) Weeds.
(c) Snow (greater than 6 inches in depth).
(d) Erosion.

4) Record test of the zone on the appropriate Department forms, noting failures or any conditions that could effect operation of the zone.

C. System Maintenance Training: Training shall be set-up so that at the end of training, facility maintenance personnel shall have a complete understanding of:
1. Routine (monthly, quarterly or annual) maintenance required to the system and how to perform that maintenance.
   a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system.

2. Knowledge of all components in the system and adjustments to the components that they would be required to perform to maintain operation of the system.

3. How to replace all items listed as spare parts for the system.
   a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the
4. Annual testing procedures for the system required to be performed by the Department.
   a. Each microwave zone shall be tested annually as follows:
      1) Perform the weekly Test.
      2) Attach the microwave test unit to the microwave receiver unit.
      3) Remove covers from both the microwave transmitter and receiver unit.
         a) Verify that tamper alarms are reported at the perimeter alarm system's zone monitor upon removal of covers.
         b) Check that the channel selected at both units is the same.
         c) Check the sensitivity setting at the receiver is set between 40 to 50 percent of maximum.
      4) Verify alignment of the transmitter and receiver unit to the reflector with the microwave test unit.
         a) Adjust alignment of the transmitter and receiver units for optimum alignment if signal strength is not sufficient.
      5) Walk test the middle of the zone to determine the zone width.
         a) At the middle of the zone, stand approximately 12 to 15 feet (perpendicular) from the centerline of the beam, slowly walk toward the beam using 6 inch steps until the microwave test unit alarms. Stop walking this is the edge of the beam on that side of the zone.
         b) Cross the zone and again start outside the zone approximately 12 to 15 feet perpendicular from the centerline of the beam, slowly walk toward the beam using 6 inch steps until the microwave test unit alarms. Stop walking this is the edge of the beam on that side of the zone.
         c) The distance between the 2 alarmed points is the maximum width of the zone, which is greatest at the middle of the zone.
         d) Ensure that the zone does not detect the edge of the security (razor) coils. Adjust the sensitivity (to increase/decrease) the maximum width so it detects approximately 1 to 2 feet from the security coil.
      6) Crawl test with a slow belly crawl the ends of the zone adjacent to the microwave transmitter and receiver units and adjacent to the reflector.
         a) This test should be done inside the vehicle compound.
            (1) Where the microwave zone shoots
through a fence, the crawl test should be made at the base of both sides of the fence. Detection should occur on both sides of the fence.

b) Verify with the attendant at the perimeter alarm system's zone monitor that the alarm was received.
   (1) During the crawl test, monitor the microwave test unit to verify for proper sensitivity setting of the zone.
   (2) Adjust sensitivity setting of the zone, if signal strength is not sufficient. Adjustment to the height of the microwave heads may be required to detect a crawling target.

c) Repeat this test the test at the other end of the zone.

d) A Human shaped test dummy of approximately 5 to 6 feet in height may be used in lieu of an actual person performing the belly crawl test. Drag the dummy across the zone by rope.
   (1) Do not use an aluminum ball for the crawl test. The sensitivity setting to pick up the ball would make the sensitivity for the zone to high, and cause excessive nuisance alarms in the zone.

e) Use extra care to ensure sufficient detection in corner zones. Microwave unit at corner zones may be required to be located closer to the ground to ensure sufficient overlap with adjacent zones.

7) Record test of the zone on the appropriate Department forms, noting failures or any conditions that could effect operation of the zone.

3.03 FIELD QUALITY CONTROL

A. Preliminary System Test:
   1. Prerequisite: The CCTV Control System in Building No.1 must be operational and inter-connected with the Perimeter Alarm System and Perimeter Camera Stations prior to performing the Preliminary System Test.
   2. Preparation: Have the Integrator’s Field Advisor inspect and adjust the completed system and then operate it long enough to assure that it is performing properly.
      a. Contractor shall provide personnel to assist in the performance of the system tests and shall provide personnel and materials required to make adjustments as directed by the Integrator’s Field Advisor to prepare the system for the system acceptance tests.

   3. Run a preliminary test for the purpose of:
a. Determining whether the system is in suitable condition to conduct the acceptance test.

b. Checking and adjusting equipment.
   1) Check alignment between transmitter and receiver.
   2) Check that the sensitivity setting for each zone is set within 40 to 50 percent of maximum.
   3) Check that tamper switches within microwave transmitter and receiver unit operate and are monitored and annunciating at the perimeter alarm system's zone monitor.

c. Training facility personnel.

B. System Acceptance Test:
1. Preparation: Submit the report of preliminary test to the Director's Representative certifying that the system is ready for the System Acceptance Test. The Director's Representative will schedule the test within the next 3 working days and make arrangements to have a Facility Representative witness the System Acceptance Test.

2. The System Acceptance Test shall be witnessed by the Director's Representative and a Facility Representative and shall be performed under the direction of the Integrator’s Field Advisor with the assistance of the Contractor’s personnel.

3. The System Acceptance Test shall include the following tests as an integral test required for Perimeter Alarm System (Section 281605):
   a. Perform simulated escape attempts listed below at 10 foot intervals within each zone unless otherwise directed (Director's Representative shall select exact location and type of escape attempt or combination of attempts). Each escape attempt shall produce an alarm. If it does not, wait 30 seconds and repeat at the same location. If misses are repeated in the same location, the entire zone must be corrected and retested. The simulated escape attempts shall be performed by a person weighing 120 lbs or less. Provide safety equipment and take proper precautions when performing tests. Terminate each attempt upon detection.
      1) Walk Test: Walk slowly across detection zone perpendicular to the beam.
      2) Run Test: Run quickly across detection zone perpendicular to the beam.
      3) Belly Crawl: Crawl on stomach across detection zone parallel to beam (2 inches per second). This test shall be conducted immediately adjacent to the transmitter and receiver units, microwave reflector and at other locations where directed.
         a) A Human shaped test dummy of approximately 5 to 6 feet in height may be used in lieu of an actual person performing the belly crawl test. Drag the dummy across the zone by rope.

   b. Test each function summarized in SYSTEM DESCRIPTION.

4. Map out extent of microwave signal within each zone.

5. Supply all equipment necessary for system adjustment and testing.

6. Submit written report of test results signed by Company Field Advisor and
Director's Representative. Mount a copy of the final report in a plexiglass enclosed frame assembly adjacent to the security equipment racks. Include the following on the test form:

a. Sensitivity setting of each receiver (sensitivity setting should be 40 percent of maximum or less and in no case shall be greater than 50 percent of maximum).
b. Height of each receiver and transmitter.
c. Length of each zone.
d. Weather conditions during test.

C. System Testing and Adjusting During Guarantee Period:
1. After satisfactory completion of acceptance test, Facility personnel will investigate and record all system alarms. If the system does not meet the following criteria it shall be considered defective under the terms of paragraph 9.8 of the General Conditions:
   a. False alarms that are internally generated within the system shall not exceed 1 per 100 hrs.
   b. False alarms caused by the following weather conditions shall not exceed 1 per 48 hours:
      1) Wind up to 30 mph.
      2) Rain up to 3 inches per hour.
      3) Snow up to 5 inches per hour.
2. Within one week of notification that any zone does not meet the above criteria, make arrangements to correct the zone and retest in accordance with 3.03 B. 3. a. & b.

END OF SECTION
SECTION 281605
PERIMETER ALARM SYSTEM

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Microwave Detection System: Section 281604.

B. Video Surveillance System: Section 282304.

C. Division 26: Associated Electrical materials.

1.02 AWARD REQUIREMENTS REGARDING THIS SYSTEM

A. As a condition of award the contractor will be required to provide proof that the contractor or the contractor’s designated sub-contractors are capable of meeting the contract requirements for this system. This proof shall include the following:

1. Proof that the companies (or persons) performing the work required for this system are experienced in the installation of this system or are experienced in the installation systems of similar operation and construction to the specified system and equipment.

2. Proof that the contractor and the contractor’s designated sub-contractors have resources (personnel, equipment, etc.) available to complete the contract requirements within the construction duration required by this contract.

3. Proof that the companies (or persons) performing the work required for this system are licensed in New York State to install security systems.

B. The Director may determine that a pre-award meeting will be held for this contract. At the meeting the contractor will be required to provide additional details to prove that the contractor or the contractor’s designated sub-contractors are capable of meeting the contract requirements for this system.

1.03 DEFINITIONS

A. Manufacturers’ Technical Advisor:

1. An employee of the company producing the system (or a company which lists and markets the primary components of the system under their name) who is certified in writing by the company to be technically qualified in design, installation, and servicing of the required products. Personnel involved solely in sales do not qualify.

B. Integrator’s Field Advisor:
1. An individual employed by an organization (other than the company producing the system), certified in writing by the company producing the system, that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as a field advisor in their behalf. Personnel involved solely in sales do not qualify.

1.04 SYSTEM DESCRIPTION

A. The perimeter alarm system operates as an automatic detection and alarm system to alert facility personnel of any change in status of all monitored perimeter alarm system zones and locate intruders that attempt to cut, climb, or lift the fence fabric.

B. The perimeter is divided into 16 sensor cable zones, and one microwave detection system zone.

C. The main components of the perimeter alarm system consist of the following:
   1. Network Switches.
   2. Armored Sensor Cables.
   3. FlexZone Processors.
   4. Microwave Receiver and Transmitter.
   5. Universal Device Interface.
   7. Network Manager Computer and Workstations.
   8. Zone LCD Monitor

D. The Network Manager Computer shall be located in Security Head of Building No. 1 and shall perform the following:
   1. Indicates alarm, tamper, access or secure conditions for every zone in the system on a map of the facility site.
      a. The Network Manager Computer shall also be connected to a Video Graphic Display on a Zone LCD Monitor, which will provide a graphic representation of the status of the perimeter security zones.
   2. Sounds an audible alarm for all alarm, tamper, and trouble conditions within the system.
   3. Provides audio monitoring for every sensor cable zone in the system, allowing facility personnel to distinguish various sounds of attempted breaching, tampering, or trouble conditions.
   4. Thru the Universal Device Interface, automatically initiates switching of the Video surveillance systems’ camera stations, covering any zone in alarm, to the designated monitors in the Control Room in Building No. 1.
   5. Change in the system’s status, indicating the date, time, system, and/or zone condition, zone number, and operator number are electronically stored to CCTV network system manager computer and can printed out by the System Alarm Printer when needed.
   6. A keyboard and mouse will allow facility personnel to:
      a. Acknowledge changes in the system’s status (alarm, tamper and trouble conditions).
b. Place any zone in the access mode.
c. Program system functions.
d. Perform a self-test of the complete system or individual zones.

E. Each sensor cable shall operate as an automatic, supervised, detection and alarm system, integrated with the Network Manager Computer to alert security personnel of an attempted breach of the perimeter security fence. Each sensor cable zone's operation is summarized as follows:
1. Sensor cables located on the perimeter fences and FlexZone processors (located in fence accessory stations) detect attempts to climb over or cut through the fence.
2. The cover of the FlexZone processor is monitored by a tamper switch which is connected to the tamper circuit of one of the sensor cable zone's tamper circuit.
3. Sensor Cable will transmit Data and power to other FlexZone processors on the system. A transponder built into the first FlexZone Processor transmit alarm conditions to the Network Manager Computer.
4. Each zone’s status is continuously monitored by the perimeter alarm system.
5. Self-test features in the FlexZone Processors allow attendants at the Zone LCD Monitor to conduct tests of sensor cable zones.
6. Detect multiple simultaneous intrusions, when each intrusion attempt is separated by a sensor cable distance greater than 50 m (164 feet).
7. Support flexible, software-defined detection zones. Each FlexZone processor shall support up to 4 or 60 distinct, individually sized zones, depending on the model.
8. Pinpoint the position of a detected intrusion to within 3.0 m (9.8 feet) or less at least 95% of the time.

F. The microwave detection zone shall operate as an automatic, supervised, detection and alarm system, integrated with the FlexZone Processor to alert security personnel of an attempted breach of the vehicle compound. FlexZone monitors and controls the microwave detection system zone as follows:
1. The microwave detection system's transmitter and receiver units (located adjacent to the vehicle compound) detect attempts to breach the vehicle compound (Section 281604).
2. The microwave detection system's transmitter and receiver units are connected to the FlexZone Processor which monitors the status of the microwave zones alarm and tamper contacts and transmits the status of the microwave zone to the Network Manager Computer.
3. The microwave zone’s status is continuously monitored by the perimeter alarm system.
a. All wiring between the microwave transmitter and receiver units and the FlexZone Processor are completely supervised.
4. Self-test features in the Network Manager Computer allow attendants at the Zone LCD Monitor to conduct tests of the microwave detection system zone.
a. Operation of the zone test feature at the Zone LCD Monitor will be completed through the auxiliary inputs/self-test inputs of the
FlexZone Processor (which monitors the microwave zone) which will initiate a zone test of the microwave zone.

G. All wiring between FlexZone Processor, and the microwave transmitter and receiver are completely supervised.

1.05 SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 013300 does not apply to this Section.

B. Submittal Requirements: Submittals required by this section are to be submitted (by contractor) in Submittal Packages as follows:

1. Submittals Package 1: Product Data and Quality Control Submittals specified below at the same time as a package.
   a. Submit Submittals Package 1 within 30 days of contract award.

2. Submittals Package 2: Submit Contract Closeout Submittals specified below at the same time as a package.
   a. Submit Submittals Package 2 upon physical completion, when directed by the Director’s Representative.

3. It is the Contractor's responsibility to review and verify that all information required for each submittal package is included in the submittal package. Errors or omissions found by the Contractor are to be corrected prior to the Submittals Package submission for approval. Incomplete Submittal Packages submitted for review and approval will be returned.
   a. It is the Contractor's responsibility to verify that portions of the submittal packages provided by a Sub-Contractor are complete as well as portions of the submittal packages being provided directly by the Contractor.

C. Product Data (Submittals Package 1):

1. Submit catalog sheets, specifications, and installation instructions for each item being proposed.
   a. At the top of each catalog sheet, specification or installation instruction that is being submitted indicate the Specification Section, Article, Paragraph and Subparagraph of the item is being submitted.

2. Bill of Materials: Provide a Bill of Materials identifying each system device or component proposed to be used for this system as listed in PRODUCTS of this section.
   a. The Bill of Materials shall provide the following information:
      1) Identify each item by name and model number.
      2) Indicate the page number(s) in the Submittal Package where information required for that item can be found.
      3) Identify the appropriate specification section, Article number, paragraph and subparagraph where that item is listed in the project manual.
3. Name, address and telephone number of nearest fully equipped service organization.

D. Quality Control Submittals (Submittals Package 1):

1. Work Schedule:
   a. Submit a work schedule of how the installation of the system shall be performed. Schedule shall include:
      1) A brief description of the work to be performed at each phase.
      2) Estimated time durations required to perform each phase of the work.
      3) Date that Pre-installation Training Meeting will be held.
         a) Pre-installation Training Meeting should not be held more than 2 weeks prior start of the installation of any system component listed PART 2 PRODUCTS for this system unless an earlier time is agreed upon by the Director’s Representative.
      4) Delivery dates that materials being provided under this contract will be required to be at the contract site.
      5) Delivery dates that materials will be required to be at the contract site.
      6) Dates that services will be required to be performed.
   b. Certification from the contractor stating that the contractor has verified with the manufacturers (and/or distributors) of the materials the Contractor proposes for this contract, that the manufacturers (and/or distributors) of the materials guarantees delivery of the materials no later than the date indicated in the Contractor’s work schedule.

2. Installers' Qualifications Data Forms: Include a completed INSTALLER’S QUALIFICATION DATA FORM for each person who will be performing the Work and their immediate supervisor.
   a. Forms must be completely filled out.
   b. Forms must include all information required, showing that the experience criteria have been met.
   c. Each Form must be signed by the installer.

3. Integrator’s Field Advisor Data, Include:
   a. Name, business address and telephone number of Integrator’s Field Advisor(s) secured for the required services.
   b. Certified statement (letter) from the Companies producing the system listing the qualifications of the Integrator’s Field Advisor. The certification statements from the Companies shall include the following:
      1) Information stating that the Integrator’s Field Advisor is experienced in the engineering, design and installation of the Equipment being used for this project.
      2) Each product for which the Company gives authorization for the Integrator’s Field Advisor to oversee installation of and each service the Integrator’s Field Advisor can perform in their behalf, listed specifically for this project.
c. Listing of similar projects that the Integrator’s Field Advisor has worked on in the past 3 years.
d. Listing of training that the Integrator’s Field Advisor has received on the equipment being proposed for this project.
e. Confirmation of New York State Security/Fire Alarm Installers Licensure: Integrator’s Field Advisor must be covered by a New York State Security/Fire Alarm Installers license.

4. Manufacturer’s Technical Advisor Data: Include:
a. Name, business address and telephone number of Manufacturer’s Technical Advisor secured for the required services.
b. Certified statement from the Company listing the qualifications of the Manufacturer’s Technical Advisor.
c. Services and each product for which authorization is given by the Company, listed specifically for this project.

E. Contract Closeout Submittals (Submittals Package 2):
2. Certificate: Affidavit, signed by the Manufacturers’ Technical Advisor and Integrator’s Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
3. Operation and Maintenance Data:
a. Deliver 2 copies, covering the installed products, to the Director's Representative. Include:
   1) Operation and maintenance data for each product.
   2) Complete Point to Point Wiring Diagrams (As-Built Drawings) of entire system as installed. Identify all conductors and show all terminations and splices (identification shall correspond to markers installed on each conductor).
   3) Name, address, and telephone number of nearest fully equipped service organization.

1.06 QUALITY ASSURANCE

A. Installers' Qualifications: The persons installing the Work of this Section and their supervisor shall be personally experienced in security systems and shall have been engaged in the installation of security systems for a minimum of 3 years.

1. Qualifying experience must be in the installation of security systems similar in operation and construction of the system being specified by this section.

2. Furnish to the Director completed INSTALLER’S QUALIFICATION DATA FORM for each person who will be performing the Work and their immediate supervisor. Each form shall include:
a. Installer's name.
b. Employer's Name and Address.
c. Qualifying Experience: Project information of 5 similar projects, which the installer, had worked on during the past 3 years. Information shall include for each project:
1) Name and Address of project.
2) Dates installer worked on project.
3) Name and telephone Number of installer's supervisor for the project.
4) Types of security installation work installer performed on project.

B. Integrator’s Field Advisor: The Integrator’s Field Advisor will be responsible to perform the following:

1. Provide the information required for the Submittals Packages in regards to the materials listed in this specification section.
   a. The Integrator’s Field Advisor shall compile one complete set of submittal information to the Contractor for copying by the Contractor and inclusion in the Contractor’s six copies of the submittal package.

2. Assist the Manufacturers’ Technical Advisor in conducting the pre-installation training meeting at the contract site.
   a. Provide all materials necessary for training (samples of all equipment being installed, training aides, handouts, overhead projector, etc.).

3. Render advice and technical support regarding installation and integration with other systems.
   a. Render advice and technical support regarding interconnections between this system, the microwave detection system (Section 281604).
   b. Render advice and technical support regarding interconnections between this system, the Video Surveillance system (Section 282304).

4. Assist the Contractor in coordination of the installation of this system as it relates to the installation other systems being provided under this contract and related contracts.

5. Provide technical advice and inspection of the installation at the contract site at all times during the installation of the system equipment and for the following:
   a. Provide daily inspection the installation of the system.
   b. Render advice and guidance regarding installation of the system.
   c. Render advice and guidance on final adjustments of the system.
   d. Render advice regarding installation of the system as it relates with the work with the other systems.
   e. In Building No. 1, mount and perform terminations to the Zone LCD Monitor and perform interconnections between the Network Manager Computer and Universal Device interface unit of the CCTV control system and require programming of the Network Manager Computer and CCTV control system.
   f. Assist the Manufacturers’ Technical Advisor in the performance of the preliminary tests of the system.
   g. Perform the final systems test and certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
C. Manufacturers’ Technical Advisor: The Manufacturers’ Technical Advisor will be responsible to perform the following:

1. Conduct a pre-installation training meeting at the contract site with the installers (and their supervisor) who will be performing the work, the Director's Representatives and facility supervisory and maintenance personnel. The meeting shall be a minimum of 8 hours in duration (held in four 2 hour increments). The topics covered shall include, but shall not be limited to the following:
   a. Manufacturers’ Technical Advisor shall present an overview of the system as it is to be installed.
   b. Manufacturers’ Technical Advisor shall lead a discussion of installation concerns and coordination issues on this system and related systems and related work being installed under this project.
   c. Manufacturers’ Technical Advisor shall provide training on procedures for installing system components and precautionary measures installers should be aware of while performing the work.

      1) Manufacturers’ Technical Advisor shall review wiring requirements for each component of the system with the installers and Integrator's Field Advisor.
      2) Manufacturers’ Technical Advisor shall provide training on termination, bonding and grounding procedures required for proper installation of the system wiring.

2. Render advice and technical support regarding installation and integration with other systems.
   a. Render advice and technical support regarding interconnections between this system, the microwave detection system (Section 281604).
   b. Render advice and technical support regarding interconnections between this system, the Video Surveillance system (Section 282304).

3. Provide services at the contract site for a minimum of 24 hours for the following:
   a. Inspect the installation of the system equipment and perform preliminary tests of the system.
   b. Perform final systems test and certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
   c. Train facility security personnel, security supervisory personnel and maintenance personnel in operation and routine (weekly and annual) testing of the system (minimum of four 2-hour sessions).

1.07 MAINTENANCE

A. Service Availability: A fully equipped service organization capable of guaranteeing response time within 4 hours to service calls shall be available 24 hours a day, 7 days a week to service the completed system.
B. Spare Parts: are to be furnished at contract close-out to be stored at the contract site.
1. One FlexZone Processor
2. One 150 meter reel of Armored Sensor Cable.
3. Two Splice kits.
4. Two surge protectors (DTK-2MLP-12)
5. Two surge protectors (DTK-2MLP-24)
6. Two Hundred stainless steel cable ties for securing Armored Sensor Cable to fence fabric.
7. One Ethernet Switch
8. One Network Manager Computer

PART 2 PRODUCTS

2.01 ZONE LCD MONITOR

A. The PMCL600 Series FHD LED monitor shall the following features: VGA, BNC and HDMI inputs, picture-in-picture (PIP), looping BNC output, and full high definition resolution.

B. The High Definition LCD monitors shall be capable of providing a maximum of 1920 x 1080P Resolution with front panel controls.

C. The PMCL600 Series FHD LCD monitor shall meet or exceed the following design and performance specifications.
   1. Electrical Specifications
      a. Input Voltage 100 to 240 VAC, 50/60 Hz
      b. Power Consumption 1) PMCL624 35 W
      c. Video Input Interfaces
         d. 1 BNC, looping; 1 HDMI (2 HDMI for wall mount); 1 VGA; 1 USB.
      e. Audio Input Interfaces 3.5 mm audio jack
      f. Horizontal Frequency: 15 to 75 kHz
      g. Vertical Frequency 25 to 75 Hz
      h. Sync Format NTSC/PAL

D. Environmental Specifications
   1. Operating Temperature 32° to 104°F (0° to 40°C)
   2. Operating Humidity 10% to 85%, noncondensing

E. Physical Specifications
   1. Dimensions
      a. PMCL624 1.91” D x 21.8” W x 12.92” H

   2. Unit Weight
      a. PMCL624 7.9 lb
F. Mechanical Specifications
1. Native Resolution 1920 x 1080p
2. Panel Aspect Ratio 16:9
3. Viewing Area
   a. PMCL624 20.75 x 11.67 in
4. Pixel Pitch
   a. PMCL624 0.0106 x 0.0106 in
5. Video Formats 480p, 1080i, 1080p
6. Brightness
   a. PMCL624 250 cd/m2
7. Contrast Ratio
   a. PMCL624 1000:1
8. LED Backlight Type
9. Panel Life 40,000 hours
10. Viewing Angle (H/V) 178°/178°
11. Displayable Colors 16.7 million
12. Response Time
   a. PMCL624 5 ms
13. Speakers 2 internal (8 ohms)
14. Front Panel Controls Power, left/right, up/down, menu, input.
15. Indicators LED (power on/off)

G. Warranty
1. 2 year, parts and labor

H. Pelco Model Numbers
1. PMCL624 24-inch

2.02 FLEXZONE PROCESSORS

A. FlexZone-60 Processor: Senstar Model No. G6EM0102:
1. Provides Electronic processing for up to 60 software defined sensor zones.
2. Up to 300m of sensor cable per side.
3. Power Consumption: Less than 2.5W.
4. (2) auxiliary inputs.
5. Weatherproof enclosure.
6. (4) relay outputs
7. A and B-side sensor cable inputs
8. EDAPT included
9. Operating temperatures from -40 degrees F to 158 degrees F.
10. Shall support physical media options for A and B-side communication utilizing multi-mode fiber optic cable.
11. The processor module shall detect and indicate physical tampering conditions, including:
   a. Opening of the processor enclosure cover, resulting in tamper switch activation
   b. Cutting the sensor cable
   c. Short-circuiting the sensor cable
d. Disconnecting the sensor cable

12. Provide the first and the last FlexZone Processor with Multi-Mode Fiber Optic Cable Network Interface Card as manufactured by Senstar Model No. 00BA1901.

13. Provide the first and the last FlexZone processor with a Power supply(PS): 48VDC, 50W Senstar Model Number GP0154-050, located in the Security Head. Power supply to be din-rail mounted.

2.03 ARMORED SENSOR CABLE

A. Sensor Cable: Senstars Model No. G6FG0200, FlexZone sensor cable inside flexible metal jacket - Armored sensor cable.
   1. Furnished in 150 meter length.

2.04 SPLICE KIT

A. Senstars Model No. G6KT0300, Condulet fitting for use with their FlexZone Armored Sensor Cable.
   1. Used for connecting two armored sensor cables together when required for longer detection zones.

B. Senstars Model No. C6KT0101 splice kit for use with their FlexZone Armored Sensor Cable.
   1. Used for connecting two armored sensor cables together when required for longer detection zones.

2.05 NON-DETECTING CABLE

A. Non-sensitive coaxial cable: Senstars GW0332-RL.

2.06 SURGE SUPPRESSORS

A. Equip system with surge suppressors to protect equipment from voltage transients and lightning surges.
   1. Surge Protection Units for Data and Audio conductors: Ditek Corp.’s DTK-2MHLP-12 Surge Protection Units with Ditek Corp.’s MB10 mounting base.
   2. Surge Protection Units for DC power conductors: Ditek Corp.’s DTK-2MHLP-24 Surge Protection Units with Ditek Corp.’s MB10 mounting base.

2.07 STAINLESS STEEL CABLE TIES

A. Cable Ties: for securing the Armored Sensor Cable to the perimeter fence:
   1. Stainless Steel Cable Ties: As manufactured by Senstar Model No. GH01080:
      a. 100-piece bags.
   2. Stainless Steel Cable Tie Tool as manufactured by Senstar Model No. GX0310.
2.08 MARKERS

A. Markers:
   1. Premarked self-adhesive; W.H. Brady Co.’s B940, Thomas and Betts Co.’s E-Z code WSL self-laminating, Ideal Industries’ Mylar/Cloth wire markers, or Markwick Corp.’s permanent wire markers.
   2. Flexible sleeve markers; Plastic Extruded Parts Inc.’s FS series.
   3. Snap-on markers; Plastic Extruded Parts Inc.’s RS series.
   4. Thermal transfer (non-smearing), Brady’s ID PAL hand held labeling tool, portable thermal transfer printer or equal.

2.09 ACCESSORIES

A. Provide all additional materials (conduits, enclosures, fasteners, etc) as required for installing the system equipment as indicated on the drawings.

2.10 ETHERNET SWITCH

A. Ethernet Switch (ES) as manufactured by Avaya, ERS 3510GT.
   1. 8-Ports of 10/100/1000Base-T with 2 SFP ports.
   2. Fanless operation.
   3. System CPU operates at 400MHz
   4. Switch Configured with 32MB Flash, 128MB DRAM
   5. RJ-45 Console port provides industry standard serial port connectivity.
   6. Ships with 1 set of 19” rack mount brackets
   7. Dimensions: 1 rack unit
   8. Supply Required SFP modules for multi-mode fiber optic cable.
   9. Electrical Specifications:
      a. 100 to 240 VAC, 0.18A@100 VAC.
      b. Thermal rating (output): 61 BTU/hr max
      c. Power consumption 18 Watts max.

2.11 NETWORK MANAGER COMPUTER/WORKSTATION

A. Durable Desktop Personal Computer (WS) as manufactured by Dell, Model OptiPlex XE2 small form Factor, EPA.
   1. Windows 8 Pro 64-bit with 4th Gen intel Core I5 processor.
   2. Integrated Intel HD graphics 4600.
   3. Non-ECCdual-channel 1600MHz DDR3 SDRAM with 8GB of memory.
   4. Dimensions: 11.4”x3.7”x12.3”
   5. 4 external USB powers
   6. 500GB Solid State Hybrid Hard Drive
   7. 315W power supply.
   8. (2) HDMI Ports
   9. RS-232 Port
   10. RJ-45 port with 10/100/1000 network card.
   11. Provide network manager computer with One rack unit keyboard with 17” LCD monitor and 16 port KVM as manufactured by Middle Atlantic, model RM-KB-LCD17X16KVM.
12. Provide Network Interface Unit (NIU) in Security Head as manufactured by Senstar, Model No. 00EM1301. NIU to be din-rail mounted.

2.12 UNINTERRUPTABLE POWER SUPPLY (UPS)

A. Uninterruptable Power Supply (UPS): as manufactured by APC, model No. SMT750.
   1. Smart uninterrupted power supply, 750VA/500W tower.
   2. Output Connections: (6) NEMA 5-15R.
   3. Input Connections: NEMA L5-15P.
   4. Output Power Capacity: 500 Watts / 750 VA.
   5. Multi-function LCD status and Control Console.
   6. Audible Alarm: Alarm when on battery, distinctive low battery alarm and configurable delays.
   8. 3 years repair or replace (excluding battery) and 2 years for battery.

2.13 ACCEPTABLE MANUFACTURERS:

A. Manufacturer’s names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as “acceptable” may only be substituted for approval provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the “specified” manufacturer. Listing of a manufacturer as specified or acceptable does not relieve the manufacturer of the responsibility to comply with the complete specification.

B. Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as necessary to show compliance with the specification. Information must be submitted at least fourteen (14) days prior to bid due date and be approved by addendum. Product substitution will not be accepted during the submittal process.

C. Contact Mark Clemons at Senstar for product information based on products listed in this specification: (703) 463-3084.

PART 3 EXECUTION

3.01 INSTALLATION

A. Pre-installation Training Meeting.
   1. Make arrangements through the Director’s Representative and the Integrator’s Field Advisor to have the Manufacturer’s Technical Advisor conduct the Pre-installation Training Meeting for this system.
a. Provide a minimum of one-week notice to the Director’s Representative, so that a Pre-Installation Training Meeting schedule can be set up with facility personnel and arrangements can be made for a location to hold the meeting.

b. The Integrator’s Field Advisor shall provide all materials necessary for training (samples of all equipment being installed, training aides, handouts, overhead projector, etc.).

c. Training shall be schedule so to avoid conflict with any other training required by this contract.

d. Contractor shall have all installers (and their immediate supervisor) who will be performing the work attend this training.  
   1) Only persons who have attended this training meeting will be allowed to install or work with any of the products specified in PART 2 in this specification section.

B. Install the Work in accordance with the Company’s printed instructions. Interconnect with microwave detection system (Section 281604) and the Video Surveillance System (Section 282304) for a completely integrated system.

   1. No mounting, terminations and/or connections of devices specified in this section are to be made until the Pre-installation Training Meeting has been performed.

   2. No component of this system may be energized (powered up) until after the Integrator’s Field Advisor has inspected the component’s installation and approves it being energized.

C. Install sensor cable on fence as shown on drawings with stainless steel cable ties.

   1. Sensor cable is to be fastened to fence fabric every 12 inches (maximum) on center.

   2. Sensor cable shall be ran below mid rail and return back to the beginning of the zone on the upper mid-rail.

D. Surge Protection:

   1. Install surge protection on each conductor entering and leaving fence accessory stations and running to adjacent fence accessory stations.

E. Make all cable connections, terminations and splices in fence accessory stations or security equipment racks.

   1. Terminations and splices of the sensor cable (where indicated and required on the drawings) can be made on the fence utilizing the methods indicated on the drawing.

   2. Use markers to identify conductors at terminal strips, fence accessory stations, and pull boxes (designations shall correspond with point to point wiring diagrams).

   a. Markers for individual conductors of a multi-conductor cable is not required, if the following requirements are met:

      1) Each individual conductor in the cable is color coded differently from other conductors in the cable.

      2) The multi-conductor cable has a marker identifying it.
3) The color coding of each conductor is identified on the point to point wiring diagram.

F. Upon completion of the installation of each sensor cable detection zone have the Integrator’s Field Advisor inspect the zone and then operate, adjust and test the zone to confirm that the zone is installed and operating properly.

G. In Building No. 1 all work regarding this system and related systems shall be performed in the presence and direct guidance of the Integrator’s Field Advisor.
   1. The installation of all conduit and wire between the security equipment racks in the Security Head and the Control Room on the first floor shall be performed under the direct guidance of the Integrator’s Field Advisor.
   2. The Integrator’s Field Advisor shall also perform all interconnections (connections, terminations, etc.) and programming required between Perimeter Alarm System and related systems so that this system will operate with the associated systems as described in the SYSTEM DESCRIPTION in this specification section.
      a. The Integrator’s Field Advisor shall perform all interconnections required between the network manager computer of this system and the universal device interface of the CCTV control system.
      b. The Integrator’s Field Advisor shall perform all interconnections and programming required between this system and the Zone LCD Monitor (Video Graphic Display).

3.02 SYSTEM TRAINING

A. After the system is substantially complete and operational, provide on-site training of facility security, security supervisory, and maintenance personnel.
   1. Provide a minimum of 1 week notice to the Director’s Representative, so that a training schedule can be set up with facility personnel and arrangements can be made for a location to hold the training.
   2. Provide all materials necessary for training (training aides, handouts, overhead projector, etc.).

B. System Operation Training: Training shall be set-up so that at the end of training, facility (security, security supervisory, and maintenance) personnel shall have a complete understanding of:
   1. How the system operates.
      a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system.
   2. Knowledge of all components in the system and their function.
   3. How the system is interconnected with other security systems and how the system operates in conjunction with the other systems.
   4. Weekly testing procedures for the system required to be performed by the Department.
      a. It is required that each perimeter zone be tested weekly as follows:
         1) Perform the detections system’s weekly test as described below:
a) Check to see that the activation of the detection system in that zone causes the following responses by the perimeter alarm system's zone LCD monitor:

1) An audible alarm is sounded by the zone LCD monitor.
2) The status of the display lights for that zone changes to red upon alarm and returns to green when the alarm is cleared.
3) The appropriate visual indication is displayed (i.e. point number in alarm, alarm status, etc.) on the zone LCD monitor.
4) The system printer prints-out all actions by the perimeter alarm system during the test of the zone.
5) Camera stations associated with the alarm points are automatically switched to the alarm monitor of the CCTV system.

(a) Prior to performing a test on a perimeter zone monitored by pan/tilt/zoom camera station, so to confirm proper functioning of the camera station, perform the following:

(i) Pan the camera station 90 degrees away from the zone that is to be tested.
(ii) Tilt the camera station to an angle other than what will be called up when the zone goes into alarm.
(iii) Adjust the lens’ field of view to a setting other than what will be called up when the zone goes into alarm.

b. It is required that each sensor cable zone be tested weekly as follows:

1) Visually inspect the sensor cable zone by walking entire zone.

   a) Check to see that the sensor cable is securely fastened to the fence (or security coil) at approximately 12 inch intervals.

   b) Look for loose items on the fence (such as loose signage, loose bracing, fence fabric, etc.) which could rattle in the wind causing nuisance alarms.
2) Climb Test: Perform a simulated climb test on the zone.
   a) Caution should be exercised due to the presence of security (razor) coil.
   b) Perform the following simulated climb test:
      (1) Fence mounted sensor cable zones:
          Grasp the fence fabric with both hands (at approximately 5 feet high on the fence), shake the fence while lightly kicking the lower portion of the fence fabric. Kick the fence 4 times; this will simulate a climb of the fence. Detection should occur approximately 3 to 5 seconds after the last kick on the fence.

3) Cut Test: At the end of the zone (within 10 feet of the termination point of the zone), perform a simulated cut test on the zone.
   a) With a metal object (such as a screwdriver) strike the fence fabric (or security coil) 4 times, strike within 1 to 2 feet of the sensor cable (do not strike the sensor cable itself). Detection should occur approximately 3 to 5 seconds after the last strike on the fence (or coil).

4) Record test of the zone on the appropriate Department test forms, noting failures or any conditions that could effect operation of the zone.

C. System Maintenance Training: Training shall be set-up so that at the end of training, facility maintenance personnel shall have a complete understanding of:
   1. Routine (monthly, quarterly or annual) maintenance required to the system and how to perform that maintenance.
      a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system.
   2. Knowledge of all components in the system and adjustments to the components that they would be required to perform to maintain operation of the system.
   3. How to replace all items listed as spare parts for the system.
      a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system working on the system.
   4. Annual testing procedures for the system required to be performed by the Department.
      a. The perimeter security alarm system shall be tested annually as follows:
         1) Test each point monitored by the perimeter alarm system.
            a) Test each zone for alarm and tamper/trouble.
               Check to see that the activation of the detection
system in that zone causes the following responses by the perimeter alarm system:

1) An audible alarm is sounded by the zone LCD monitor.

2) The status of the display lights for that zone changes to red upon alarm and returns to green when the alarm is cleared.

3) The appropriate visual indication is displayed (i.e. point number in alarm, alarm status, etc.) on the zone LCD monitor.

4) The system printer prints out all actions by the perimeter alarm system during the test of the zone.

5) Camera stations associated with the alarm points are automatically switched to the alarm monitors of the CCTV system.
   
   a) Prior to performing a test on a perimeter zone monitored by pan/tilt/zoom camera station, so to confirm proper functioning of the camera station, perform the following:
      
      i) Pan the camera station 90 degrees away from the zone that is to be tested.
      
      ii) Tilt the camera station to an angle other than what will be called up when the zone goes into alarm.

      iii) Adjust the lens’ field of view to a setting other than what will be called up when the zone goes into alarm.

2) Test each point controlled by the perimeter alarm system.
   a) Test the self-test function for each perimeter zone. Check to make sure that all actions listed in 3.02, C, 4, a, 1), a), (1) through (5) above occur.

3) Load test batteries for the system and detection systems.
   a) Disconnect all AC power feeds and operate systems for 30 minutes from batteries.
   b) Monitor voltages of batteries from start to finish of 30 minute load test.
      
      1) At the end of the tests, voltage should be above 48 VDC for 48 volt systems.
(2) Replace batteries every 4 years regardless of load test results.

4) Check system’s time/date setting.

5) Check system printer’s operation.

b. Each sensor cable zone be tested annually as follows:

1) Visually inspect the sensor cable zone by walking entire zone.
   a) Check to see that the sensor cable is securely fastened to the fence at approximately 12 inch intervals. Replace cable ties as required.
   b) Look for loose items on the fence (such as loose signage, loose bracing, fence fabric, etc.) which could rattle in the wind causing nuisance alarms.

2) Open the FlexZone processor unit.
   a) Verify that a tamper alarm is reported at the zone LCD monitor upon opening the zone processor unit.
   b) Verify sensor cable supervision by disconnecting the sensor cable.

3) Climb Test: Perform a climb test on the zone. Test the zone at the beginning, middle and end (minimum number of locations required).
   a) Caution should be exercised due to the presence of security (razor) coil mounted on the fence.
   b) Test for climb sensitivity by climbing or shaking the fence. Detection should occur without excessive shaking.
   c) Detection should cause the perimeter alarm system to go into alarm and switch the appropriate CCTV camera to the alarm monitor.
      (1) Check to see that, upon alarm, pan/tilt/zoom cameras automatically move to view the zone in alarm.
   d) Attention should be paid at corners or where main fence posts are located. These areas are usually less sensitive. Perform slow, stealthy climbs at these locations.
   e) Detection along the zone should be relatively consistent. Inconsistent areas may have loose fence fabric.

4) Cut Test: Perform a simulated cut test on the zone. Test the zone at the beginning, middle and end (minimum number of locations required). Test zone as indicated below:
   a) Fence mounted sensor cable (Test bottom and top of fence as indicated below):
      (1) With a metal object (such as a screwdriver) strike the fence fabric (strike the number of times that the cut setting is set at), strike within 1 to 2 feet
of the bottom of the fence (do not strike the sensor cable itself). Detection should occur approximately 3 to 5 seconds after the last strike on the fence.

(2) With a metal object strike the fence fabric (strike the number of times that the cut setting is set at), strike within 1 to 2 feet above the sensor cable (do not strike the sensor cable itself). Detection should occur approximately 3 to 5 seconds after the last strike on the fence.

5) Cut and climb testing can be monitored locally with the sensor cable system test unit.
   a) The test unit can be used also to check the zone’s audio signal. The audio signal should be relatively clear. Noisy audio is often an indication of wet sensor cable.

6) Record test of the zone on the appropriate Department forms, noting failures or any conditions that could affect operation of the zone.
   c. It is required that each microwave detection system zone be tested annually as described in Section 281604.

3.03 FIELD QUALITY CONTROL

A. Sensor Cable Test: Perform a visual inspection of the fence mounted sensor cable to verify proper cable installation free of abrasions and breaks in the outside jacket. Also perform the following continuity/resistance tests with an ohmmeter capable of reading 1 megohm + 25 percent.
   1. Test continuity/resistance between conductors and shield of sensor cable and record readings. Normal reading shall be as recommended by the manufacturer of the sensor cable.
   2. Test continuity/resistance between shield of sensor cable and fence. Normal reading shall be infinite or maximum resistance of the meter.

B. Preliminary System Test:
   1. Prerequisite: The CCTV Control System in Building No.1 must be operational and inter-connected with the Perimeter Alarm System and Perimeter Camera Stations prior to performing the Preliminary System Test.
   2. Preparation: Have the Manufacturers’ Technical Advisor and Integrator’s Field Advisor inspect and adjust the completed system and then operate it long enough to assure that it is performing properly.
      a. Contractor shall provide personnel to assist in the performance of the system tests and shall provide personnel and materials required to make adjustments as directed by the Manufacturers’ Technical Advisor (and/or the Integrator’s Field Advisor) to prepare the system for the system acceptance tests.
   3. Run a preliminary test for the purpose of:
a. Determining whether the system is in a suitable condition to conduct the acceptance test.
b. Checking and adjusting equipment.
c. Training facility personnel.

4. Submit written report of preliminary test certifying that the system has been installed in accordance with the contract requirements and certifying that the system is ready for the System Acceptance Test. Report shall be signed by the Manufacturers’ Technical Advisor, the Integrator’s Field Advisor, and the Contractor.

C. System Acceptance Test:
1. Preparation: Submit the report of preliminary test to the Director’s Representative certifying that the system is ready for the System Acceptance Test. The Director’s Representative will schedule the test within the next 3 working days and make arrangements to have a Facility Representative witness the System Acceptance Test.
2. The System Acceptance Test shall be witnessed by the Director’s Representative and a Facility Representative and shall be performed under the direction of the Integrator’s Field Advisor with the assistance of the Contractor’s personnel.
3. The System Acceptance Test shall include the following tests:
   a. Test system functions step by step as summarized under SYSTEM DESCRIPTION, and as follows:
      1) Test each point monitored by the perimeter alarm system.
         a) Test each zone for alarm and tamper/trouble.
            Check to see that the activation of the detection system in that zone causes the following responses by the perimeter alarm system:
            (1) An audible alarm is sounded by the zone LCD monitor.
            (2) The status of the display lights for that zone changes to red upon alarm and returns to green when the alarm is cleared.
            (3) The appropriate visual indication is displayed (i.e. point number in alarm, alarm status, etc.) on the zone LCD monitor.
            (4) The system printer prints-out all actions by the perimeter alarm system during the test of the zone.
            (5) Camera stations associated with the alarm points are automatically switched to the alarm monitors of the CCTV system.
               a) Prior to performing a test on a perimeter zone monitored by pan/tilt/zoom camera station, so to confirm proper functioning of
the camera station, perform the following:

(i) Pan the camera station 90 degrees away from the zone that is to be tested.

(ii) Tilt the camera station to an angle other than what will be called up when the zone goes into alarm.

(iii) Adjust the lens’ field of view to a setting other than what will be called up when the zone goes into alarm.

b) Where multiple devices (i.e. 2 tamper switches, etc.) are connected to the same monitor point on the system, test each device separately to assure operation of all.

2) Make the following tests for each sensor cable zone:

a) Perform simulated escape attempts listed below at 10 foot intervals, unless otherwise directed (Director’s Representative shall select exact location and type of escape attempt or combination of attempts). Each penetration of the sensor system shall produce an alarm. If it does not, wait 30 seconds and repeat in the same location. If misses are repeated in the same location, the entire zone must be corrected and retested. The simulated escape attempts shall be performed by a person weighing 100 lbs or more. Provide safety equipment and take proper precautions when performing tests. Terminate each test climb at detection or when the climb is complete, whichever comes first.

(1) Fast Climb Over: Approach and make contact with the fence and rapidly scale the fabric until the top is reached. At this point, either jump down or climb down the opposite side of the fence. Typical elapsed time for this intrusion against an 16 foot high, razor ribbon topped chain link fence is 4-8 seconds.

(2) Slow/Stealthy Climb Over: Approach and make contact with the fence and slowly, deliberately, and stealthfully climb to the top of the fence, carefully negotiate the razor ribbon and climb down the opposite side of the fence.
Typical elapsed time for this intrusion against an 16 foot high, razor ribbon topped chain link fence is 10 to 20 seconds.

(3) Cut Through: At a minimum of one location in each zone, securely attach or tightly weave a 2 x 2 foot square sample of fence fabric to the lower portion of the fence. Sample fabric shall be identical to existing fence fabric. Cut sample fabric and note number of cuts and time to alarm (Do not damage fence). Typical elapsed time is 20 seconds. Remove sample fabric.

b) Perform the following tests to show that the system will not alarm from the following stimuli:

(1) A person weighting 100 to 200 lbs. walking at 3 mph within 10 feet of the protected fence.

3) Make system acceptance tests for the microwave detection system as described in Section 281604.

4) Test each point controlled by the perimeter alarm system.
   a) Test the self-test function for each perimeter zone. Check to make sure that all actions listed in 3.03, C, 3, a, 1), a), (1) through (5) above occur.

5) Load test batteries for the system and detection systems.
   a) Disconnect all AC power feeds and operate systems for 30 minutes from batteries.
   b) Monitor voltages of batteries from start to finish of 30 minute load test.
      (1) At the end of the tests, voltage should be above 48 VDC for 48 volt systems.

6) Check system’s time/date setting.

7) Check system printer’s operation.

3. Supply all equipment necessary for system adjustment and testing.

4. Submit written report of test results signed by the Integrator’s Field Advisor, Contractor, Director’s Representative and the Facility’s Representative. Mount a copy of the final report in a plexiglass enclosed frame assembly adjacent to the security equipment rack.
D. System Testing and Adjusting During Guarantee Period:

1. After satisfactory completion of acceptance test, Facility personnel will investigate and record all system alarms. If the system does not meet the following criteria it shall be considered defective under the terms of paragraph 9.8 of the General Conditions:
   a. False alarms that are internally generated within the system shall not exceed 1 per 100 hrs.
   b. False alarms caused by the following weather conditions shall not exceed 1 per zone per 48 hours:
      1) Wind up to 30 mph.
      2) Rain up to 3 inches per hour.
      3) Snow up to 5 inches per hour.

2. Within one week of notification that any zone does not meet the above criteria, make arrangements to correct the zone and retest in accordance with 3.03, C.3.

END OF SECTION
SECTION 282304

VIDEO SURVEILLANCE SYSTEM

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Optical Fiber Cables: Section 271524
B. Electronic Door Locking and Monitoring System: Section 284601
C. Perimeter Alarm System: Section 281605
D. Cast In Place Concrete: Section 033001
E. Fence Accessory Stations for Perimeter Security systems: Section 281602

1.02 GENERAL REQUIREMENTS

A. The work to be done under this section of the Specifications shall include the furnishing of labor, material, equipment and tools required for the complete installation of the work indicated on the Drawings, as specified herein, or as noted in other sections of Division 28 – Electronic Safety and Security.

B. All materials a part of the electronic security infrastructure and necessary to its proper operation, but not specifically mentioned or shown on the Drawings, shall be furnished and installed without additional charge.

C. The Drawings and Specifications are complementary to each other and what is called for by one shall be as binding as if called for by both. If a discrepancy exists between the Drawings and Specifications, the higher level of functionality shall be included to meet the design intent.

1.03 REFERENCES

A. Underwriters Laboratories, Inc.
B. NEC

1.04 DEFINITIONS

Note: The definition below supersedes the definition in section 014216 for Technical Advisor and Field Advisor.

A. Approved: Acceptable to the Owner’s Representative and the Engineer.
B. Furnish: Supply and deliver to project site, ready for unloading, unpacking, assembly, installation, and similar operations.
C. **Install**: Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

D. **Integrator’s Field Advisor**:  
   1. An individual employed by an organization (other than the company producing the system), certified in writing by the company producing the system, that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as a field advisor in their behalf. Personnel involved solely in sales do not qualify.

E. **Manufacturers’ Technical Advisor**:  
   1. An employee of the company producing the system (or a company which lists and markets the primary components of the system under their name) who is certified in writing by the company to be technically qualified in design, installation, and servicing of the required products. Personnel involved solely in sales do not qualify.

F. **Provide**: Furnish and install, complete and ready for the intended use. Deliver to the project site all required equipment and accessories, install and interconnect all required equipment and accessories for a complete and operational CCTV system.

G. The term “Director’s Representative” means the employee or agent of the Design and Construction Group designated in writing by the Director as such. Under the general supervision of the Director, the Director’s Representative shall have complete charge of the Work and shall exercise full supervision and direction of the Work. Where the Contract Documents specifically designate a person to perform a function or duty, that person shall be the Director’s Representative but only for the performance of that function or duty. Where the work “directed” appears in the Contract Documents, the words “by the Director’s Representative” shall be deemed inserted thereafter in each case except where it is obviously inappropriate in context.

**1.05 DESCRIPTION OF EXISTING SYSTEM**

A. The indoor and outdoor perimeter surveillance CCTV system consists of recording equipment provisions for camera stations located throughout the interior of the building and camera stations located around the perimeter of the facility which are operated in conjunction with a Networked-based Video Security System (NVSS) consisting of encoders, decoders, network storage managers, system managers, PC work stations, keyboard control units, network switch, and monitors. The indoor and outdoor perimeter surveillance CCTV equipment is located in the main security console, along with a viewing station located in the control room in Building No. 90.  
   1. The existing indoor and outdoor perimeter surveillance CCTV equipment is manufactured by Pelco (DX9100).

B. An attendant at the control room operates the system with a workstation. The workstation allows viewing monitors to survey and evaluate the status of personnel in the areas within range of the camera stations.
C. Scenes are viewed by camera stations:
   1. Zoom-pan/tilt camera stations contain equipment required for completely adjustable viewing of scenes (remotely controlled from the keyboard control unit).
   2. Fixed camera stations contain equipment required for viewing a fixed scene (not remotely adjustable).

D. The video signal from each camera station is transmitted to a dedicated monitor for that camera station.
   1. Each dedicated monitor continuously displays the scene viewed by the camera station to which it is dedicated.
   2. Dedicated monitors are not controlled by the workstation and/or decoders.
   3. The scenes displayed by dedicated monitors are also displayed on selected monitors which are connected to the output of the workstation/decoders.

E. Camera stations transmit video signals to dedicated monitors. Each monitor continuously displays the scene viewed by the camera station to which it is dedicated. Dedicated monitors are not controlled by the NVSS.

F. A keyboard control unit, connected to the workstation, allows the attendant to control the following:
   1. Camera station functions including addressing, pan and tilt (joy stick control), zoom, and focus. (Iris is automatically controlled, not manually controlled through TVCPU).
   2. Alarm closure arm and clear.
   3. Camera station automatic sequencing run and hold.
      a. The programmed sequence may either be continuously repeated until the hold button is depressed or the sequence may be programmed to stop on a selected camera station until the run button is pushed.
   5. Call up of prepositioned scenes.
   6. Call up of any camera station to any monitor connected to the system.

1.06 MODIFICATIONS TO EXISTING SYSTEM

A. Remove all existing devices and apparatuses.

B. Provide a complete and new video surveillance system.

1.07 ALARM FROM PERIMETER SYSTEM DESCRIPTION

A. The IP video management system consists of VideoXpert™ Management software and components which includes power supplies, network storage managers, Power Over Ethernet Switches, PC work stations, keyboard control units, network switch, universal device interface, and monitors.
B. The IP video management system software updates shall be downloadable from a publicly available website.

C. The IP video management system is Microsoft® Windows®-based for easy setup and maintenance.

D. The IP video management system will support browser-based administration interface which provides management capabilities, locally and remote, without an Installed Desktop.

E. The IP video management system will support the ability of modular plug-ins.

F. The network storage manager is to use RAID 6 parity across the storage drives to protect recorded data against a hard disk drive failure. The network storage manager will only use enterprise-level hard disk drives specifically rated for operation in RAID systems. Data will be stored for a minimum of 23 days.

G. Video monitoring of all cameras shall be possible from any workstation as set up per client’s request. Review capabilities for the digitally recorded video via the secure network specified without interruption to recording capabilities.

H. The IP video management system will be designed for reliability through fault-tolerant, distributed architecture, and multiple levels of redundancy.

I. The IP video management system will provide predictable scalability and modular design.

J. The IP video management system is to support up to 6 monitors per workstation, each driven by independent CPUs, displaying up to 16HD streams per monitor.

K. The IP video management system workstations must be capable to utilize a 3D mouse and programmable keyboard accessories, and keyboard shortcuts for common operations, to maximize operator control.

L. The IP video management system needs to provide an open interface that facilitates the creation and deployment of User Interface plug-ins including mapping, video information overlays (eConnect), Access control, and license plate recognition (PlateSmart – US only).

M. The IP video management system must support recording of MJPEG, MPEG-4 and H.264 IP streams.

N. The IP video management system shall support Pelco and third-party H.264 Megapixel video streams up to 28 Megapixel.

O. The IP video management system is to have a fully open architecture with support for both IP-specific camera as well as cameras with ONIVIF S.

P. The IP video management system shall provide migration paths for Endura® (v2.4.3 or later) and Digital Sentry® (v7.9 or later).
Q. The IP video management system must be capable to Aggregate independent VMS deployments across networks and manage all video through a single system while preserving local operation (VideoExpert Ultimate distributions).

R. The IP video management system will be able to be viewed, managed, and played back through a single user interface simultaneously with Digital Sentry (v7.9 or later) and Endura (v2.4.3 or later) digital video management systems through supplied VideoXpert Management software.

S. The IP video management system will run on standard commercial off-the-shelf processors and hardware with predictable performance characterized by benchmark information on manufacturer supplied specifications.

T. The IP video management system will support Pelco Sarix Analytics at no additional licensing cost.

U. The IP video management system shall indicate system performance and operation status utilizing a variety of reports including csv and pdf formats.

V. Client software shall create and assign tags, organizing system resources as administrators or operators decide.

W. Client software shall provide the capability of running a client application in addition to the video management system.

X. Client software, at minimum, to include advanced search capabilities for camera and recordings.
   1. Client software will utilize an Investigation mode which enables operators to synchronize video playback and export investigative playlists covering scenes of interest in forward or reverse at speeds up to 128 times normal playback.
   2. A client computer with system compatible software will be the user interface for viewing one or more systems. Live and recorded video and current event video shall be displayed on any client computer using a proper login and password. The client computer shall be able to connect to an unlimited number of recorders simultaneously to display live and recorded video.
   3. Client Software will not require a license and be available to be installed on as many clients as required by the user.
   4. Client Software must be compatible with existing Digital Sentry and Endura Network storage systems.
   5. Client Software access will be User Account Controlled such that an operator must enter their credentials and will only have functionality prescribed to by the set of Roles assigned to their user account by their administrator. User Roles shall limit the ability to access live or recorded video as well as the ability to export video and other standard client operations.
   6. Client Software to allow multiple monitor support for up to 6 displays per client workstation, providing virtual matrix functionality with the use of enhanced decoders.
7. Client Software must allow video streams to be selectable from a system tree on an individual camera, individual system, client defined local groups, or from pre-defined recorder based groups.

8. Client cells, at minimum, have the ability to include system management, live, and search options. Tabs can be displayed simultaneously on the client.

9. Systems cells will, at minimum, display connection status, system names, and custom categories. This tab at minimum will additionally allow:
   a. Mapping plug-ins
   b. Card Access plug-ins
   c. Web Browser plug-ins
   d. Live video
   e. Recorded video
   f. Mission control console
   g. eConnect plug-ins
   h. PlateSmart plug-ins (US only)
   i. Synchronized video live and recorded (investigations)
   j. Screen layout select 1, 4, 9, 16 etc.
   k. Digital Zoom
   l. User selectable in-video PTZ control
   m. Quick review from 30 sec, 1 min, 30 min and 1 hour (through keyboard hot buttons)
   n. Virtual matrix capabilities
   o. Display recorded video with full VCR controls with an active overlay, (play, fast forward and reverse, and frame by frame).
   p. Playback available on a time line format for ease of use

10. Video export to any system-accessible media including locally to HDD, CD/DVD, Flash USB device or to network storage.

11. Video authentication of exported video via check sum verification.

12. Client, at minimum, will support simultaneous playback for up to (9) 1080P cameras all synchronized with each other. Also have the capability to playback non-synchronized cameras at one time in different cells.

13. Modular Window Based Client: the client shall be comprised of 1 main control panel, which can be hidden, working in unison with a series of windows, each providing a tab based experience.

14. Saveable Tabs: any layout of video can be saved as TAB to be later recalled by on operator.

15. Dockable Mission Control: the main control panel can be hidden, free floating or dynamically docked to any open VMS client Window.

16. Mission Control Sort: the device list in mission control can be sorted by device name or device ID.

17. Mission Control Filter: the device list in mission control can be filtered by the following terms:
   a. Simple text based filter (matching the device name or device ID)
   b. Tag based filtering (shows devices matching the intersection of all assigned tags)
   c. Status based Filtering: show devices with a particular status:
      1) Online
      2) Offline
3) Recording
4) Not recording
5) On screen
6) Not on screen

18. Saved Investigations: operators are able to save a current investigation, preserving the associated device list and any created clips for later recall. Saved investigations can be shared with other operator’s similar tabs.

19. Remote Workspace Push: an operator with appropriate permissions can choose to have a saved workspace sent to one or more operators’ clients, causing their system to launch the saved workspace.

20. Remote Tab Push: an operator with appropriate permissions can choose to send a saved tab one or more operators’ clients, causing their system to launch the saved tab.

21. Thumbnail on timebar: when hovering over the timebar, an operator will see a thumbnail representing the contents of the video stream at that point in time.

22. Information popup: when hovering over a device, an operator will see a popup that shows the following:
   a. Device state
   b. Device name
   c. device ID
   d. thumbnail
   e. associated tags
   f. IP Address

23. Snapshot: an operator will be able to create a quick JPG image of the current frame of video in a cell.

24. Digital Zoom: the operator will be able to digitally zoom in on a video stream on live or playback.

25. Optical Zoom and Pan Tilt Control: operators will be able to use the mouse, 3D mouse or KBD5000 joystick to send commands to cameras that support PTZ mechanism, thereby controlling where the camera is pointing.

26. Preset Trigger: operators will be able to trigger a preset action on cameras that are storing presets.

27. Drag to Swap: an operator will be able to select the video in one cell, drag that video over another cell and have the system swap the streams.

28. Dynamic call-up by ID: operators will be able to start typing a camera ID while having a cell selected to immediately see an input box. Hitting enter will load the associated camera to the cell.

29. Last Workspace Recall: the operator will be presented with the last workspace they had opened when they logged back into the system.

Y. System shall be able to associate any camera(s) with any microphone(s) when exporting video/sound.

1.08 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.
B. Packaging of Submittals: Submittals required by this section are to be submitted (by contractor) in packages as follows: Submit (4) sets of shop drawings, product data and quality control submittals specified below as a complete package. SUBMITTALS NOT COMPLYING WITH ALL OF THE OUTLINED REQUIREMENTS WILL BE REJECTED.

1. Submittals Package 1: Submit seven (7) Shop drawings, Product Data and Quality Control Submittals specified below at the same time as a package.
   a. Submit Submittals Package 1 within 30 days of contract award.

2. Submittals Package 2: Submit Point to Point Wiring Diagrams and Training Submittals specified below at the same time as a package.
   a. Submit Submittals Package 2 within 30 days of receipt of approval of Submittals Package 1.

3. Submittals Package 3: Submit Contract Closeout Submittals specified below at the same time as a package.
   a. Submit Submittals Package 3 upon physical completion, when directed by the Director’s Representative.

C. Seismic Qualification Certificates: for security equipment racks from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions. Base certification on the maximum number of components capable of being mounted in each equipment rack along with rack type. Identify components on which certified is based.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

D. Shop Drawings (Submittals Package 1):

1. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be accepted), including video signal integrity equipment, etc. required for a complete system.

2. Scale drawings showing mounting of video door station components.

3. Scaled elevation drawings showing location and mounting of components to be mounted in the security equipment racks Security equipment rooms.

4. Details of camera station poles and bases.

E. Product Data (Submittals Package 1):

1. Catalog sheets, specifications and installation instructions.

2. Bill of materials showing proposed quantities of all equipment to be used on this project.

3. Detailed description of system operation (format similar to SYSTEM DESCRIPTION).

4. State number of POE ports used specifically for this project and number of POE ports available for future use if system is expanded to maximum capacity.
5. Name, address and telephone number of nearest fully equipped service organization.
6. Include calculations used to size UPS’s for a fifteen-minute back-up time.

F. Quality Control Submittals (Submittals Package 1):
   a. Also include copy of identification card issued by the Licensee for each person who will be performing the Work.
2. Installers' Qualifications Data: Include a completed INSTALLER'S QUALIFICATION DATA FORM for each person who will be performing the Work.
   a. Forms must be completely filled out.
   b. Forms must include all information required, showing that the experience criteria have been met.
   c. Each Form must be signed by the installer.
3. Company Field Advisor Data:
   a. Secure the services of a Company Field Advisor:
      1) Include the name, business address and telephone number of the Company Field Advisor.
   b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
   c. Services and each product for which authorization is given by the Company, listed specifically for this project.
4. Letter from the Company Field Advisor stating that the Company Field Advisor has reviewed the Submittals Package for accuracy and completeness and approves all materials and installation methods included in the Submittals Package.
5. System Qualifications: Submit System Qualification information if proposing a system other than that specified.
6. Project Work Plan:
   a. Include a detailed work guideline listing the OCFS requirements as they apply to this specific site.
   b. Include a detailed project work scheduling plan.
   c. Include a set of detailed project installation drawings compiled specifically for this project.
   d. Include training schedules for this specific project.
   e. Include personnel contacts for this specific project.
7. Include direction for proper handling and storage for all equipment.

G. Point to Point Wiring Diagrams (Submittals Package 2):
1. Submit complete point to point wiring diagrams of the entire system as it is to be installed.
   a. Point to Point wiring diagrams shall show the following:
      1) All components in the system.
      2) All cables and conductors between each component.
3) Identify all cables and conductors and show all terminations and splices (identification shall correspond to markers to be installed on each conductor).

b. Point to Point wiring diagrams shall have an accompanying letter from the Company Field Advisor(s) stating that the Company Field Advisor(s) has reviewed the Point to Point wiring diagrams for accuracy and completeness and approves the Point to Point wiring diagrams for use.

H. Contract Closeout Submittals (Submittals Package 3):

1. System acceptance test report.
2. Digital Video Test Recordings (Scenes) of all camera’s.
3. Certificate: Affidavit, signed by the Company Field Advisor(s) and notarized, certifying that the system meets the contract requirements and is operating properly.
4. Operation and Maintenance Data:
   a. Deliver 2 copies, covering the installed products, obtain a signed receipt from the Director’s Representative. Include:
      1) Operation and maintenance data for each product.
      2) Complete point to point wiring diagrams (As-Built Drawings) of entire system as installed. Identify all conductors and show all terminations and splices (identification shall correspond to markers installed on each conductor).
      3) Name, address, and telephone number of nearest fully equipped service organization.
      4) Show all “as installed” cable paths.
      5) Identify all conductors including cat6 cable and power cables.
      6) Show all terminations and splices. Identification shall correspond to marker installed on each conductor.
      7) Written test report for all cables.

1.09 QUALITY ASSURANCE

A. Equipment Qualifications:

1. Products other than those specified:
   a. If products other than those specified, are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations that can prove the proposed products have operated satisfactorily for 1 year.
      1) Reference information required above must be that of the End-User of the equipment, no other references will be accepted (i.e. Installers, Sales Reps, etc.).
      2) Pay travel expense for the Director’s Representative to inspect two of these installations.
   b. The Company producing the product shall have test facilities available, which can demonstrate that the proposed product meets contract requirements.
1) Pay all costs, including travel expenses to the test facility for the Director's Representative to witness test demonstration.

B. Installer's Qualifications: The persons installing the Work of this Section and their supervisor shall be personally experienced in closed circuit television systems and shall have been engaged in the installation of closed circuit television systems for a minimum of 3 years.

1. Qualifying experience must be in the installation of CCTV systems similar in operation and construction of the system being specified by this section.
2. Furnish to the Director completed INSTALLER'S QUALIFICATION DATA FORM for each person who will be performing the Work. Each form shall include:
   a. Installer's name.
   b. Employer's Name and Address.
   c. Qualifying Experience: Project information of 5 similar projects, which the installer, had worked on during the past 3 years.
      Information shall include for each project:
      1) Name and Address of project.
      2) Dates installer worked on project.
      3) Name and telephone Number of installer's supervisor for the project.
      4) Types of security installation work installer performed on project.

C. Manufacturers’ Technical Advisor: Secure the services of a Manufacturers’ Technical Advisor from the Company producing the NVSS for the following:

1. Assist in the formation of the Submittals Packages, and review the Submittal Packages for accuracy and completeness.
2. Engineering associated with interconnections between the Video Surveillance System (Section 282304) and the perimeter alarm system (Section 281605).
3. Engineering associated with interconnections between the NVSS and the cameras.
4. Render advice regarding installation and final adjustment of the system.
5. Coordinate installation of the system and the related work with the other systems.
6. Conduct a pre-installation meeting at the contract site with the installers (and their supervisor) who will be performing the work, the Director's Representatives and facility supervisory and maintenance personnel. The meeting shall be a minimum of 8 hours in duration (held in four 2 hour increments). The topics covered shall include, but shall not be limited to the following:
   a. Manufacturers’ Technical Advisor shall present an overview of the system as it is to be installed.
   b. Manufacturers’ Technical Advisor shall lead a discussion of installation concerns and coordination issues on this system and related systems and related work being installed under this project.
c. Manufacturers’ Technical Advisor shall provide training on procedures for installing system components and precautionary measures installers should be aware of while performing the work.
   1) Manufacturers’ Technical Advisor shall review point to point wiring diagrams with the installers and provide training on termination, bonding and grounding procedures required for proper installation of the system wiring and components.

7. Provide supervision of the installation at the contract site for a minimum of 60 hours and for the following:
   a. Supervise the installation of the NVSS.
   b. Render advice regarding installation and final adjustment of the system.
   c. Coordinate installation of the system and the related work with the other systems.
   d. Perform programming of the system.
   e. Perform preliminary tests of the system.
   f. Train facility security personnel, security supervisory personnel and maintenance personnel in operation and routine (weekly) testing of the system (minimum of four 3-hour sessions).
   g. Train facility maintenance personnel in adjustments, programming, routine maintenance and annual testing of the system (minimum of 8 hours of training – held in four 2 hour increments).
   h. Witness final system test and certify with an affidavit that the system is installed in accordance with the contract documents and is operating properly.
   i. Explain available service programs to facility supervisory personnel for their consideration.

D. Manufacturers’ Technical Advisor (Camera Stations): Secure the services of a Manufacturers’ Technical Advisor from the Company producing the camera stations for the following:
   1. Assist in the formation of the Submittals Packages, and review the Submittal Packages for accuracy and completeness.
   2. Engineering associated with interconnections between the NVSS and camera stations.
   3. Assist the Manufacturers’ Technical Advisor of the NVSS with conducting the pre-installation meeting at the contract site. The Manufacturers’ Technical Advisor for the camera stations shall conduct a portion of the pre-installation meeting. This portion of the meeting shall be a minimum of 2 hours in duration and cover the following topics (but shall not be limited to the following):
      a. Manufacturers’ Technical Advisor for the camera stations shall present an overview of each type of camera station as they are to be installed.
      b. Manufacturers’ Technical Advisor for the camera stations shall lead a discussion of installation concerns and coordination issues on the installation of the cameras stations with the NVSS.
c. Manufacturers’ Technical Advisor for the cameras shall provide
training on procedures for installing the camera stations and
precautionary measures installers should be aware of while
performing the work.
1) Manufacturers’ Technical Advisor shall review point to
point wiring diagrams with the installers and provide
training on termination, bonding and grounding
procedures required for proper installation of the system
wiring and components.

4. Provide supervision of the installation at the contract site for a minimum
of 8 hours and for the following:
a. Supervise the installation of the camera stations.
b. Render advice regarding installation of the cameras.
c. Assist in initial and final adjustments to the cameras.
d. Perform preliminary tests of the system.
e. Train facility security personnel in operation, and routine
(weekly) testing of the cameras (minimum of two 2-hour
sessions).
f. Train facility maintenance personnel in adjustments, routine
maintenance and annual testing of the camera stations (minimum
of 8 hours of training – held in four 2 hour increments).
g. Assist in performing final system test and certify with an
affidavit that the cameras are installed in accordance with the
contract documents and are operating properly.
h. Explain available service programs to facility supervisory
personnel for their consideration.

1.10 MAINTENANCE

A. Service Availability: A fully equipped service organization capable of
guaranteeing response time within 8 hours to service calls shall be available 24
hours a day, 7 days a week to service the completed system.

B. Spare Parts:
1. One complete outdoor PTZ camera station (camera, lens, receiver/driver,
and housing).
2. Eight complete indoor camera station (Of each type) (camera, lens,
housing).
3. 4% of total hard drive purchased.
4. VXS 80MM Mid Axial Fan (#VXS-FAN-MID)
5. One POE Switch
6. Three SFP
7. Two of each type of surge protector
8. Three of each size fuse for all electronic equipment.
9. VXS 80MM Exhaust Axial Fan Rear (#VXS-FAN-REAR)
10. VXS High Efficiency Power Supply (#VXS-PSU)
11. VXS Low Profile INT raid Adapter (#VXS-RAID)
12. VXS OS 200GB 2.5” SSD (#VXS-SSD-200GB)
PART 2 PRODUCTS

2.01 GENERAL

A. All equipment and materials used shall be standard components, manufactured and regularly utilized in CCTV Systems.

B. Furnish only CCTV System equipment that has been thoroughly tested before shipment to the project site.

C. Provide all equipment listed in the following Product Specification sub-sections but not limited to Section 2 of this Specification or Contract Drawings for a complete and operational CCTV System.

D. The system design is based on Pelco’s VideoXpert Platform; a Network Video Management System.

2.02 VIDEOXPERT™ SPACE MOUSE CONTROLLER (KCU)

A. The 3D Space Mouse must be compatible with all VideoXpert Series distributed, network video management components.

B. Patented six-degrees-of-freedom (6DoF) sensor – Intuitively and precisely navigate digital models or camera positions in 3D space.

C. Advanced ergonomic design – The full-size, soft-coated hand rest positions the hand comfortably, and 15 large, soft-touch, function keys allow quick access to frequently used commands.

D. QuickView Keys – Fingertip access to 12 views makes it easier to switch cameras.

E. Intelligent Function Keys – Easy access to 4 application commands for an optimized workflow.

F. On-Screen Display – Provides a visual reminder of function key assignments on your computer screen.

G. 3D Space Mouse Modifiers – Fingertip access to Ctrl, Shift, Alt and Esc keys saves time by reducing the need to move your hand between mouse and 3D Space Mouse.

H. Virtual NumPad – Allows direct numerical input into your application using your standard mouse rather than the 3D Space Mouse.

I. The 3D Space Mouse must be part of an integrated system and shall be configured so any number can be added to the system. When combined with user interfaces (UIs), network storage managers (NSM’s), encoders, IP cameras, and video consoles, the 3D Space Mouse forms an integral part of a complete network-based video control system.
J. The 3D Space Mouse will meet or exceed the following design and performance specifications.

1. Power Supply Specifications
   a. Input Connector Type: Universal, interchangeable

2. 3D Space Mouse Base Specifications
   a. 3D Space Mouse Interface: USB 2.0
   b. Cable: USB

3. 3D Space Mouse Module Specifications
   a. Joystick: Fully proportional PTZ, variable speed; with zoom, iris, and focus controls

4. Physical Specifications
   a. Dimensions: 204 x 142 x 58 cm (8.0” D x 5.6” W x 2.3” H)
   b. Unit Weight: 665 g (1.47 lbs)

5. Environmental Specifications
   a. Ambient Temperature: 21°C to 23°C (70°F to 74°F)
   b. Operating Temperature: 0°C to 40°C (32°F to 104°F) air intake of unit
   c. Storage Temperature: –40°C to 65°C (–40°F to 149°F)
   d. Operating Humidity: 20%-80%

K. Pelco Model Number
1. 3DX-600-3DMOUSE: VideoXpert enhanced 3D Mouse w/joy and Jog Stick

2.03 NETWORK BASED VIDEO SECURITY SYSTEM (NVSS)

A. CORE / CMG (SM)
1. Ability to maintain database of cameras and recording devices, and provide a convenient Web interface.
2. Ability to define administer level user accounts which will have the ability to set new roles and subset and permissions, determining the system functions and devices users can access.
3. Ability to allow the ability to assign resources to recording pools through the Core’s Admin portal.
4. Ability to store videos that operators elect to export from network storage devices for safe keeping.
5. Ability to be deployed as an independent CORE server working with an independent Media Gateway to provide systems functions.
6. Ability to be deployed in the same server as a Media Gateway, thereby creating a single server solution for system functionality.
7. Ability to be deployed as a cluster, providing fault tolerance, scalability and load balancing.
8. Ability to be deployed as a virtual machine.

B. OPS CENTER(WS)
1. To be installed as VideoXpert client software.
2. Client Software is deployable on Standard Windows based machines.
3. Operator workspace can optionally be extended up to 6 monitors or beyond with use of Enhanced Decoders.
4. Allows the creation of Operator workspaces which shall define the layout of control panels, windows, and pre-populated camera channels and other content.

5. Allow users to configure and recall complete workspaces, enabling operators to quickly log in and get the information they need.

6. Client software can be controlled using a standard mouse and keyboard.

7. Client software operation can be enhanced utilizing the 3D mouse, KBD5000, or G710 Keyboard.

C. Recommended Client and Server Hardware Specifications:
1. Core/CMG, and Ops Center must meet or exceed the following design and performance specifications.
   a. System Specifications
      1) Processor: Intel® Xeon® E3-1275 v3
      2) Internal Memory: 32GB DDR3 RAM ECC (Core/CMG), 8GB DDR3 Non-ECC RAM (Media Gateway and Ops Center)
      3) Operating System: Microsoft® Windows® 2012 Server (Core/CMG and Media Gateway), Windows 7 Ultimate SP3 (Ops Center)
      4) User Interface: VideoXpert system software, web browser
      5) Internal Storage: SSD (480GB Core/CMG, 120GB Media Gateway and Ops Center)
      6) Storage: 1TB (Core/CMG)
      7) Drive Bays: 6 (5 unused)
      8) Optical Drive: DVD±RW
      9) USB Ports: 3 USB 2.0 ports (1 Front, 2 Rear) USB 3.0 Ports (rear)
   b. Video Specifications
      1) Video System: Intel HD Graphics P4700 (Core CMG), Intel HD Graphics P4700; supports optional upgrade
      2) Memory: Shared (Core/CMG), Shared; 1GB for OPS-WKS6 (Ops Center)
      3) Video Outputs: 2x DisplayPort, DVI-D, VGA (Core/CMG), 2x DisplayPort, DVI-D, VGA; supports up to 6 outputs for OPS WKS6 (Ops Center)
      4) Max Resolution: DisplayPort 3840x2160 at 60 Hz DVI-D and VGA 1920x1200 at 60 Hz
      5) Video Standards: NTSC 60 Hz, PAL 75 Hz
   c. Audio Specifications
      1) Audio Decoding: G.711 speech codec
      2) Audio Bit-rate: 64kbps
      3) Audio Levels:
         a) Input: Electret microphone
         b) Output: Up to 3 Vp-p, adjustable, minimum load of 8 ohms
      4) Audio Connectors
         a) Connector Tip: 3.5 mm stereo jacks (2x)
         b) Connector Ring: Signal left (input and output)
         c) Connector Sleeve: Common
d. Network Specifications
1) Interface: Gigabit Ethernet (1000Base-T) ports (2x)

e. Front Panel
1) Buttons: Power, configuration/reset:
   a) Unit Status: Green, amber, red
   b) Primary Network: Green, amber, red
2) Indicators
   a) Secondary Network: Green, amber, red
   b) Software Status: Green, amber, red (based on diagnostics)
   c) Hard Disk Status: Green, red, off (behind bezel)

f. Power Specifications
1) Power Input: 100 to 240 VAC, 50/60 Hz, autoranging
2) Power Supply: Internal
3) Cable Type: 1 USA (117 VAC); or 1 European (220 VAC); or 1 UK (250 VAC); or 1 Argentinean (250 VAC); or 1 Australian (250 VAC); All, 3 prongs, method connector
4) Power Consumption:
   a) 100 VAC / 60 Hz: 160.0 W, 1.60 A, 547 BTU/H
   b) 115 VAC / 60 Hz: 160.0 W, 1.39 A, 547 BTU/H
   c) 220 VAC / 60 Hz: 160.0 W, 1.39 A, 547 BTU/H
d) UPS: Compatible with APC Smart-UPS, managed through the VideoXpert product architecture

g. Environmental Specifications
1) Operational Temperature: 10° to 35°C (50° to 95°F) at unit intake
2) Storage Temperature: –40° to 65°C (–40° to 149°F)
3) Operating Humidity: 20% to 80%, non-condensing
4) Maximum Humidity: 10% per hour
5) Operating Altitude: –15 to 3,048 m (~50 to 10,000 ft)
6) Operating Vibration: 0.25 G at 3 Hz to 200 Hz at a sweep rate of 0.5 octave/minute

h. Physical Specifications:
1) Construction: Steel Cabinet
2) Finish:
   a) Front Panel: Grey metallic with black end caps
   b) Chassis: Black matte finish
   c) Dimensions: 58.8 x 43.4 x 8.9 cm (20.0” D x 17.1” W x 3.5” H)
3) Unit Weight
   a) Core/CMG: 14.2 kg (31.4 lbs)
   b) OPS Center: 14.2 kg (31.4 lbs)
   c) Media Gateway: 14.2 kg (31.4 lbs)

i. Certifications:
1) CE, Class A; meets EN50130-4 standard requirements
2) FCC, Class A
3) UL/cUL Listed
4) C-Tick
5) CCC
6) KCC
7) S-Mark

D. Warranty:
1. 36 months, parts and labor

E. Supplied Accessories:
1. USB Keyboard and Mouse
2. Power cord (US)
3. Bezel Key (2)
4. Rack Mount Kit (Brackets, rails, and hardware for Mounting in a 2RU rack)

F. Pelco Model Numbers:
1. CMG-SVR: VideoXpert Core and Media Gateway all-in-one hardware with software licenses
2. COR-SVR: VideoXpert Core server hardware and software license
3. OPS-WKS6: Ops Center workstation with upgraded graphics card, enabling use of up to 6 monitors using Enhanced Decoders (D09U-ENH-DEC)

2.04 VIDEOXPERT™ ENHANCED KEYBOARD

A. The keyboard must be compatible with all VideoXpert Series distributed network video management systems.

B. The mechanical keys deliver responsiveness and tactile feedback superior to rubber-domed keys. With an actuation force and distance of 45 g and 2 mm, respectively, the keys are optimized for rapid command entry. The keys have been tested for durability to a 50 million cycle life.

C. Whisper-quiet key. Quiet, non-clicking key switches, and a built-in dampening ring underneath each keycap significantly reduce the distracting noise coming from your key presses without sacrificing responsiveness.

D. Adjustable dual-zone backlighting, illuminated to locate keys—even in low light. The entire keyboard is backlit in white LED light and adjustable to one of four brightness levels, plus “Off”. For better visibility of the WASD and arrow keys, their brightness can be adjusted independently from the rest of the keyboard.

E. 26-key rollover Multi-key input on the VideoXpert means complex moves can be executed exactly every time. With 26-key rollover, press almost any number of keys plus modifier keys (Control, Alt, Shift) in any order and get exactly what you intended.

F. 110 anti-ghosting keys technology on contact. All 110 keys of the VideoXpert are calibrated to prevent anti-ghosting. During the heat of battle, you need to
simultaneously run, strafe, select a weapon and open a door. Press and hold multiple keys simultaneously without fear of missing or unexpected key presses.

G. USB pass-through to easily connect your mouse or other USB device via the keyboard Hi-Speed USB pass-through for your computer’s USB port.

H. Durable tilt legs stand up under keyboard. The durable tilt legs provide stability and comfort even in your most intense gaming sessions.

I. The keyboard shall meet or exceed the following design and performance specifications.
   1. Keyboard Base Specifications
      a. Keyboard Interface: USB 2.0
      b. Cable: USB
      c. Upstream Port: USB 2.0 (USB type B connector)
      d. Downstream Port: 2x USB 2.0 hi/full/low speed (USB type A connector)
   2. System Requirements: Windows 7, 2 USB ports 70 MB of available hard disk space

J. Pelco Model Number
   1. Y-U0018-G710KBD: VideoXpert Enhanced Keyboard

2.05 VIDEOXPERT™ ENHANCED VIDEO DECODER (ED)

A. The HD network video decoder is to be fully VideoXpert compatible.

B. The HD video decoder needs to support any digital video stream on the network and allow for the decoding of up to 16 simultaneous streams from any video encoder or recorder. It shall also allow for simultaneous and independent viewing of both live and recorded video.

C. The HD video decoder must decode H.264 in High, Main, or Base profiles, and MPEG-4 encoded video streams.

D. The HD video decoder capability to decode up to sixteen 4CIF resolution, 30 images per second (ips) MPEG-4 encoded video streams simultaneously, or up to twelve H.264 Baseline, 4CIF resolution, 30 ips video streams simultaneously, or up to four 1080p streams encoded in H.264 Baseline profile. Additional streams shall be decoded using EnduraView™. EnduraView shall minimize the network bandwidth consumption and CPU processing requirements by automatically subscribing to a lower resolution, lower bit-rate stream from a given camera depending on current load and screen configuration.

E. The HD video decoder will drive one high-resolution monitor through HDMI connections for displaying the video footage.

F. Diagnostics to be systemized with other system components. Any faults shall be reported to users that have subscribed to diagnostic alarms regardless of where the user is located. In addition, the HD video decoder shall also support SNMP messages and traps and be compatible with SNMP versions 1 and 2.
The HD video decoder to meet or exceed the following design and performance specifications.

1. **Power Specifications**
   a. **Power Consumption**
      1) 100VAC 121 W, 1.21 A, 413 BTU/H
      2) 120 VAC 119 W, 0.99 A, 406 BTU/H
      3) 240 VAC 122 W, 0.51 A, 416 BTU/H
   b. **Power Supply External**
   c. **Power Input** 100 to 240 VAC, 50/60 Hz, autoranging

2. **Environmental Specifications**
   a. **Operating Temperature** 10°C to 35°C (50°F to 95°F)
   b. **Operating Humidity** 20% to 80%, non-condensing
   c. **Maximum Humidity** 10% per hour
   d. **Operating Altitude** –16 to 3,048 m (~50 to 10,000 ft)
   e. **Operating Vibration** 0.25 G at 3 Hz to 200 Hz at a sweep rate of 0.5 octave/minute

3. **Video Specifications**
   a. **System**
      1) Maximum Resolution 2560 x 1600 resolution; 60 Hz (NTSC) 50 Hz capability for PAL
      2) Video Coding H.264 in High, Main, or Base profiles and MPEG-4
      3) Decoding Performance 16X real-time MPEG-4 streams at 704 x 480/576 (NTSC/PAL); 16X real-time H.264 Baseline streams at 704 x 480/576 (NTSC/PAL); 8X 720p H.264 Baseline streams; 4X 1080p H.264 Baseline streams
   b. **Video Outputs/Connector**
      1) **Types**, 2: HDMI outputs (2 HDMI-to-VGA adapters supplied)
      2) **Screen Configuration**: On each of monitor: 1 image (1 x 1), 4 images (2 x 2), 9 images (3 x 3), 16 images (4 x 4), 6 images (1 large + 5 small), 10 images (2 large + 8 small), 13 images (1 large + 8 small); Each high definition monitor (16:9 aspect ratio) can also display 6 images (3 x 2) and 12 images (4 x 3)

4. **Network Specifications**
   a. **Interface** Gigabit Ethernet (1000Base-T) ports (2x)
   b. **Front Panel**
      1) **Buttons** Power, configuration/reset
      2) **Unit Status** Green, amber, red
      3) **Primary Network** Green, amber, red
      4) **Indicators**
         a) **Secondary Network** Green, amber, red
         b) **Software Status** Green, amber, red (based on diagnostics)
         c) **Hard Disk Status** Green, red, off (behind bezel)

5. **Certifications**
   a. **CE, Class A**: meets EN50130-4 standard requirements
   b. **FCC, Class A**
   c. **UL/cUL Listed**
d. C-Tick
e. S Mark
f. CCC

H. Warranty
1. 36 months, parts and labor

I. Pelco Model Number

2.06 VIDEOXPERT™ STORAGE MANAGER (NSM)

A. The network storage manager is to record video and audio streams from IP cameras and video encoders on the network.

B. The network storage manager must incorporate the server functions and storage elements into a purpose-built chassis.

C. The network storage manager is to use RAID 6 parity across the storage drives to protect recorded data against a hard disk drive failure.

D. The network storage manager will only use enterprise-level hard disk drives specifically rated for operation in RAID systems.

E. The network storage manager chassis must be designed for video surveillance recording applications and encompass redundancy at all vital points:
   1. Redundant, hot swappable power supply modules
   2. Redundant, hot swappable system fans
   3. Hot swappable O/S drive
   4. Hot swappable CPU fans

F. The network storage manager chassis must be designed for online service and maintenance and cannot be removed from the rack when hard disk drives, fans, power supplies, or operating system drives must be replaced.

G. The network storage manager is to be built upon a reliable and robust Linux® operating system.

H. The network storage manager must support a guaranteed recording throughput of 250 Mbps per storage device with a minimum of 64 Mbps of read throughput. This throughput shall be guaranteed under normal and error (RAID rebuild) conditions.

I. The network storage manager will support any number of cameras so long as the maximum throughput required is less than 250 Mbps.

J. The network storage manager shall support the recording of H.264 in High, Main, or Base Profiles and MPEG-4 streams from standard resolution and megapixel cameras.
K. The network storage manager is to support continuous, scheduled, alarm/event (including analytics alarms), motion, and manual recording. Pre- and post-alarm periods shall be configurable up to the total capacity of the system.

L. The network storage manager must support bookmarking and locking/unlocking of video content on the drives.

M. The network storage manager is to support privacy tools that allow administrators to establish maximum retention times for normal, alarm, and locked video.

N. The network storage manager must support an intelligent video grooming protocol that can reduce the frame rate of recorded video as the video ages. Administrators shall have the flexibility to determine whether to groom alarm video or leave at its real-time level.

O. The network storage manager shall have the ability to report all diagnostic events, including software status diagnostics to a centralized user interface. In addition, Simple Network Management Protocol (SNMP) traps shall be available for monitoring through a third-party SNMP management console.

P. The network storage manager shall be fully managed from a remote workstation, including the ability to configure settings and update firmware and software.

Q. The network storage manager is to be capable of interfacing with the APC® Smart-UPS® using a USB connector. The network video recorder shall receive status and control signals from the uninterruptible power supply (UPS) when it is in backup mode. This function shall inform the operator about the amount of charge remaining and trigger a controlled shutdown when the charge becomes zero.

R. The network storage manager must meet or exceed the following design and performance specifications.

1. Power Specifications
   a. Power Input: 100 to 240 VAC, 50/60 Hz, autoranging
   b. Power Supply: Internal, dual-redundant, hot-swappable
   c. Cable Type: 2 USA (117 VAC)

2. Power Consumption
   a. 100 VAC: 262 W, 2.65 A, 895 BTU/H
   b. 115 VAC: 263 W, 2.31 A, 895 BTU/H
   c. 220 VAC: 254 W, 1.25 A, 868 BTU/H
   d. UPS: Compatible with APC Smart-UPS, managed through the Endura VideoXpert product architecture

3. Environmental Specifications
   a. Operating Temperature: 10° to 35°C (50° to 95°F) at unit intake
   b. Operating Humidity: 20% to 80%, non-condensing
   c. Maximum Humidity: 10% per hour
   d. Operating Altitude: –16 to 3,048 m (–50 to 10,000 ft)
   e. Operating Vibration: 0.25 G at 3 to 200 Hz at a sweep rate of 0.5 octave/minute
4. Physical Specifications
   a. Construction: Steel cabinet
   b. Finish:
      1) Front Panel: Gray metallic with black end caps
      2) Chassis: Black matte finish
   c. Dimensions:
      1) Without Rails: 68.1 x 43.2 x 13.2 cm (24.3" D x 17.0" W x 5.2" H)
      2) With Rails: 62.7 x 48.26 x 13.2 cm (24.7" D x 19.0" W x 5.2" H)
   d. Unit Weight:
      1) Empty: 21 kg (46 lbs)
      2) Fully Equipped: 30 kg (66 lbs)
   e. Mounting: Desktop (feet); Rack, 3 RU per unit (Rack rails and hardware provided)

5. System Specifications:
   a. System Drive: Linux CompactFlash system drive
   b. RAID Level: RAID 6 for storage drives
   c. Effective Capacity: Up to 27.2 TB
   d. Drive Interface: SAS/SATA II
   e. Network Interface: 2, 1 Gigabit Ethernet RJ-45 ports (1000Base-T)
   f. Security: 2 modes: secure mode (device authentication) and unsecured mode
   g. Auxiliary Interfaces:
      1) USB 2.0 2 USB 2.0 Ports on rear panel 1 USB 2.0 port on front panels

6. Front Panel Specifications
   a. Power: Blue Pelco badge
   b. Software Status: Green, amber, red (based on diagnostics)
   c. Network Port 1 Speed: Green, amber, red
   d. Network Port 2 Speed: Green, amber, red
   e. Hardware Status: Green, amber, red
   f. Hard Drive Status: Green, red
   g. Power Button: On, off (soft), off (hard)

7. Certifications:
   a. CE, Class A
   b. FCC, Class A
   c. UL/cUL Listed
   d. C-Tick
   e. S Mark
   f. CCC/CQC

S. Warranty:
   1. 36 months, parts and labor

T. Pelco Model Numbers:
   1. VSM5200-36: Network storage manager, 36 TB storage
   2. VSM5200-48: Network storage manager, 48 TB storage
2.07 SECURITY EQUIPMENT RACKS

A. Security Equipment Rack: fully welded steel frame, modular cabinet rack assembly; Middle Atlantic Products, MRK, having:

1. Number of sections as required to house the system equipment.
   a. Each section 36 inches deep by 19 inches wide panel space, with height as indicated on drawings. Note: The number of sections indicated on the drawings are the minimum number to be provided. If additional sections are required due to the characteristics of the system equipment, provide additional sections as approved.

2. Skeletal frame including top and bottom.
   a. Black e-coat finish and numbered rack spaces.

3. Front, Back, and Side Panels:
   a. Fully vented locking front doors.
   b. Blank panels to cover front panel space where equipment is not installed.
   c. High CFM split rear door, 1320 CFM for 44 space with thermostat regulator.
   d. Set of 4 leveling feet.
   e. Solid top black e-coat finish.
      1) Size as required to enclose equipment indicated on the drawings.
   f. Black enamel finish.

4. Chassis support angles and equipment shelves:
   a. Provide fixed shelves for support of equipment that is not rack mountable.

5. Accessories as required for mounting and support of equipment.

6. Surge Protection Multi-outlet strips mounted vertically within the enclosure with number of 15 amp, 120V ac receptacles (3 wire grounding type) as required for equipment. (Not less than 6 receptacles in each section.)

7. One rack unit keyboard with 17” LCD monitor and 16 port KVM as manufactured by Middle Atlantic, model RM-KB-LCD17X16KVM

8. LED light kit as manufactured by Middle Atlantic, model LT-GN-PNL.

9. One rack unit cable management as manufactured by Middle Atlantic, model PHCM-1-2.

B. Wall Mounted Security Equipment Rack: Pivoting, sectional wall cabinet; Middle Atlantic Products, DWR, having:

1. Tool-Free Quick-Mount system for easy, one-person mounting of the center section to the backpan on the jobsite.

2. 16-guage steel construction with 1/8” thick laser-cut corner braces.

3. Grounding/bonding stud in top and bottom of center section and backpan facilitates proper grounding and bonding of electronic equipment as per NEBS and NEC standards.

4. Finished in a durable black textured powder coat.

5. Reversible pad lockable center section is keyed differently from optional front door for security.

6. Center section rear channel accommodates slim power to save space.
C. Security Equipment Racks:
   1. Seismic Performance: Equipment racks shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. The term “withstand” means “the unit will remain in place without separation of any parts from the device when subjected to the seismic forces and the unit will be fully operational after the seismic event.

2.08 UNINTERRUPTABLE POWER SUPPLY (UPS)

A. Uninterruptable Power Supply (UPS): as manufactured by APC, model No. SMT750.
   1. Smart uninterruptable power supply, 750VA/500W tower.
   2. Output Connections: (6) NEMA 5-15R.
   3. Input Connections: NEMA L5-15P.
   4. Output Power Capacity: 500 Watts / 750 VA.
   5. Multi-function LCD status and Control Console.
   6. Audible Alarm: Alarm when on battery, distinctive low battery alarm and configurable delays.
   8. 3 years repair or replace (excluding battery) and 2 years for battery.

B. Uninterruptable Power Supply (UPS): as manufactured by APC, Model No. SRT5KXLT.
   1. Smart uninterruptable power supply, 5000VA/5.0Kva floor mounted.
   2. Output Connections: 3-wire hard wired utilizing APC Model No. SRT001 output hardwire kit.
   3. Input Connections: Nema L6-30P
   4. Output Power Capacity: 4.25Kwatts / 5.0 kVA.
   5. LED status indicators
   6. Audible Alarm: Alarm when on battery, distinctive low battery alarm and configurable delays.
   7. Battery type: Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.
   8. 3 years repair or replace (excluding battery) and 2 years for battery.

C. Uninterruptable Power Supply (UPS): as manufactured by APC, model No. SMX3000RMLV2U.
   1. Smart uninterruptable power supply, 3000VA/3.0Kva 2U rack mounted.
   2. Output Connections: (6) NEMA 5-15R and (2) NEMA 5-20R
   3. Input Connections: NEMA L5-30P.
   4. Output Power Capacity: 2700 Watts / 3000 VA.
   5. Control Panel: LED status display with On Line, On Battery, Replace Battery and Overload indicators, Multi-function LCD status and control console.
   6. Audible Alarm: Alarm when on battery, distinctive low battery alarm and configurable delays.
   8. Battery type: Maintenance-free sealed Lead-Acid battery with suspended electrolyte, leak-proof.
   9. 3 years repair or replace (excluding battery) and 2 years for battery.
10. (UPS-BAT) UPS Battery supply, as manufactured by APC, model number SMX120RMBP2U.

2.09 FLAT-PANEL HIGH DEFINITION LCD MONITOR

A. The PMCL600 Series FHD LED monitor shall the following features: VGA, BNC and HDMI inputs, picture-in-picture (PIP), looping BNC output, and full high definition resolution.

B. The High Definition LCD monitors shall be capable of providing a maximum of 1920 x 1080P Resolution with front panel controls.

C. The PMCL600 Series FHD LCD monitor shall meet or exceed the following design and performance specifications.
   1. Electrical Specifications
      a. Input Voltage 100 to 240 VAC, 50/60 Hz
      b. Power Consumption
         a. PMCL624 35 W
         b. PMCL643 80 W
      c. Video Input Interfaces
         d. 1 BNC, looping; 1 HDMI (2 HDMI for wall mount); 1 VGA; 1 USB.
      e. Audio Input Interfaces 3.5 mm audio jack
      f. Horizontal Frequency: 15 to 75 kHz
      g. Vertical Frequency 25 to 75 Hz
      h. Sync Format NTSC/PAL

D. Environmental Specifications
   1. Operating Temperature 32° to 104°F (0° to 40°C)
   2. Operating Humidity 10% to 85%, noncondensing

E. Physical Specifications
   1. Dimensions
      a. PMCL624 1.91” D x 21.8” W x 12.92” H
      b. PMCL643 2.5” D x 38.55” W x 22.89” H
   2. Unit Weight
      a. PMCL624 7.9 lb
      b. PMCL643 48.5 lb

F. Mechanical Specifications
   1. Native Resolution 1920 x 1080p
   2. Panel Aspect Ratio 16:9
   3. Viewing Area
      a. PMCL624 20.75 x 11.67 in
      b. PMCL643 37.52 x 21.378 in
   4. Pixel Pitch
      a. PMCL624 0.0106 x 0.0106 in
      b. PMCL643 0.0193 x 0.0193 in
   5. Video Formats 480p, 1080i, 1080p
6. Brightness
   a. PMCL624  250 cd/m²
   b. PMCL643  300 cd/m²

7. Contrast Ratio
   a. PMCL624  1000:1
   b. PMCL643  1200:1

8. LED Backlight Type

9. Panel Life  40,000 hours

10. Viewing Angle (H/V)  178°/178°

11. Displayable Colors  16.7 million

12. Response Time
   a. PMCL624  5 ms
   b. PMCL643  6.5 ms

13. Speakers  2 internal (8 ohms)

14. Front Panel Controls
   Power, left/right, up/down, menu, input.

15. Indicators
   LED (power on/off)

G. Warranty
   1. 2 year, parts and labor

H. Pelco Model Numbers
   1. PMCL624  24-inch
   2. PMCL643  43-inch

2.10 FLAT PANEL MOUNTS

A. The flat panel monitor shall be provided with a wall-mount suitable for the weight and size of the specified unit and provide swivel and/or tilt capabilities.

B. The flat panel monitor shall be provided with side-mounted speakers.

C. The wall mount shall be a Pelco PMCL-Series.

2.11 CAMERA STATIONS

A. General:
   1. The system’s back box shall have three conduit openings. The series is available with a clear lower dome.
   2. The camera system shall offer a large selection of camera and lens options.
   3. The camera system shall meet or exceed the following design and performance specifications.

B. Standard Indoor/Outdoor Camera
   1. General Specifications:
      a. Construction: Aluminum with steel camera mounting bracket and polycarbonate dome
      b. Finish: Light gray polyester power coat
      c. The indoor, vandal-resistant network dome camera shall provide options for clear and smoked lower dome.
d. The indoor, vandal-resistant network dome camera shall provide advanced low-light capabilities for day/night models with sensitivity down to 0.05 lux in color and 0.00 lux in monochrome with infrared.

2. Electrical Specifications:
   a. Network Port: RJ-45 for 100Base-TX, Auto MDI/MDI-X
   b. Input Power: PoE (IEEE802.3af, Class 3)
   c. Power Consumption: 330 mA maximum

3. Mechanical Specifications:
   a. Clear dome with zero light loss and smoked dome with f/1.0 light loss.
   b. Pan/Tilt Adjustment: Manual, 355° pan; 180° tilt

4. Video Specifications:
   a. Frame rates up to 30, 25, 15, 12.5, 10, 5, 1.
   b. Network interface of 100Mbps (or greater)
   c. Video Streams
      1) Multiple simultaneous streams with up to 2 different configurations plus service stream; the second stream is variable based on the setup of the primary stream
      2) Color: NTSC

5. Warranty
   a. 3 years, parts and labor.

6. Pelco
   a. IME Series, refer to camera matrix for exact quantity, mounts and type.

C. Standard Outdoor/Indoor PAN-TILT-ZOOM camera:
1. General Specifications:
   a. The indoor/outdoor network positioning camera shall be a discreet camera dome system consisting of a dome drive with a variable speed/high speed pan/tilt drive unit with continuous 360° rotation.
   b. The indoor/outdoor network positioning camera offer multiple simultaneous video streams with 2.1 megapixel (MPx) 1920 x 1080 resolution, auto iris with 30X optical, and 12X digital zoom.
   c. The indoor/outdoor network positioning camera shall support standard IT protocols.
   d. The indoor/outdoor network positioning camera shall be conformant to the ONVIF, Profile S and support open architecture best practices with a published API available to third-party network video recording and management systems.
   e. The indoor/outdoor network positioning camera shall provide image stabilization to compensate for vibration introduced into the camera.
   f. The indoor/outdoor network positioning camera shall provide user-selectable configurations for day/night auto mode.
   g. The environmental network dome camera shall be NEMA-4X, IP66 rated.
h. The environmental network dome camera shall provide a 3/4-inch NPT conduit attachment in the back box for in-ceiling applications.

2. Electrical Specifications:
   a. Network Port: RJ-45 for 100Base-TX, Auto MDI/MDI-X
   b. Input Power:
      1) 24 VAC nominal, 24VA nominal (without heater and blower), 81VA nominal (with heater and blower)
      2) 24 VDC nominal, 1 A nominal (without heater and blower), 3 A nominal (with heater and blower)
      3) PoE+, 18 W, Environmental Models (with heater on), 15 W, Non-Environmental Models (with heater off),
      4) HPoE, 60 W, Environmental Models (with heater on), 15 W, Non-Environmental Models (with heater off),

3. Mechanical Specifications:
   a. Pan Movement: 360° continuous pan rotation
   b. Pan Speed: Variable between 450° per second continuous pan to 0.1° per second.
   c. Presets: 256 positions
   d. Tours: 16 Tours
   e. Motor: Continuous duty and variable speed, operating at 18 to 32 VAC, 24 VAC nominal.

4. Video Specifications:
   a. Frame rates up to 60, 50, 30, 25, 15, 12.5, 10, 8.333, 7.5, 6, 5, 3, 2.5, 2, 1.
   b. Network interface of 100Mbps (or greater)
   c. Video Streams
      1) Multiple simultaneous streams with up to 2 different configurations plus service stream; the second stream is variable based on the setup of the primary stream

5. Warranty
   a. 3 years, parts and labor.

6. Pelco
   a. The discreet camera dome system shall be the Spectra 1080P S6230-Series Network Dome Positioning System. Refer to camera matrix for exact quantity, mounts and type.

D. Camera Wall Mount:
   1. Fixed:
      a. Finish: Gray Polyester powder coat.
      b. As Manufactured by Pelco model WMVE-SR.
   2. PTZ:
      a. Finish: Gray Polyester powder coat.
      b. As Manufactured by Pelco model IWM.

E. Corner Adapter:
   1. Finish: Gray Polyester powder coat.
   2. As Manufactured by Pelco model CM400 and IWM.

F. Parapet Mount:
1. Parapet, wall/rooftop mount mounts to inside or outside of Parapet wall with 0.375-inch (M8) diameter stainless steel bolts of appropriate length (not supplied). Includes indexing bolts to secure the arm in position.
2. Cable Entry Via cable feedthrough hole in bottom.
3. Maximum Load 45 lb (20.41 kg)
4. Construction:
   a. Aluminum
5. Finish: Gray polyester powder coat
6. Pelco:
   a. PP450 Parapet mount

2.12 SURGE PROTECTION

A. Equip system with surge suppressors to protect equipment from voltage transients and lightning surges. Provide surge suppressors to protect each cable (and conductor) entering and leaving fence accessory stations, and the security equipment rack for exterior devices.
   1. Internal surge protection built-in to system devices is not acceptable protection, provide external surge suppressor units as manufactured by Ditek, Northern Technologies and Transtector.
   2. The type of surge suppressor units to be provided shall be suitable for the circuit it is connected, as recommended by the surge suppressor manufacturer and approved for use by the Company Field Advisor(s) for the Indoor and outdoor CCTV System.

B. Surge Suppressors: Ditek’s Model DTK-1F (provide on each circuit feeding equipment racks)
   1. AC hardwired transient voltage surge suppressor.
   2. Single circuit.
   3. UL, IEEE C62.41B listed.
   5. <5 nsecond installed, <1 nsecond component level response time.
   6. 120 VAC service voltage rated.
   7. 22,500 amps surge current rated.
   8. Operating temperature -40°C to +85°C.
   9. 6,000,000 hours MTBF.

C. DITEK Surge Suppressor.
   1. Provide surge protection on each exterior cameras CAT 6 cable and ACP cable entering and leaving security equipment racks. Provide 6” square box on interior side of building located next to camera for surge protection device. Ground to building steel.

2.13 WIRING

A. Cables:
   1. All electrical characteristics shall meet the requirements of the Company producing the system (attenuation, conductor to conductor capacitance, cross-talk, dc resistance, velocity of propagation, etc.).
   2. Exterior Cameras:
a. For Connections between the Power Over Ethernet Switch (POE) and Camera Stations, provide CAT6 suitable for direct burial and plenum rated. Remove plenum rated below when installed within conduit.

3. Interior Cameras Plenum Rated:
   a. For connection to Fixed Camera Stations located within the building, provide CAT 6 cable; Paige TIA/EIA certified category 6, unless otherwise recommended by camera manufacturers.
   b. For connection to PTZ Camera Stations located within the building, provide CAT 6 cable; Paige TIA/EIA certified category 6, unless otherwise recommended by camera manufacturers.

4. Miscellaneous Cables; provide additional cables as required for System to function as summarized in SYSTEM DESCRIPTION and indicated on the drawings:
   a. Number, size, and type of conductors as recommended by the Company producing the equipment.
   b. Conductors shall be enclosed in a cable with a jacket suitable for the environment that they are to be installed.
   c. Conductors shall be enclosed in a cable with a jacket suitable for the environment that they are to be installed.

2.14 CONNECTORS

A. Connectors: As produced by Amphenol Corp. (Weatherproof type where installed in exterior locations.)

2.15 VIDEO SIGNAL INTEGRITY EQUIPMENT

A. Video amplifiers, differential amplifiers, ground loop eliminators, etc., as required for proper signal transmission to produce sharp, clear, distortion free pictures on monitors.

2.16 MARKERS AND NAMEPLATES

A. Station Locator: Flip type bound file, indexed with tabs and equipped with 8-1/2” x 11” (minimum) plans showing location of each camera station, guard station, and location of all major equipment associated with the system. Enclose each plan in clear plastic envelope so that plans can be removed and updated.

B. Wiring Diagram: One line diagram showing interconnection of all major components associated with the system. Encase with aluminum or stainless steel frame, and plexiglass front.

C. Markers:
   1. Prewmarked self-adhesive; W.H. Brady Co.'s B940, Thomas and Betts Co.'s E-Z code WSL self-laminating, Ideal Industries' Mylar/Cloth wire markers, or Markwick Corp.'s permanent wire markers.
   2. Flexible sleeve markers; Plastic Extruded Parts Inc.’s FS series.
   3. Snap-on markers; Plastic Extruded Parts Inc.’s RS series.
   4. Thermal transfer (non-smearing), Brady's ID PAL hand held labeling tool, portable thermal transfer printer or equal.
D. Nameplates: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
   1. Phenolic: Two color laminated engraver's stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
   2. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

2.17 ENVIRONMENTAL ALARM UNIT (EAU)

A. Temperature sensor with water detection as manufactured by Network Technologies Incorporated.
   1. Enviromux model Enviromuc-5D.
      a. 5 external configurable sensors, 5 digital inputs, 2 output relays.
      b. Configure Smart Alerts for different event combinations.
      c. 100 to 240 VAC at 60 Hz via AC adapter.
      d. Optional 1RU rackmount kit.
      e. Internal battery backup – alerts are sent when there is a power outage and when power returns.
      f. Dual redundant power for connection to two separate power sources.
      g. Supports NTI’s advanced sensors which can be extended up to 1,000 feet using Cat5/5e/6 cable.
      h. Integrates with various Open Source monitoring packages – Nagios and MRTG.
      i. Remote Temperature sensor (Enviromux-STSM-E7):
         Temperature accuracy ±1.26°F for -4 to 41°F and ±0.72°F for 41 to 140°F
      j. Industrial Temperature/Humidity Sensor (ENVIROMUX-STHS-N4085IND-10); Applications from -40 to 185°F (-40 to 85°C) and 20 to 80% relative humidity.

2.18 CAMERA POWER INJECTOR

A. Power Supply (outdoor PTZ cameras and Fence perimeter Fixed cameras), as manufactured by Pelco, POE75U. (Used in enclosures)
   1. 75 Watts of High PoE power for exterior PTZ.
   2. 1 output
   3. 120VAC input
   4. diagnostic LED
   5. operating temperature -4 to 104 degrees Fahrenheit.

2.19 ACCESSORIES

A. Include accessories required to perform the functions summarized in SYSTEM DESCRIPTION and indicated on the drawings.

2.20 NETWORK SWITCHES

A. Ethernet Switch (CES/ES) as manufactured by Avaya, VSP 4450GSX.
1. 12-Ports of 10/100/1000Base-T with PoE+ support
2. 36 ports of 100/1000 Mbps SFP ports
3. 2 ports of 1/10 gig SFP+
4. System CPU operates at 1.2GHz
5. Switch Configured with 2GB of 800 DDR3 DRAM
6. RJ-45 Console port and a USB 2.0 port
7. Ships with 1 set of 19” rack mount brackets
8. Redundant Power Supplies.
9. Dimensions: 1 rack unit
10. Supply Required SFP modules.
11. Electrical Specifications:
     a. Supplied with 1 x 1000W AC field replaceable power supply unit
     b. Supports addition of second field replaceable AC power supply for redundancy
     c. Power consumption without POE is 95W typical and 140W max with a thermal of 324BTU/hr typical and 477.70 BTU/hr max.

B. Power over Ethernet Switch (POE) as manufactured by Avaya, ERS 3524GT-PWR+.
1. 24-Ports of 10/100/1000Base-T ports with support for IEEE 802.3af PoE or IEEE 802.3 at PoE+, with 4 shared SFP powers (combo with ports 21-24)
2. 2 Rear SFP ports can be used as additional ports in Standalone Mode, or, as 2 rear HiStack ports delivering up to 10Gbps (FDX) of Stackable Chassis throughput per switch in Stacking Mode.
3. System CPU speed: 400MHz
4. System memory: 32MB Flash, 128MB DRAM
5. RJ-45 Console port provides industry standard serial port connectivity
6. Switch Capacity and forwarding rate (64-byte): 52Gbps / 38.7Mpps
7. MTBF: 336,357 hrs
8. Dimensions: 1 rack unit
10. Electrical Specifications:
     a. Input Voltage: 100 to 240 VAC at 47 to 63 HZ
     b. Input Current (max): 5.0A@100VAC
     c. Power consumption: 500 Watts max
     d. Thermal output: 357 BTU/hr max

C. Power over Ethernet Switch (POE) as manufacturer by Avaya, VSP 4850GTS-PWR+.
1. 48-Ports of 10/100/1000Base-T ports with support for both IEEE 802.3af PoE and IEEE 802.3at PoE+
2. 2 Shared SFP Ports, Plus 2 x 1/10Gigabit SFP+ ports, Plus 2 x rear HiStack ports delivering up to 384Gbps of Stackable Chassis throughput.
3. System CPU speed: 533MHz
4. Switch is configured with 1 GB RAM
5. RJ-45 Console port provides industry standard serial port connectivity.
6. 146cm HiStack Cable.
7. Dimensions: 1 rack unit
8. Supply Required SFP modules.
9. Electrical Specifications:
   a. Input Voltage: 100 to 240 VAC at 47 to 63 HZ
   b. Power consumption: 112 Watts (without PoE Load), 855 watts Max when operating on one power supply, 1855 watts max when operating on two power supplies.
   c. Thermal output: 383 BTU/hr max

2.21 COPPER PATCH PANEL (CPP)

A. UTP Coupler Patch Panel
   1. Exceeds channel requirements of ANSI/TIA-568-C.2 Category 6 and ISO 11801 Class E standards at swept frequencies 1 to 250 MHz.
   3. Industry Standard interface provides a quick and easy plug and play connection to RJ45 patch cords; backwards compatible.
   4. Factory installed 24-port patch panel mounts
   5. As manufactured by Panduit, model CP24688BL.

B. Cable Management System (CMS)
   1. 2RU
   2. Hinged cover
   3. 48 port
   4. As manufactured by Panduit

2.22 ALARM PANEL (AP)

A. Alarm panel, as manufactured by Honeywell, Vista-20P series.
   1. Aux. power 12VDC, 600mA maximum.
   2. Seven hour standby at 400mA aux. load with four amp hour battery.
   3. Supports up to four relay boards (up to 16 relays).
   4. Eight hardwired zones.
   5. Programmable swinger suppression.
   6. 20 selectable zone types plus four configurable zone types.
   7. 6160 keypad

2.23 THOMAS & BETTS WHILE-IN–USE COVER MODELS CKNM (SINGLE GANG) AND 2CKNM (DOUBLE GANG).

A. Specifications:
   1. High impact UV-resistant polycarbonate base construction.
   2. Weather proof transparent, high impact thermoplastic cover.
   3. Lockable cover design.
   4. UL Listed.

B. Provide the while-in use-covers at all emergency power 120vac receptacles.
2.24 WIRE-PULLING COMPOUNDS

A. To suit type of insulation; American Polywater Corp.’s Polywater Series, Electric Products Div./3M’s WL, WLX, or WLW, Greenlee Textron Inc.’s Y-ER-EAS, Cable Cream, Cable Gel, Winter Gel, Ideal Industries Inc.’s Yellow 77, Aqua-Gel II, Agua-Gel CW, or Thomas & Betts Corp.’s Series 15-230 Cable Pulling Lubricants, or Series 15-631 Wire Slick.

2.25 WIRE MANAGEMENT PRODUCTS

A. Cable Clamps and Clips, Cable Ties, Spiral Wraps, Velcro etc: as manufactured by Catamount/T&B Corp., or Ideal Industries Inc.

2.26 NETWORK TIME PROTOCOL (NTP)

A. 9389: NetClock/GPS NTP Time Server
B. 8225: GPS Outdoor Antenna
C. Cal7050: 50’ of Antenna cable (LMR 400)
D. GPS Surge Protector
E. 5-Year Spectracom Warranty
F. As manufactured by Spectracom

2.27 KEYBOARD/VIDEO/MOUSE EXTENDER (KVM-E)

A. Single Head:
   1. 1920 x 1080 @ 60 Hz
   2. 1”H x 2.9”W x 4.9”D
   3. Connectors
      a. Local unit:
         1) (1) USB Type B F; (1) DVI-D F
         2) Interconnect: (1) RJ-45; (1) 2.5-mm barrel connector; (2) 3.5-mm audio connectors
         3) Power: From the interface or via optional PS649-R3
      b. Remote unit:
         1) (2) USB Type A F; (1) DVI-I D F
         2) Interconnect: (1) RJ-45;
         3) Power: 90-240 VAC, 47-63 Hz, autosensing, external, with IEC 320 connector and cord

B. Dual Head:
   1. 1920 x 1080 @ 60 Hz
   2. 2”H x 3.1”W x 5”D
   3. Connectors
      a. Local unit:
         1) (2) USB Type B F; (2) DVI-D F
2) Interconnect: (2) RJ-45; (2) 2.5-mm barrel connector; (2) 3.5-mm audio connectors
3) Power: From the interface or via optional PS649-R3

b. Remote unit:
   1) (4) USB Type A F; (2) DVI-I D F
   2) Interconnect: (2) RJ-45;
   3) Power: 90-240 VAC, 47-63 Hz, autosensing, external, with IEC 320 connector and cord
4. As manufactured by blackbox, model ACU5502A-R3.

2.28 CAMERA STATION POLES

A. Tapered (continuous) galvanized steel poles, having:
   1. 26 foot nominal height. (As indicated on drawings)
   2. 15 inch minimum bolt circle.
   3. 11 inch minimum shaft diameter at base OE – (3125 inches).
   4. Bracket Arm: 6 feet long, 6 inch diameter, and 7 gage minimum galvanized steel with:
      a. Mounting plate at end for mounting camera station.
      b. 3 x 5 inch minimum handhole with reinforcing frame and cover located at outer end of arm.
   5. 4 x 8 inch minimum handhole with reinforcing frame and cover near top of pole.
   6. 4 x 8 inch minimum handhole near pole base with reinforcing frame and cover. Secure cover with vandal resistant screws.
   7. Mounting plate on top of pole suitable for mounting camera station.
   8. Four 1-1/2 inch diameter anchor bolts 60 inches long with 4 inch right angle leg. Threaded end hot dipped galvanized for minimum of 10 inches. Two galvanized nuts with each anchor bolt. Template for setting anchor bolts.
   9. Pole construction suitable for a deflection rate of less than .26 inches per 100 lbs load at yield 18 inches from top of pole.

B. Acceptable Manufacturers: Union Metal Corporation, Canton Ohio 44711.

2.29 CONCRETE BASES

A. Bases may be precast or poured in place.
   1. Use Concrete as specified in Cast-In-Place Concrete (Section 033001).
   2. Construct concrete pole base as detailed on drawings.
   3. Use reinforcing steel as detailed on drawings.
   4. Install Four 1-1/2 inch diameter anchor bolts 60 inches long with 4 inch right angle leg. Threaded end hot dipped galvanized for minimum of 10 inches. Two galvanized nuts with each anchor bolt. Utilize pole manufactures template for setting anchor bolts.

2.30 UNIVERSAL DEVICE INTERFACE (UDI)

A. Universal device interface for third-party cameras or for ASCII systems.

B. Connections
1. RS-232 DB-9 connector.
2. 1 Gigabit Ethernet RJ-45 (10/100/1000Base-T)
3. 2 USB 2.0 ports, 1 parallel port, 1 S-Video port, audio input/output

C. Power
1. Power input: 12VDC
2. Power Consumption: 60W, 5A, 205 BTU/H

D. Can accommodate IP camera streaming for as many as 16 standard resolution cameras and several megapixel cameras from most manufacturers.

E. Any combination and any mix of IP camera type and manufacturer is supported to reach a maximum bit rate, frame rate and resolution.

F. These cameras can be distributed throughout the network and then associated with a UDI5000 series to translate network communication packets into a standard that is compatible with the system.

G. Provides users with a powerful means by which to leverage investments in legacy analog systems and integrations, while paving the way to leverage the benefits afforded by today’s IP and megapixel camera technologies.

H. Pelco Model Numbers
1. UDI5000-CAM.
2. UDI5000-MTRX.

2.31 OPTICAL FIBER MEDIA CONVERTER (OFMC)

A. POE Media Converter for fixed cameras as manufactured by Pelco, FMCI-PG1PoE (Located in FAS enclosure).
1. Electrical port supports auto negotiation for 10 Mbps, or 1000 Mbps, Full-Duplex or Half Duplex Data.
2. IEEE802.3at Class1-4 Power over Ethernet (PoE) 30W at 48VDC
3. LED Status Indicators for Monitoring All Critical and Normal Operating Parameters.
4. Provide required FSFP modules.
5. External Power supply.
6. Operating temperature -40°f to 167°f
7. Dimensions: 3.30”D x 2.50”W x 1.10”H
8. Electrical Specifications:
   a. Power Input: 48 VDC
   b. Power Consumption: 50W

B. Media Converter rack mounted as manufactured by Pelco, FMCI-BF1SM1STM (for all fence perimeter PTZ and Fixed cameras) and for PTZ cameras as manufactured by Pelco, FMCI-AF1SM1STM (Located in FAS enclosure).
1. Supports Auto negotiation and Automatic medium dependent interface/medium dependent interface crossover (MDI/MDI-X)
2. LED Status Indicators for Monitoring All Critical and Normal Operating Parameters.
3. Stand-alone or rack mountable modular design.
4. Compliant with IEEE 802.3 standards.
5. Full-Duplex Transmission of 10/100/1000 Mbps Ethernet.
6. Provide required FSFP modules.
7. External Power supply.
8. Operating temperature -40°F to 167°F
9. Dimensions: 6.10”D x 5.30”W x 1.10”H
10. Utilize USRACK chassis for rack mounting of device.
11. Electrical Specifications:
    a. Power Input: standard size 8 to 15 VDC, mini AC/DC 22 to 27 VAC or 8 to 24 VDC
    b. Power Consumption: 2W

2.32 ACCEPTABLE MANUFACTURERS:

A. Manufacturer’s names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as “acceptable” may only be substituted for approval provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the “specified” manufacturer. Listing of a manufacturer as specified or acceptable does not relieve the manufacturer of the responsibility to comply with the complete specification.

B. Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as necessary to show compliance with the specification. Information must be submitted at least fourteen (14) days prior to bid due date and be approved by addendum. Product substitution will not be accepted during the submittal process.

C. Contact Mark Wilens at Wilens Professional Sales, Inc. for product information based on products listed in this specification: (845) 679-4300.

PART 3 EXECUTION

3.01 PRELIMINARY TEST RECORDINGS

A. After receipt of approval of submittal package No. 1, perform Preliminary Test Recordings (Video) to verify correct placement of the camera stations.

B. Prior to installation of the system, provide preliminary test recordings of 10% of total camera stations.

1. Perform the following test recording for each camera station:
   a. Temporarily locate the camera stations at the locations indicated on the drawings.
      1) The camera station(s) shall have the cameras, lenses and housings as indicated on the drawings for the camera station(s).
2) Provide temporary supports, cabling, etc. required for the camera station(s) for making the test recordings.
3) Make a digital recording of each camera station test recording for a minimum of 30 seconds.
4) Include written description and/or camera station layout to accompany digital recording to identify each recorded scene.
5) Supply equipment necessary to make the video digital recordings.
6) The temporary installation shall be performed under the supervision of the Company Field Advisor for the cameras.
7) At the start of the recording for each camera station:
   a) A person is to hold a sign up to the camera with the camera station designation written on it that is be recorded in that scene. Sign must be visible in recording playback.
   b) The person is to then walk from end to end of the area to be covered by the camera station.

2. All recordings shall be witnessed by the Director's Representative and the Company Field Advisor(s) for the cameras equipment.

3. Provide a written report for the Director's Representative that includes any recommendations, if any, by the Company Field Advisor(s) for better video coverage.
   a. If during the course of making the preliminary test recordings the Company Field Advisor determines that an alternate location for a camera station might be more appropriate for an area, make an additional recording for that area with the equipment relocated to the location recommended by the Company Field Advisor.
      1) No changes to any equipment's permanent location is to be made without the written request.

3.02 INSTALLATION

A. Pre-installation Meeting:
   1. After approval of Submittals Package 1, conduct Pre-Installation Meeting.
      a. Provide a minimum of 1 week notice to the Director’s Representative, so that a Pre-Installation meeting schedule can be set up with facility personnel and arrangements can be made for a location to hold the meeting.
      b. Provide all materials necessary for training (training aides, handouts, overhead projector, etc.).

B. Install closed circuit television system in accordance with the Company's printed instructions:
   1. Terminations and connections to devices are not to be made until Point to Point Wiring Diagrams (required to be submitted in Submittals Package 2) have been submitted and approved.

C. Camera Station Poles:
1. Install each camera station pole on a concrete base.

2. Prepare a level surface on compacted earth, undisturbed earth or concrete footing. Set bases on the prepared surface. Have all bases checked and approved by the Director's Representative for level and elevation prior to making any conduit connections.

3. Install camera station poles vertical:
   a. Use 2 nuts on each anchor bolt. Run first nut down on the thread to the top of the foundation.
   b. Install pole, run second nut down.
   c. Adjust pole if necessary, then tighten nuts in accordance with pole manufacturer's recommendations.
   d. Grout voids between metal base of camera station poles and concrete base. Create a drain through the grout by slipping a short length of conduit under the base in the wet grout, projecting it into the large drain hole in the base of the camera station poles. Rotate the conduit to finish the drain, then remove conduit.

D. Cables:
1. Optical Fiber cables shall be continuous and un-spliced between the security equipment racks and the camera stations.
2. Install conductors in raceways after the raceway system is completed. Exception: Conductor types specifically indicated on the drawings not to be installed in raceways.
3. No grease, oil, or lubricant other than wire pulling compounds specified may be used to facilitate the installation of conductors.
4. Connect system components requiring a primary power supply to dedicated emergency power branch circuits. 120 VAC Power by Electrical Contractor.
5. Make connections and splices at system components, terminal strip cabinets, and console only. Connections or splices will not be allowed at any other location in the system.
6. Use wire management products to bundle, route, and support wiring in junction boxes, pull boxes, wire ways, gutters, channels, and other locations where wiring is accessible.
7. The security vendor will be responsible for final calculations of power and signal runs to insure the wiring supplies a non-degraded signal and power requirements that meets manufactures specifications for equipment based on final device location and routing back to security headend equipment.
8. Bending and pulling tensions will not be exceeded per the cable manufacturer specifications. Contact manufacturer for specific requirements of the cable to be pulled.

E. Connections:
1. Make connections and splices at camera stations, fence accessory stations. Connections at the security equipment racks (Furnished by Others). Connections or splices will not be allowed at any other location in the system.
2. Use markers to identify conductors at terminal strips, fence accessory stations, and security equipment racks (designations shall correspond with point to point wiring diagrams).
   a. Markers for individual conductors of a multi-conductor cable is not required, if the following requirements are met:
      1) Each individual conductor in the cable is color coded differently from other conductors in the cable.
      2) The multi-conductor cable has a marker identifying it.
      3) The color coding of each conductor is identified on the point to point wiring diagram.

3. Use coaxial cable connectors for splicing and terminating coaxial cables. Use terminal strips for splicing and terminating other types of cable.

F. Surge Suppressors:
   1. Provide surge protection on each CAT 6 cable and ACP cable entering and leaving security equipment racks.
   2. At fence accessory stations: provide surge suppressers on each CAT 6 cable and ACP cable going to camera stations powered from that fence accessory station.
   3. At fence accessory stations: provide surge suppressers on 24 VAC conductors going to camera stations powered from that fence accessory station.
   4. At circuits for equipment racks: Provide surge protection on each circuit.

G. Identification, Labeling, Marking:
   1. Station Locators: Install adjacent to each workstation.
   2. Wiring Diagram: Install adjacent to equipment in hub router security equipment rooms.
   3. Nameplates:
      a. Install nameplate with monitor designation over each monitor.
      b. Install P-touch labels for camera station number on all interior cameras.
      c. Install phenolic nameplates for camera station number on all exterior cameras. Mount on wall or camera pole below camera 10’ AFG.
      d. Install phenolic nameplates for all equipment racks.
      e. Install phenolic nameplates for all equipment mounted in equipment racks.
   4. Identification of Circuits: Identify wires and cables by system and function in cabinets with premarked, self-adhesive, wraparound type markers. Designations shall correspond with point to point wiring diagrams. Wiring must be identified at both ends of wiring and within 3 inches of termination point.
   5. Battery Data: Insert a copy of the battery warranty in each battery compartment and mark on batteries the date placed in service.

H. Mounting Hardware:
   1. Mount all exposed equipment with security grade tamper proof center pin reject style torx type mounting screws.

I. Earth ground of equipment as required by equipment manufacturer.
1. Do not use telephone ground connections as earth grounds.
2. Do not use connections to building structural steel as earth grounds.
3. Provide equipment-grounding conductors to ground bar

3.03 SYSTEM TRAINING

A. After the system is substantially complete and operational, provide on-site training of facility security, security supervisory, and maintenance personnel.
   1. Provide a minimum of 1 week notice to the Director’s Representative, so that a training schedule can be set up with facility personnel and arrangements can be made for a location to hold the training.
   2. Provide all materials necessary for training (training aides, handouts, overhead projector, etc.).

B. System Operation Training: Training shall be set-up so that at the end of training, facility (security, security supervisory, and maintenance) personnel shall have a complete understanding of:
   1. How the system operates.
      a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system.
   2. Knowledge of all components in the system and their function.
   3. How the system is interconnected with other security systems and how the system operates in conjunction with the other systems.
   4. Weekly testing procedures for the system required to be performed.

   Each perimeter zone shall be tested weekly as follows:
   a. Perform the detections system’s weekly test as described by below.
      1) Check to see that the activation of the detection system in that zone (thru the perimeter alarm system) causes the following responses by the perimeter surveillance CCTV system:
         a) Camera stations associated with the alarm points are automatically switched to the video quad and alarm monitor of the CCTV system and switched to the CCTV system’s video recorder. The video recorder should automatically start recording upon alarm.
            (1) Prior to performing a test on a perimeter zone monitored by pan/tilt/zoom camera station, so to confirm proper functioning of the camera station, perform the following:
               (a) Pan the camera station 90 degrees away from the zone that is to be tested.
               (b) Tilt the camera station to an angle other than what will be called up when the zone goes into alarm.
(c) Adjust the lens’ field of view to a setting other than what will be called up when the zone goes into alarm.

(2) Verify pre-position (pre-shot) called-up upon alarm by each pan/tilt/zoom camera station is aimed and focused to completely view the zone in alarm.

(3) Verify video recorder activation by reviewing recorded images after performing weekly testing of automatic camera call-up upon alarm.
   (a) Recorded images should show actions of each camera station upon receipt of the alarms.
   (b) Recorded images will provide record of test having been performed and will provide indication of the quality of the recording and ensure images being recorded are in satisfactory.

C. System Maintenance Training: Training shall be set-up so that at the end of training, facility maintenance personnel shall have a complete understanding of:

1. Routine (monthly, quarterly or annual) maintenance required to the system and how to perform that maintenance.
   a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system.

2. Knowledge of all components in the system and adjustments to the components that they would be required to perform to maintain operation of the system.

3. Programming of the system.
   a. Training should include, but is not limited to the following:
      1) How to program automatic call-up of camera stations as salvos (and set camera station pre-positions) when the zones they are associated with go into alarm.
      2) How to set pre-positioned scenes for each zoom-pan/tilt camera station.
      3) How to program automatic sequencing of camera stations in any order on monitors connected to the output of the enhanced decoder.
         a) How to set dwell time (2 to 60 seconds) that each camera station scene is displayed in sequence on the monitor.
      4) How to set system time and date.
      5) How to program on screen camera station identification displayed for each camera.
a) How to set the identification positioning and brightness for each monitor connected to the output side of the enhanced decoder.

6) How to store and re-store system programming to and from CD’s, via the dedicated workstations.

7) Training should include instruction in all programming required to the system necessary for the system to operate as outlined in the SYSTEM DESCRIPTION.

8) Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system working on the system.

4. How to replace all items listed as spare parts for the system.
a. Training should include precautionary concerns that personnel should be aware of that could effect proper operation of the system working on the system.

5. Annual testing procedures for the system required to be performed by the Department.
a. The perimeter surveillance CCTV system be tested annually as follows:
1) Perform weekly test upon the system.
2) For pan/tilt/zoom camera stations: Verify all pre-positions settings for each camera station is aimed and focused as required.
3) Check the condition of all of the system monitors to ensure that each displays a clear and sharp picture.
4) Check system’s time/date setting.
5) Check operation system from each system keyboards and monitors connected to the system.

3.04 FIELD QUALITY CONTROL

A. Cable Test: Electronically meter test and documents all cables, control wiring, and twisted cables prior to installing equipment and electronically test and document all cables under the supervision of Company Field Advisor. Test for open, grounds, and shorts.

B. Make corrections to wiring prior to proceeding. Advice the Director’s Representative of any cable that cannot be repaired.

C. Provide written test results for all cables and certify operation.

D. Test all cables after installation and prior to connecting new equipment.
1. Cable Testing: The following tests will be performed to ensure that the cable is installed correctly:
   a. Wire map.
   b. Length.
   c. Insertion loss (attenuation).
   d. NEXT loss (Near-End Crosstalk)
   e. PSNEXT loss (Power Sum Near-End Crosstalk).
   f. ELFEXT loss.
   g. PSELFEXT loss (power Sum Equal Level Far-End Crosstalk)
h. Return loss.
i. ACR (Attenuation to Crosstalk Ratio)
j. PSACR (Power Sum Version of ACR)
k. Propagation Delay
l. Delay Skey
m. Model Number: Fluke Networks DTX-1800 Cable Analyzer.

E. UPS Testing:
1. Perform the tests listed below according to manufacturer’s recommendations upon completion of installation of the system.
   a. Simulation of malfunctions to verify proper operation.
   b. Tests of duration of supply on emergency, demonstrations of low-battery voltage shutdown and transfer due to normal source failure. Utilize Load bank of equal load on UPS to test.
   c. Test for 15 minutes to prove capacity of system.
   d. Continue test beyond 15 minutes to automatic shutdown due to low battery voltage.
   e. Submit written report of test results signed by person performing test and the director’s representative.

F. Preliminary System Test:
1. Preparation: Have the Company Field Advisor adjust the completed system and then operate it long enough to assure that it is performing properly:
   a. Adjust each camera's imaging device position ("Back Focus Adjustment") in relationship with its lens to maximize the camera performance. Make adjustments at night (or during the day using a filter). Iris shall be fully open while adjusting the position of the imaging device in the camera. Exact method for adjustments shall be in accordance with the camera and lens manufacturers' printed instructions.
   b. Make adjustments for clear, sharp, distortion free scenes and roll-free vertical interval switching to the satisfaction of the Director's Representative.
   c. Program system, including salvo call-up of camera stations upon alarm as indicated on the drawings and their pre-position programming of each camera station to view the zone in alarm.
      1) Pre-position Tour: Pre-position No. 99 for each camera station shall be set so that with all camera stations set at pre-position No. 99 a complete tour of the facility's perimeter fences associated with the perimeter alarm system is made.
         a) In pre-position No. 99, the entire perimeter shall be covered and automatic sequencing of cameras stations simulates a tour of the perimeter alarm system fence.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in suitable condition to conduct the acceptance test.
      b. Checking and adjusting CCTV equipment.
      c. Training facility personnel.
G. Digital Test Recordings (Scenes):
1. After completion of the preliminary system test and prior to system acceptance test, make digital recordings of the following scenes recorded from the cameras installed under this project:
   a. During daylight with the cameras positioned in pre-position No. 99, consecutively sequence all cameras (with the dwell time set for each camera at 30 seconds) for a minimum period of 15 minutes or until all cameras have been viewed twice.
   b. Same as item "a." above except recording shall be done at night.
   c. Activate a test of each perimeter alarm system zone and record the following:
      1) Record in quad view the salvo (4 camera stations) called up when the zone goes into alarm.
         a) After 30 seconds of recording, and while still recording, pan each camera station covering the zone a minimum 90 degrees away from the zone being tested, clear and re-test the zone and record for another 30 seconds in quad view.
         b) Without moving the camera stations record for a minimum of 15 seconds each of the camera stations at full screen covering the zone being tested.
2. Include written description to accompany tape to identify each recorded scene.
3. Digital recordings shall be suitable for playback on a standard digital MPEG video playback system.

H. System Acceptance Test:
1. Prerequisite: Digital Test Recording of camera scenes must be approved prior to scheduling of the System Acceptance Test.
2. Preparation: Notify the Director's Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
3. Make the following tests:
   a. Test each system function step by step as summarized in SYSTEM DESCRIPTION.
   b. Demonstrate that:
      1) Each camera station provides sharp, clear, distortion free scenes on the associated monitors for the lighting conditions.
      2) Each indoor camera station operates through full range of lighting conditions including: daylight (all fixtures off), general lighting on (at night), and night lights only (at night).
      3) Each outdoor camera station operates through a full range of lighting conditions including low lighting levels. A portion of this test must be performed at night.
      4) Each camera operates through the full range of zoom lens.
      5) Each camera housing operates through the full range of its pan and tilt capabilities.
6) Outdoor camera station mountings are stable in wind conditions at the site.

4. Supply equipment necessary for system adjustment and testing.
5. Submit written report of test results signed by Company Field Advisor and Director's Representative. Mount a copy of the final report in a plexiglass enclosed frame assembly adjacent to the security equipment rack.

END OF SECTION
SECTION 283105

MODIFICATIONS TO FIRE ALARM SYSTEM

PART 1   GENERAL

1.01 ALLOWANCES

A. An allowance for the following portions of the Work of this Section is included in Section 012100:
   1. Services of the Company Field Advisor as described in QUALITY ASSURANCE.
   2. All items listed in SUBMITTALS.
   3. Engineering and reprogramming associated with the installation of the new equipment and updating existing information.
   4. All products listed in PART 2 of this Section except:
      a. Protective devices.
      b. Terminal strip cabinets.
      c. Conductors and cable.
      d. Signs, labels, markers, and nameplates.
      e. Labor for installation of the products is not included in the allowance and shall be included in the contract sum.
   5. Spare parts listed in Part 1 of this Section except protective devices.

1.02 REFERENCES

A. Underwriters Laboratories Inc.
B. National Fire Protection Association Standard 72 and 13” FOR SPRINKLER SYSTEM ALARM AND SUPERVISION.

1.03 DEFINITIONS

A. Initiating Device Circuit: A circuit to which automatic or manual initiating devices are connected where the signal received does not identify the individual device operated. Example:
   1. Circuits from PPSSs and ICUs to non-addressable signal initiating devices.

B. Notification Appliance Circuit: A circuit or path directly connected to a notification appliance. Example:
   1. Circuits from PPSSs and ICUs to notification appliances.

C. Signaling Line Circuit: A circuit or path between any combination of circuit interfaces, control units, or transmitters over which multiple system input signals or output signals, or both are carried. Examples:
   1. Circuits from PSS to building PPSSs and ICUs.
   2. Circuits from PPSSs and ICUs to addressable devices.
D. Operating Mode:
1. Private Mode:
   a. Audible and visible signaling only to those persons directly concerned with the implementation and direction of emergency action initiation and procedure in the area protected by the fire alarm system, and:
   b. Audible and visible signaling only to those persons within special designated areas where private mode operation is specified to be applicable.
2. Public Mode: Audible and visible signaling to occupants or inhabitants of the area protected by the fire alarm system.

1.04 DESCRIPTION OF EXISTING SYSTEM

A. The existing site fire alarm system is a FireworX FX-10RD Zoned System. This system monitors the following existing buildings: Building 1 (houses head end), building 2.

B. The existing fire alarm control panel in building 1, 10 zone, GE FX10RD FACP.

C. Existing System Description:
1. Smoke detectors and smoke sensors operate in conjunction with the systems’ alarm verification program.
   a. The alarm verification operation is selectable by zone for smoke detectors.
   b. The activation of any smoke detector within its zone initiates the alarm verification program.
2. Alarms are processed by the system at 3 levels of priority:
   a. Fire alarms have the highest priority.
   b. Other alarms that require interaction by the attendant have the second level of priority.
   c. Monitored points which do not require interaction by the attendant are the third level of priority.
3. Access to the system functions are controlled thru at least 3 levels of access security to prevent program modifications or use by unauthorized personnel.
4. Alarms, supervisory signals, and trouble signals are distinctively and descriptively annunciated.
5. Switches for silencing audible trouble and supervisory signals transfers the audible signal to a lamp or other visible indicator adjacent to the switches.
6. All system visual and audible trouble signals and visible indication of their restoration is indicated at the PSS.
   a. Each building’s visual and audible trouble signals and visible indication of their restoration is indicated at its PPSS.
7. Monitoring of ground fault conditions indicate a ground fault trouble condition at the PSS.
8. Summary reports are displayed and printed at the PSS upon appropriate keyboard or function command.
9. Life safety control-by-event functions are retained in a non-volatile programmable memory and are not alterable through normal operation of the system.
   a. The life safety control-by-event control points may be manually operated at any time by authorized personnel thru appropriate system commands.
   b. Dedicated switches in the remote annunciator/control centers (RA/CCs) allow personnel to manually operate specific pre-programmed life safety control-by-event control points.
   c. Life safety control-by-event functions are printed and displayed at the PSS.

10. User programmable control-by-event functions may be programmed thru appropriate system commands to automatically activate any user programmable control point upon a status change from any programmable monitor point.
   a. The user programmable control-by-event control points may be manually operated at any time by the authorized personnel thru appropriate system commands.
   b. Dedicated switches in the RA/CCs allows personnel to manually operate each pre-programmed user programmable control-by-event control point.
   c. Assigned messages, date and time are printed and displayed at the PSS for the control points activated by the user programmable control-by-event function.

11. User programmable parameters for automatic time-initiated functions (start/stop, on/off, secure/access, etc.) may be added, omitted and altered thru appropriate system commands.
   a. The time-initiated user programmable control points may be manually operated at any time by authorized personnel thru appropriate system commands.
   b. Dedicated switches in the RA/CCs allows personnel to manually operate each pre-programmed user programmable time-initiated control point.
   c. Assigned messages, date and time are printed and displayed at the PSS for the control points activated by the time-initiated control point.

D. The PSS activates immediately and performs its alarm functions upon receipt of system alarm condition thru actuation of automatic or manual initiating devices:
1. The PSS sounds its audible alarm and illuminates its system alarm lamp or flashing display.
   a. The PSS displays the point and type of alarm condition.
   b. The PSS prints the assigned message with date and time on the printer for the point in alarm.
2. The fire department is automatically called.
3. An authorized person at the PSS presses the acknowledge button which silences its audible alarm and causes a print-out and CRT display of the assigned message for the point in alarm with date, time and an acknowledge prefix.
E. Life Safety Control-By-Event Functions: The PSS, PPSSs and ICUs immediately perform life safety control-by-event functions upon system alarm condition:

1. Audible alarm signal sounds:
   a. Through out the building in which the alarm is initiated. Alarm is transmitted to main FACP and annunciates on main FACP.
   b. An authorized person may silence any alarm signal in progress through a silence command, but subsequent actuation of non-addressable initiating devices in other zones cause the system to resound and record the alarm. Subsequent actuation of another addressable initiating device also causes the system to resound and record the alarm.
   c. An authorized person may activate the alarm notification appliances on selected floors, and all floors, each building, and all areas of the facility.
      1) Visual indicators in the RA/CC at the PSS indicate on/off status of the alarm notification appliances.
2. Visual alarm notification appliances illuminate and flash a fire warning signal.
3. Electromagnetic door hold-open devices de-energize, allowing the associated smoke doors to close.
4. Selected HVAC equipment (fans, air handling units) shut down.
5. Fire dampers and smoke dampers close.
6. Non-motorized rolling fire shutters and non-motorized rolling fire doors close when the associated smoke detecting devices are actuated.
7. Motorized rolling fire shutters and motorized fire doors close when the associated smoke detecting devices are actuated.

F. An authorized person manually resets system at conclusion of alarm condition. When an alarm condition is corrected, a print-out and display occurs at the PSS stating the assigned reset message for the point in alarm with the date, time and reset suffix.

G. Primary and Secondary Power Supplies:
1. Failure of primary power supplies automatically transfers the affected portions of the system to the secondary power supplies.
2. Utilizing the secondary battery power supplies, the system operates under maximum normal load conditions for 24 hours and then is capable of operating all alarm notification appliances used for evacuation for 5 minutes.
3. Upon restoration of primary power supply, the system reverts to normal operation without loss, attendant intervention, or manual re-start procedures.

H. Monitoring Integrity of Installation Conductors and Other Signaling Channels:
1. Performance of Signaling Line Circuits:
   a. Circuits from PSS to PPMCU’s: NFPA 72, Class A, Style 7. A print-out and display occurs to identify trouble conditions.
b. Circuits from PPMCU’s and ICUs to Addressable Devices: NFPA 72, Class B, Style 4. A print-out and display occurs to identify trouble conditions.

2. Performance of Initiating Device Circuits (Buildings _1 & 2):
   a. Circuits from PPMCU’s and ICUs to Initiating Devices (Fire Alarm): NFPA 72, Class B, Style C. A print-out and display occurs to identify trouble conditions.

3. Performance of Notification Appliance Circuits (Buildings _1 & 2):
   a. Circuits from PPMCU’s and ICUs to Notification Appliances: NFPA 72, Class B, Style Y. A print-out and display occurs to identify trouble conditions.

4. Monitoring Integrity of Power Supplies:
   a. An audible and visual alarm, display and print-out indicates failure of the primary (main) power supplies, within the system, at the PSS.
   b. The system also monitors the secondary (battery) power supplies for battery trouble conditions (low voltage/no batteries, high current and charging current).

I. Interconnection of Fire Safety Control Functions:
   1. Monitoring of wiring to the protected premises fire safety function relays and appliances causes a print-out and display to occur at the PSS to identify trouble conditions.

J. Sprinkler System Alarm and Supervision:
   1. Flow of water through a waterflow fire alarm switch causes a system alarm.
   2. Supervision of sprinkler system signal attachments (sprinkler valve supervisory switches, pressure switches, etc.) indicates circuit trouble and supervisory signal conditions at the PSS.
   3. Control valves in the sprinkler system are supervised.

K. Supervision of All Fire Suppression Systems for Tampering:
   1. In addition to the specific supervision functions of each fire suppression system, each system indicates trouble condition at the PSS whenever components of the system are tampered with, opened or removed.

1.05 MODIFICATIONS TO EXISTING SYSTEM

A. Remove and Replace existing zoned fire alarm control panels in buildings 1 & 2 with fiber networked addressable fire alarm control panels.

B. Provide sprinkler valve supervisory and sprinkler alarm capability.

C. Provide multi-point aspirating smoke detectors capable of 40 individual addressable points from a single detector, VESDA #VEA-040-A10-VER-040-40-STX

D. Provide microbore flex tubing from multi-point aspirating smoke detector to client sleeping rooms. Provide with Tamper proof sampling port VESDA #VSP-620.
E. Provide additional addressable smoke detectors as indicated on contract drawings.

F. Provide additional addressable heat detectors as indicated on contract drawings.

G. Remove and replace existing combination horn/strobes with combination horn/strobes.

H. Provide additional combination horn/strobes as indicated on contract drawings.

I. Provide ICU, signal initiating devices, notification appliances, etc.

J. Provide monitor modules to connect existing non-addressable zones to fire alarm control panel.

K. Provide 1-1/4” Conduit with (2) 12-strand Multimode fibers to create a fiber loop from FACP in building 1 to FACP in building 2.

1.06 DESCRIPTION OF COMPLETED SYSTEM

A. The completed system shall operate as outlined in DESCRIPTION OF EXISTING SYSTEM, with the following exceptions:
   1. Actuation of multi-point aspirating smoke detector sends alarm signal to local FACP and initiates annunciation circuit in building and at main FACP.  
   2. Control valves in the sprinkler system are supervised to initiate 2 separate and distinct signals indicating movement of the valve from its normal position.
      a. The off-normal signal is initiated during the first 2 revolutions of a hand wheel or during 1/5 of the travel distance of the valve control apparatus from its normal position.
      b. The second signal indicates restoration of the valve to its normal position. (The off-normal signal remains until the valve is restored to its normal position).

1.07 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Preliminary Submittal: Existing system test report.

C. Submittals Package: Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.
   1. Company Field Advisor Letter: With the submittals package include a letter from the Company Field Advisor stating that he/she has reviewed the Submittals Package for accuracy and completeness, and approves all materials and installation methods included in the Submittals Package.

D. Shop Drawings:
1. Composite wiring and/or schematic diagrams of the modifications as proposed to be installed (standard diagrams will not be acceptable).
   a. Indicate circuits which are power-limited if power-limited wiring is proposed for use.
   b. For 2-hour fire rated cable assemblies show proposed routes and installation details (include UL classification data, listing and system number).
   c. Include transient surge and lightning protection grounding details for signaling line circuits, initiating device circuits, and ac power conductors entering and leaving each fire alarm control panel.

E. Product Data:
1. Catalog sheets, specifications and installation instructions.
2. Bill of materials.
3. Detailed description of completed system operation. Format similar to DESCRIPTION OF COMPLETED SYSTEM.
4. Include for each system component which utilizes batteries the battery ampere-hour capacity recommended for each component by the Company producing the system, for the specified duration.
5. Statement from the Company producing the system, for each size and type of single conductor and multiconductor cable proposed for use, indicating that the electrical characteristics meet the requirements of the Company.
6. Data from the Company furnishing the products, proving that detection devices that receive their power from the initiating device circuit or a signaling line circuit of a fire alarm control unit are UL listed for use with the control unit.
   a. Submit data proving that the software and firmware is listed for use with the control panel.
   b. Submit data proving that the initiating devices are listed for the intended application. Also for specific applications, such as:
      1) Smoke door release accomplished directly from the smoke detecting device, show listing for release service.
      2) Air duct smoke detecting devices, showing listing indicating complete range of air velocities, temperature and humidity expected at the device when the air handling system is operated.
      3) Smoke detecting devices installed in supply air duct downstream of the fan and filters, show detector listed for the air velocity present.
      4) For smoke detecting devices installed in return air system, show listing for the air velocity present where the air leaves each smoke compartment, or in the duct system before the air enters the return air system common to more than one smoke compartment.
   c. Submit data proving that relays and appliances connected to the fire alarm system which are used to initiate control of fire safety functions are listed for the purpose.
d. Submit data proving that the method of monitoring the connection between the fire alarm system and controlled electrical and mechanical systems for integrity is listed for the purpose.

7. Detailed description of procedure proposed to test individual initiating devices.
   a. Include product information pertaining to the test equipment that will be used to perform the tests.
   b. Include certified statement that the proposed test method meets the test requirements of NFPA 72 and UL 268 (cite reference to the applicable NFPA and UL paragraphs).

F. Quality Control Submittals:
   a. Also include copy of identification card issued by the Licensee for each person who will be performing the Work.
2. Company Field Advisor Data: Include:
   a. Name, business address and telephone number of Company Field Advisor secured for the required services.
   b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
   c. Copy of NICET Letter of Approval indicating Level III or higher Fire Alarm Systems certification.
   d. Services and each product for which authorization is given by the Company, listed specifically for this project.

G. Contract Closeout Submittals:
1. System acceptance test report.
2. Certificates:
   a. Affidavit, signed by the Company Field Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
   b. NFPA Record of Completion (NFPA 72 Figure 1-6.2.1) for the modifications.
3. Operation and Maintenance Data:
   a. Deliver 2 copies, covering the installed products, to the Director’s Representative. Include:
      1) Operation and maintenance data for each product.
      2) Complete point to point wiring diagrams of the modifications as installed. Identify all conductors and show all terminations and splices. (Identification shall correspond to markers installed on each conductor.)

1.08 QUALITY ASSURANCE

A. UL Listing: The system products for the modifications shall be listed in the UL Fire Protection Equipment Directory under product category “Control Units System (UOJZ)”.
B. Company Field Advisor: Company Field Advisor shall be National Institute for Certification in Engineering Technologies (NICET) certified as Level III or higher Fire Alarm Protection/Fire Alarm Systems Engineering Technician.

1. Secure the services of a Company Field Advisor from the Company of the existing system for a minimum of 24 working hours at the contract site for the following:
   a. Render advice and witness test of existing system.
   b. Render advice regarding modifications to the system.
   c. Assist in reprogramming the system.
   d. Witness final system test and then certify with an affidavit that the modifications were installed in accordance with the contract documents and are operating properly.

1.09 MAINTENANCE

A. Spare Parts:
   1. 10 percent spare of each type initiating device.
   2. 10 percent spare of each type notification appliance.
   3. 10 percent spare of each type protective device.

PART 2 PRODUCTS

2.01 PEER-TO-PEER NETWORK

A. Network: Equip the fire alarm control panels and other network devices with network interface bus modules able to function with the existing network communication line circuit.

B. Fire Alarm Control Panels/Interconnected Control Units, Simplex’s 4100ES each with network boards suitable for 4 Multi mode fiber optic cable connections (2-Out / 2 Return):
   1. Base selection of each fire alarm control panel upon its capacity and capabilities to the specific requirements of the system at the panels’ location.
   2. Equip the approved fire alarm control panels to function as the PPMCU’s and ICU’s.
   3. Permanently record the installed software and firmware version number within each fire alarm control panel.
   4. 14 gage metal cabinet. Size as recommended by the Company producing the system.
      a. Control switches, inaccessible behind hinged and locked door.
      b. Alarm display and lamps visible when door is closed.
   5. Annunciator (or display) which individually identifies addressable devices and identifies groups of non-addressable devices by zones.
   6. Do not load visual alarm appliance circuit outputs to more than 70 percent of the FACP’s power limited rating.
   7. Input circuits suitable for operation on 120 Vac primary (main) power supply and 24 Vdc secondary (battery) power supply.
8. 24 Vdc Secondary (Battery) Power Supplies: Sealed, lead-acid gelled electrolyte or maintenance free lead-calcium batteries:
   a. Ampere-hour capacity to operate for the same duration and conditions as the existing system.
   b. Battery charger with charging characteristics as recommended by battery manufacturer.
   c. Batteries and charger integrally mounted or separate cabinet mounted as recommended by the company producing the system.
9. Accessories as required for each FACP perform its required functions upon failure of network communications.
10. Transient surge and lightning protection for signaling line circuits, initiating device circuits, and ac power conductors entering and leaving each fire alarm control panel:
    a. Signaling Line Circuits and Initiating Device Circuits: UL listed to Standard 497B; Simplex’s 2081-9027, 2081-9028, 2081-9034, 2081-9043.
    b. AC Power Conductors: Simplex’s 2081-9033, 2081-9042.

C. Remote Auxiliary Power Supplies: Simplex’s 2080 Series:
   1. 14 gage surface mounted metal cabinet. Size as recommended by the company producing the system.
   2. Control switches, inaccessible behind hinged and locked door.
   3. Input circuit suitable for operation on 120 Vac primary (main) power supply.
   4. Regulated and filtered 24 Vdc output.
   5. 24 Vdc Secondary (standby) Power Supply: Sealed, lead-acid gelled electrolyte or maintenance free lead-calcium batteries:
      a. Ampere-hour capacity to operate under load conditions specified in SYSTEM DESCRIPTION.
      b. Battery charger with charging characteristics as recommended by battery manufacturer.
      c. Meters for battery voltage and charging current.
      d. Batteries and charger integrally mounted or separate cabinet mounted as recommended by the company producing the system.
   6. Activated by host FACP via signaling line circuit loop thru addressable modules:
      a. Addressable control monitor activates the power supply outputs.
      b. Addressable monitor module senses power supply trouble conditions.
   7. Supervised power supply, battery, and notification appliance circuits.

D. Remote Addressable Network Modules(RANM):
   1. Individual Addressable Module (IAM): Simplex’s 2190-9172, 2190-9173.
3. Include 24V dc auxiliary circuit(s) as required by RANM type to suit relay operations for control, monitoring, or supervisory functions; or interconnection of fire safety control functions.

E. Remote Annunciator/Control Centers (RA/CCs): Simplex’s Network Node Unit, with:
   1. Surface mounted enclosure.
   2. Flush mounted enclosure.
   3. LCD which is capable of displaying all system points.
   4. Master enable/disable key switch for all control switches behind hinged and locked door having windows for visibility of system functions.

5. Annunciator modules for visual indication of specific life safety control-by-event functions:

6. Annunciator modules for visual indication of specific user programmable control-by-event functions specified in DESCRIPTION OF COMPLETED SYSTEM. Identify each visual indicator with appropriate message.

7. Annunciator modules for visual indication of speaker status.

8. Switch modules for manual operation of specific life safety control-by-event control points:
   a. Alarm notification appliances.

9. Switch modules for manual operation of each user programmable control-by-event control point which is utilized for this project.

10. Switch modules for manual operation of each user programmable automatic time-initiated control point which is utilized for this project.

2.02 INITIATING DEVICES

A. General:
   1. Fire detection devices that receive their power from the initiating device circuit or a signaling line circuit of a fire alarm control unit shall be listed for use with the control unit.
   2. Where individually identifiable (addressable) devices are required, but not available from the Company producing the system, either:
      a. Use non-addressable devices and individually wire each device to the FACP’s as separate monitor points, making each non-addressable device individually identifiable, or:
      b. Employ remote addressable network modules to make each non-addressable device individually addressable.

B. Ceiling Mounted Detectors (Intelligent, Addressable, Analog):
   1. General:
      a. Heat detectors, and photoelectric smoke detectors shall have common mounting base which accommodates interchanging of the different type sensors.
   2. Smoke detectors:
      a. Photoelectric Type: Simplex’s 4098-9714/9798.
1) Photoelectric type smoke detector shall have initial sensitivity level of 3.2.
2) Multi-point aspirating smoke detectors and expansion relay stack: VESDA #VEA-040-A10-VER-040-40-STX.
3) Provide microbore flex tubing: Provide with Tamper proof sampling port VESDA #VSP-620.
3. Heat Sensors:
   a. 135 degrees F (fixed temperature): Simplex’s 4098-9733/9789.

C. Air Duct Smoke Sensors (Intelligent, Addressable, Analog):
1. Photoelectric Type: Simplex’s 4098-9752/3 with 4098-9714.
   a. Listed for the air velocity present at each air duct smoke sensor’s location.
   b. Sampling tube to suit installation.
   c. Local relay (for fire safety control functions from duct detector when applicable):
      1) Relay operation programmable from FACP.
      2) Form C contact(s) rated minimum 1A @ 28 Vdc power-limited, 1/2A @ 120V ac nonpower-limited.
      3) 24 Vdc auxiliary power circuit(s) as required to suit relay operation and function.
2. Remote Alarm Indicator For Use With Air Duct Smoke Sensors: LED type indicator mounted on single gang stainless steel faceplate.
3. Remote Alarm Indicator And Test Switch For Use With Air Duct Smoke Sensors: LED type indicator and key operated switch mounted on single gang stainless steel faceplate.

D. Manual Fire Alarm Boxes:
1. Addressable:

2.03 NOTIFICATION APPLIANCES

A. General:
1. Audible signal appliances shall be UL 464 listed:
   a. Classified “Public” or “Private Mode Only” to suit application.
   b. Marked “F.A. Service” or “F.A. Service - Private Mode Only” to suit application.
2. Visual signal devices shall be UL listed:
   a. For private mode applications, UL 1638 “Fire Protective Visual Signaling Appliance”.
   b. For public mode applications, UL 1971 “Signaling Devices for the Hearing Impaired”.
   c. For wall mounting or ceiling mounting to suit application.

B. Audible/Visual Appliances:
1. Type AVA: Simplex’s 4903/92_ _Series, with:
a. Adjustable output Xenon flashtube strobe:
   1) AVA-15/75: 15/75 candela.
   2) AVA-30/75: 30/75 candela.
   3) AVA-110: 110 candela.

b. Clear lens having FIRE imprinted thereon in red letters, Audible alarm notification appliance:
   1) Type as indicated on the drawings.

C. Horns: Simplex’s 4901 Series Modular Horns, with:
   1. Surface or flush mounted type as indicated on the drawings.
   2. Basic grille type except where projector type is indicated on the drawings.
   3. Weatherproof model where installed in damp or wet locations.

D. Visual Appliances:
   1. Type Simplex’s 4904 Series, with:
      a. Adjustable output Xenon flasher:
         1) VA-15/75: 15/75 candela.
         2) VA-30/75: 30/75 candela.
         3) VA-110: 110 candela.
      b. Clear lens having FIRE imprinted thereon in red letters,
      c. Surface or flush mounted enclosure as indicated on the drawings.

2.04 AUTOMATIC FIRE SUPPRESSION SYSTEM SIGNAL ATTACHMENTS

A. General:
   1. Use non-addressable devices and individually wire each device to the FACP’s as separate monitor points, making each non-addressable device individually identifiable, or:
   2. Employ remote addressable network modules to make each non-addressable device individually addressable.

B. Sprinkler Valve Supervisory Switches:
   1. For Outside Screw & Yoke Gate Valves: Grinnell’s Model F640, Potter Electric Signal Co.’s OSYSU Series, or Simplex’s 2097 Series.
   2. For Post Indicator Valves: Potter Electric Signal Co.’s PCVS Series, or Simplex’s 2097 Series.
   3. For Gate Valves (Non-Rising Stem) and Special Applications: Potter Electric Signal Co.’s PTS, or Simplex’s 2097 Series.

C. Tamper Switches: By Micro Switch or Square D Company to suit installation conditions.

D. Waterflow Switch, Vane Type: Autocall Div., Federal Signal Corp.’s 4160, Potter Electric Signal Co.’s VSR, Reliable’s Model A, or Simplex’s 2097 Series having:
   1. Corrosion-resistant vane.
   2. Splash/dust resistant enclosure with anti-tamper switch.
3. Adjustable pneumatic retard.
4. Screw type wiring terminals.
5. Switch rated minimum 7.0 amps at 125 Vac and 0.25 amps at 125 Vdc.

2.05 PROTECTIVE DEVICES

A. Pull Station Protective Shield: Clear Lexan shield and red frame covering manual pull station. When shield is lifted a battery powered warning horn is activated. The horn is silenced by lowering and realigning the shield.
   1. Simplex’s 2099Series (STI) including:
      a. Batteries.
      b. Weatherproof shield for damp and wet locations.
      c. Mounting accessories.

B. Steel Web Guards (gym only).
   1. For Smoke and Heat Detecting Devices: Simplex’s 2098-Series.
   2. Steel Web Guards for General Application (Horns, Strobes, Speakers, etc.):
      a. Construction:
         1) All welded 7 gage wire.
         2) Nickel plated finish with lacquer coating.
      b. Manufacturer: Chase Security Systems, Inc. 5947 North Milwaukee Avenue, Chicago, IL 60646, Telephone (773) 775-7148, FAX (773) 594-0078.

2.06 TERMINAL STRIP CABINETS

A. Lockable, vandal resistant, surface mounted cabinets constructed of 14 gage steel, size as recommended by the Company producing the system. Equip cabinets with barrier type double screw terminals rated 300 V minimum, meeting UL 94 requirements for materials classed 94 V-0. Use identification strips, tags or labels to identify each conductor. Paint cabinets fire department red and stencil on front in 1/2 inch high white letters, the purpose of each terminal strip cabinet.

2.07 POWER-LIMITED INSULATED CONDUCTORS

A. All electrical characteristics shall meet the requirements of the Company producing the system (conductor to conductor capacitance, dc resistance, velocity of propagation etc.).

B. Multiconductor Cables N.E.C. Type FPLP, FPLR, FPL:
   1. Insulated copper conductors.
   2. Conductors twisted, shielded and jacketed as recommended by the Company producing the system.
   3. Voltage rating of not less than 300 volts (Voltage rating not marked on cable except where cable has multiple listings and voltage marking is required for one or more of the listings).
C. Other types of cables may be used in accordance with N.E.C. Table 760-61 “Cable Uses and Permitted Substitutions”, as approved, if listed as being suitable for the purpose.

2.08 NONPOWER-LIMITED INSULATED CONDUCTORS

A. All electrical characteristics shall meet the requirements of the Company producing the system (conductor to conductor capacitance, dc resistance, velocity of propagation, etc.).

B. Conductors twisted, shielded and jacketed as recommended by the Company producing the system.

C. Single Conductors:
   1. No. 18 and No. 16 AWG: Insulated copper conductors suitable for 600 volts, N.E.C. types KF-2, KFF-2, PAFF, PTFF, PF, PFF, PGF, PGFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, ZFF.
   2. Larger Than No. 16 AWG: Insulated copper conductors suitable for 600 volts, in compliance with N.E.C. Article 310.
   3. Conductors with other types and thickness of insulation may be used if listed for nonpower-limited fore alarm circuit use.

D. Multiconductor Cables N.E.C. Types NPLFP, NPLFR, NPLF:
   1. No. 18 and No. 16 AWG: Insulated copper conductors rated 600 volts, N.E.C. types KF-2, KFF-2, PAFF, PTFF, PF, PFF, PGF, PGFF, RFH-2, RFHH-2, RFHH-3, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, ZFF.
   2. No. 14 AWG and Larger: Insulated copper conductors suitable for 600 volts, one of the types listed in N.E.C. Table 310-13 or one that is identified for nonpower-limited fire alarm circuit use.
   3. Marking: NPLFP, NPLFR, and NPLF marked to suit listings and marked with a maximum usage voltage rating of 150 volts.

2.09 MC CABLE

A. Metal-Clad Cable, N.E.C. Type MC:
   1. All electrical characteristics shall meet the requirements of the Company producing the system (conductor to conductor capacitance, dc resistance, velocity of propagation, etc.).
   2. Conductors twisted, shielded and jacketed as recommended by the Company producing the system.
   3. Interlocked flexible galvanized steel armor sheath conforming to UL requirements for type MC metal clad cable.
   4. Insulated copper conductors suitable for 600 volts.
      a. No. 18 and No. 16 AWG: A type listed in N.E.C. Table 402-3 with a maximum operating temperature not less than 90°C, or types KF-2, KFF-2, PAF, PAFF, PTFF, PF, PFF, PGF, PGFF, PTF, PTFF, SF-2, SFF-2, ZF, ZFF.
b. No. 14 AWG and Larger: One of the types listed in N.E.C. Table 310-13 or of a type identified for use in Type MC cable.

5. Acceptable Companies: AFC Cable Systems Inc., Coleman Cable Co.


2.10 SIGNS, LABELS, MARKERS, AND NAMEPLATES

A. Procedure Sign:
1. Complete Unit: Card holder with aluminum or stainless steel frame, plexiglass front and sheet aluminum card backing plate. Minimum size card 8 x 10 inches. For each procedure sign, furnish 1 blank card in holder and 5 spare blank cards suitable for typing future procedures thereon.
2. Revised Cards: Size as required to fit existing holder, suitable for typing revised procedures thereon.

B. Nameplates: Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.
1. Phenolic: Two color laminated engraver’s stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.
3. Materials for Outdoor Applications: As recommended by nameplate manufacturer to suit environmental conditions.

C. Fire Alarm Signs: 9 x 12 inches, metal, with the words “FIRE ALARM” imprinted thereon in white letters upon a red background. Include a white arrow pointing down, left or right showing the route to, or actual location of the fire alarm stations. Frame the outside edges of the signs in red and white diagonal stripes.
1. Sign Mounting Styles:
   a. Single face for mounting flat against the wall.
   b. Double faced for mounting extended from wall.

D. Manual Fire Alarm Box Signs: Precision engrave letters with uniform margins, character size minimum 1/8 inch high, stating “LOCAL ALARM ONLY - NOT CONNECTED TO FIRE DEPARTMENT-CALL FIRE DEPARTMENT BY TELEPHONE”.
1. Phenolic: Two color (red surface, white core) laminated engraver’s stock, 1/16 inch minimum thickness, machine engraved to expose inner core color.

E. Markers:
   a. Premarked self-adhesive; W.H. Brady Co.’s B292, B708, Ideal Industries’ Mylar/Cloth wire markers, or Markwick Corp.’s permanent wire markers, Plastic Extruded Parts Inc.’s Flexible Sleeve or ID Band Markers, or Thomas and Betts Co.’s E-Z Code WSL self-laminating.
b. Other Styles: To suit application by W.H. Brady Co., Ideal Industries, Marwick Corp., Plastic Extruded Parts, Inc., or Thomas and Betts Co.

2.11 SYSTEM KEYING

A. All system locks, key switches, etc., shall match existing keying.

2.12 ACCESSORIES

A. Include accessories required to perform the functions summarized in DESCRIPTION OF COMPLETED SYSTEM and indicated on the drawings.

2.13 ACCEPTABLE MANUFACTURERS:

A. Manufacturer’s names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as “acceptable” may only be substituted for approval provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the “specified” manufacturer. Listing of a manufacturer as specified or acceptable does not relieve the manufacturer of the responsibility to comply with the complete specification.

Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as necessary to show compliance with the specification. Information must be submitted at least fourteen (14) days prior to bid due date and be approved by addendum. Product substitution will not be accepted during the submittal process.

C. Contact John Vozzy at Simplex for product information based on products listed in this specification: (518) 952-6042

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Testing Existing System:

1. Prior to modifying the system, make the following tests to ascertain the operating condition of the existing system:

   a. Test spare zones that will be utilized for the work.
   b. Test active zones which will be modified. Test all existing devices that are remaining to confirm proper operation.
   c. Test PSS, PPSS and ICU functions associated with the modifications.
2. Test shall be witnessed by the Company Field Advisor and the Director’s Representative.

3. Conduct tests that are disruptive to facility personnel after normal working hours as directed.

4. Prepare a written report for the Director’s Representative indicating the repairs required, if any, to make the existing sub-systems function properly.

5. Repairs to the existing sub-systems are not included in the Work unless requested by Order on Contract.

3.02 INTERUPTIONS TO EXISTING SUB-SYSTEMS

A. Maintain the existing system in its present condition to the extent possible while installing new Work.

B. Prior to making changes or removals relative to the existing system, notify the Director’s Representative and have procedures approved.

C. When changes or removals are required to the existing fire alarm system such that it’s ability to act as a fire alarm system is impaired, provide a temporary fire alarm system so that the building is protected at all times by a functioning fire alarm system. Notify Building Supervisor (thru Director’s Representative) of proposed temporary measures and scheduling. Both the proposed temporary measures and the scheduling must be approved by the Director’s Representative.

D. Provide signs, instructions and alternate methods for reporting a fire.

3.03 INSTALLATION

A. Install the Work in accordance with the Company’s printed instructions unless otherwise indicated.

B. Reprogram the system to include new monitor and control points and update existing system program to include changes and additions requested by facility.
   1. Obtain from the facility personnel through the Director’s Representative, a list of desired system program changes, additions, etc.

C. Do not install smoke detecting devices until the Work (including cleaning) of all trades in the area has been completed. Protect installed smoke detecting devices from airborne dust and debris.

D. Mount smoke detecting devices, and seal air holes in the back of the devices (including interior of raceways and holes associated with installation of boxes and raceways) so that air flow from inside of housing or from the periphery of the housing will not prevent entry of smoke during a fire or test condition. Seal air holes with gaskets, expanding silicone foam, or other sealants as approved.

E. Wiring For Survivability:
1. Signals from manual fire alarm boxes and other fire alarm initiating devices within a building transmitted over the same signaling line circuit shall not interfere with the manual fire alarm box signals when both types of initiating devices are operated at the same time.

2. Failure of equipment or a fault on one or more installation wiring conductors of one notification appliance circuit shall not result in functional loss of any other notification appliance circuit.

3. Connect PPSSs, ICUs and other system components requiring a primary power supply to dedicated branch circuits.
   a. Do not connect PPSS’s and ICUs to a 2 pole device which can trip both poles at once, such as a 2 pole circuit breaker with handle tie (omit the tie).

4. Splices in wiring in vertical risers is prohibited, except when the length of conductors approximate 150 feet in vertical risers, terminal strip cabinet may be used. Exception: For 2-hour fire rated cable assembly, use UL listed methods to maintain 2-hour rating.

5. Avoid splices in horizontal runs. When splices are necessary, use junction boxes. Exception: For 2-hour fire rated cable assembly, use UL listed methods to maintain 2-hour rating.
   a. Make splices with mechanical or hydraulic type pressure connectors. The use of wire nuts is prohibited.
   b. Paint cover of terminal strip cabinets and junction boxes fire department red.

6. Protect notification appliance circuits and other circuits necessary for the operation of the notification appliance circuits from the point at which they exit the fire alarm panel until the point that they enter the notification zone that they serve using one or more of the following methods:
   a. Route all wiring in conduit..

7. Wiring Class A, Style 6, 7, D, E, or Z Signaling Line Circuits, Initiating Device Circuits and Notification Appliance Circuits: Do not install both legs of Class A, Style 6, 7, D, E, or Z circuits in same cable assembly, enclosure, or raceway back to PPSS’s or ICUs.
   a. Run return legs along another route to obtain maximum benefit of these alternate path circuits.

G. Existing RA/CC: Rearrange existing annunciator and switch modules to accommodate new annunciator and switch modules.
   1. Install new annunciator and switch modules in same function location as existing annunciator and switch modules. Arrange the new and existing modules in logical sequential order.

H. Identification, Labeling, Marking:
   1. Procedure Sign Adjacent to PSS: Install revised card in existing procedure sign to suit modifications made to procedures.
   2. Alarm Notification Appliance Locator:
      a. New RA/CCs: Install new zone locator adjacent to RA/CCs.
      b. Existing RA/CCs: Install revised card in existing zone locators to suit modifications made to the RA/CCs.

3. Nameplates:
a. Install on each manual fire alarm box a nameplate stating: Floor number, and location (1st Fl, east, etc.).

b. Install adjacent to each RA/CC annunciator module and switch module a nameplate indicating function of module.

c. Label the device used as the circuit disconnecting means for the dedicated branch circuits serving the system “FIRE ALARM CIRCUIT CONTROL” with white letters on a red background.
   1) Install on each system component requiring a primary power supply a label stating the location of its circuit disconnecting means.

d. Install nameplate on each remote alarm indicator stating the location of its smoke detecting device and the area protected by the smoke detecting device and its function (IN DUCT SMOKE DETECTOR ALARM FOR ________).

4. Power-Limited Circuits: Mark circuits at terminations, indicating that circuit is a power-limited fire protective signaling circuit.

5. Fire Alarm Signs: Where directed, install single face signs mounted flat against the wall at conspicuous locations, drawing attention to the manual fire alarm boxes. Fasten signs to walls with vandal resistant fasteners.


8. Identification of Circuits: Identify wires and cables by system and function in interconnection cabinets, and FACP’s to which they connect with premarked, self-adhesive, wraparound type markers. Designations shall correspond with point to point wiring diagrams.

9. Battery Data: Insert a copy of the battery warranty in each battery compartment and mark on batteries the date placed in service.

10. Alarm Verification Warning Marking: Affix to the inside of each FACP, a list indicating:
   a. Affected circuits.
   b. Delay (seconds).
   c. The smoke detector model numbers used.

I. Fire Suppression Systems Signal Attachments:
   1. Install tamper switches.
   2. Install sprinkler system signal attachments.

J. Protective Devices: Install where indicated on the drawings.
   1. Where devices are installed on wood or masonry surfaces, attach protective devices directly to the surface with vandal resistant fasteners.
   2. Where devices are installed on suspended ceiling provide additional supports in the ceiling, such as channel support system, angle iron or additional runner bars. Fasten the additional supports rigidly to the ceiling runner bar system. Attach frame or brackets of protective device to the supports with vandal resistant fasteners. Install metal spacers
between the protective device frame and the supports so that the ceiling tiles will not be a part of the support system.

3. Use finishing collar between surface and protective device where protective device cannot be mounted tight against surface due to job conditions.

3.04 FIELD QUALITY CONTROL

A. Preliminary System Test:
   1. Preparation: Have the Company Field Advisor adjust the portion of the system applicable to the Work, and then operate it long enough to assure that it is performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in a suitable condition to conduct an acceptance test.
      b. Checking and adjusting equipment.
      c. Training facility personnel.

B. System Acceptance Test:
   1. Preparation: Notify the Director’s Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
   2. Supply all equipment necessary for system adjustment and testing.
   3. Make the following tests:
      a. Test the portion of the system applicable to the Work in accordance with NFPA 72, Chapter 7.
         1) Follow test methods stated in Table 7-2.2.
         2) Record results on NFPA 72 Figure 1-6.2.1 Record of Completion.
      b. Test system operation step by step as summarized in DESCRIPTION OF COMPLETED SYSTEM.
   4. Submit written report of test results signed by Company Field Advisor and the Director’s Representative. Also complete an NFPA Record of Completion.
      a. Mount a copy of the written report of test results, and the NFPA 72 Record of Completion in plexiglass enclosed frame assemblies adjacent to the PSS (one framed assembly for each report).

C. Conduct tests that are disruptive to facility personnel after normal working hours as directed.

3.05 INSULATED CONDUCTOR SCHEDULE - TYPES AND USE

A. Signaling Line Circuits, Initiating Device Circuits and Notification Appliance Circuits:
   1. Power-Limited Circuits: For interior wiring (in raceways) use power-limited insulated multiconductor cable types specified in PART 2 except where a 2-hour fire rated cable assembly is required.
a. Number of conductors and conductor size as recommended by the Company producing the system, except that conductor size shall not be less than No. 18 AWG for signaling line circuits and not less than No. 16 AWG for initiating device circuits and notification appliance circuits.

b. Using Non-power-Limited Wiring On Power-Limited Circuits: Wiring size and types specified for NONPOWER-limited circuits may be used for power-limited circuits if power-limited circuits are reclassified and the power-limited markings are eliminated. Refer to NEC Article 760-52(a) Exception No. 3.

2. Nonpower-Limited Circuits: For interior wiring (in raceways) use nonpower-limited insulated single conductors or multiconductor cable types specified in PART 2 except where a 2-hour fire rated cable assembly is required.

a. Number of conductors and conductor size as recommended by the Company producing the system, except that conductor size shall not be less than No. 18 AWG for signaling line circuits, not less than No. 16 AWG for initiating device circuits, and not less than No. 14 AWG for notification appliance circuits.

3. Where wiring is specifically indicated on drawings not to be run in raceway, use metal-clad cable type MC (concealed, unless otherwise indicated), except where a 2-hour fire rated cable assembly is required.

B. Signaling Line Circuits Between PPMCU’s and Networked ICUs: Use Type LAN-O or type LAN-I optical fiber cables (Section 271525) in raceways for network communication bus circuits.

C. Control Circuits Associated with the Fire Alarm System: use Class 1, 2, and 3 wiring specified in Section 260519.

D. Primary Supply Circuits and Secondary Supply Wiring:

1. Use electric light and power wiring specified in Section 260519.

END OF SECTION
SECTION 284601

ELECTRONIC DOOR LOCKING AND MONITORING SYSTEM

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Video Surveillance System (282304).

B. Intercom and Zone Paging System (275112).

C. Wiring – Division 26.

D. National Electric Code

E. Underwriters Laboratories UL508A

1.02 GENERAL CONDITIONS

A. The conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.

1.03 WORK INCLUDED

A. Included under this Section of the Work shall be the furnishing, installation, connection and testing of the complete electronic door locking and monitoring system. Electronic door locking and monitoring system shall be microprocessor based. The Programmable Logic Controller (PLC) shall be the device that accepts the various inputs from systems being interfaced with door control.

B. Coordination:
   1. The electronic door locking and monitoring system shall be installed by the Security Contractor-Installer (SCI)
   2. The electronic door locking and monitoring system shall be furnished by the Touchscreen Control System Vendor (TCSV).
   3. See Section 087100 for coordination and interface requirements with the Finish Hardware Subcontractor.

1.04 DEFINITIONS:

A. The definition below supersedes the definition in Section 014216 for Technical Advisor and Field Advisor.

B. Manufacturers’ Technical Advisor:
1. An employee of the company producing the system (or a company which lists and markets the primary components of the system under their name) who is certified in writing by the company to be technically qualified in design, installation and servicing of the required products. Personnel involved solely in sales do not qualify.

C. Integrator’s Field Advisor:
   1. An individual employee by an organization (other than the company producing the system) certified in writing by the company producing the system, that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as a field advisor in their behalf. Personnel involved solely in sales do not qualify.

D. Company Field Advisor: An employee of the Company which lists and markets the primary components of the system under their name who is certified in writing by the Company to be technically qualified in design, installation, and servicing of the required products or an employee of an organization certified by the foregoing Company to be technically qualified in design, installation and servicing of the required products. Personnel involved solely in sales do not qualify.

1.05 SYSTEM DESCRIPTION

A. The Security Control and Monitoring System is an integrated monitoring and control system that includes touchscreen stations with control software (touchscreen system), control panels, and programmable logic controllers (PLCs).

B. The Security Control and Monitoring System interfaces directly with the following systems:
   1. Intercom and Zone Paging System (275112)

1.06 COOPERATION WITH OTHER TRADES

A. The Contractor shall coordinate the work of this Section with that of other Sections as required ensuring that the entire work of this Project will be carried out in an orderly, complete, and coordinated fashion.

B. Coordinate with specific hardware used by Division 8 Contractors for builder’s hardware and security hardware.

C. Division 28 responsibilities shall include the following:
   1. Division 28 shall be responsible for furnishing and installing all equipment, installation, terminations, and testing of systems defined in Division 28.
   2. Termination to locking hardware shall be via Molex connector pigtails. Division 11 and Division 8 shall provide pigtails.
   3. Provide all control hardware and systems to control and/or monitor a door in accordance with the requirements of Division 28 and the wiring diagrams provided by Division 11.
   4. After installation, verify proper control operation of all doors.
5. Coordinate with specific hardware used by Division 8 for builder’s hardware and security hardware.
6. Division 28 shall be responsible for coordination of all interfaces with Division 26 for any lighting or power controls or Fire Alarm System interface that may be required from the Division 28 control systems. Unless stated otherwise, all interfaces shall be via dry contacts provided by Division 26.
7. Division 28 shall be responsible for coordinating with Division 26 the exact locations and requirements for electrical power provided to the security equipment.
8. Division 28 shall be responsible for ensuring that all security system equipment is powered from an emergency power panel and that all system processors and alarm devices are powered from an uninterrupted power system (UPS). Other systems to be powered from a UPS are specified herein.

D. Division 8 responsibilities shall include the following:
   1. Furnish and install door locking hardware as required for the system to perform the functions as defined herein.
   2. Provide a single point of connection for Division 28. For swing doors, the interface point shall be the lock pocket. For sliding doors, the interface point shall be a junction box in the frame and shall be shown on the shop drawings.
   3. The wiring interface shall be via a Molex connector. The mating connector, to which the Division 28 conductors are connected, shall be furnished to the Division 28 contractor with a 6” long conductor pigtail.
   4. Furnish, project specific, wiring drawings and other information as required for design and installation of the control drawings.
   5. After installation, adjust all locks and switches for proper mechanical alignment.
   6. Provide boxes or pockets as required to accommodate door position switches, locks, and/or push buttons.
   7. Provide interconnecting conduit between the door position switch and the lock pocket.
   8. Extend the lock pocket to accommodate jamb mounted push buttons or provide a means to install and maintain push buttons where installed.

E. Division 26 electrical responsibilities shall include the following:
   1. Furnish and install all conduits and wiring required for the systems defined in Division 28.

1.07 SUBMITTALS

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 013300 does not apply to this Section.

B. Submittals Package: Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.

C. Shop Drawings:
   1. Bill of materials.
2. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be accepted).
3. Total electrical load of the complete system in supervisory and alarm conditions.
4. Detailed description of system operation (format similar to SYSTEM DESCRIPTION).

D. Product Data:
1. Catalog sheets, specifications and installation instructions.
2. Name, address and telephone number of nearest fully equipped service organization.

E. Specific Requirements:
1. Submit coordination meeting minutes showing review of each door opening and operation.
2. Submit catalog cuts for all equipment and devices being furnished under this Section.
3. Submit floor plans showing locations of all control equipment.
4. Submit wiring diagrams for complete interconnection of the system
   a. Typical wiring diagrams for each device along with termination schedules listing all devices
   b. Wiring details for each piece of head end equipment.
   c. Pin-out drawings for all multi conductor cables

F. Quality Control Submittals:
   a. Include copy of identification card issued by the Licensee for each person who will be performing the work.
2. Manufacturer Technical Advisor Data shall include the following:
   a. Name, business address, and telephone number of Manufacturer Technical Advisor secured for the required services.
   b. Certified statement from the Company listing the qualifications of the Manufacturer Technical Advisor.
   c. Services and each product for which authorization is given by the Company, listed specifically for this project.

G. Contract Closeout Submittals:
2. Certificate: Affidavit, signed by the Manufacturer Technical Advisor and notarized, certifying that the system meets the contract requirements and is operating properly.
3. Operation and Maintenance Data:
   a. Deliver 2 copies, covering the installed products, to the Director’s Representative. Include:
      1) Operation and maintenance data for each product.
      2) Complete point-to-point wiring diagrams of entire system as installed. Number all conductors and show all terminations and splices. (Numbers shall correspond to numbered tags installed on each conductor.)
      3) Name, address, and telephone number of nearest fully equipped service organization.
H. Security Vendor to submit proof of state licensure for installation of security systems.

I. Security Vendor to submit proof of installer certification for all equipment to be installed on project.

J. Shop Drawings:
   1. Diagrams for cable management system.
   2. See Editing Instruction No. 5 in the Evaluations for discussion of graphic standards for Drawings.
   3. System labeling schedules.
   4. Detailed wiring diagrams, to include a detailed non-typical system one-line along with detailed device wiring.
   5. Cable administration drawings.
   6. Battery and charger calculations for central station, workstations, and controllers.
   7. Floor plan drawings indicating all field device locations including unique architectural numbers or labels.
   8. Door schedule.
   9. Project specific, typical, field device wiring diagrams.
   10. Termination schedules.
   11. Equipment room enclosures, equipment layout information.
   12. System load calculations.
   13. Touchscreen control system one-line drawing.
   14. PLC backplane drawings and Bill of Materials for each and every PLC backplane.
   15. Individual equipment wiring details.

K. Control Software Submittal
   1. Within 30 days of receiving the approved paper submittal, provide a self-installing system software submittal on CD-ROM. All graphic operations shall be functional. All building layouts, icon placements, supplementary windows, etc. shall be complete. The submittal shall essentially be a working version of the Control Software Module less PLC communications.
      a. BITMAP
      b. ICON STATE NAME
      c. DESCRIPTION
      d. COLOR
      e. SOUND
      f. ALARMED
      g. FLASHING
      h. RECORD
      i. ICON VISIBLE
      j. LED VISIBLE

L. Factory Demonstration:
1. Approximately 90 days prior to the scheduled completion of the project, schedule a demonstration for one Owner's representative and one Architect/Engineer representative to witness a demonstration of the complete touchscreen control and monitoring system assembled in the TCSV’s factory. Both the SCI and TCSV shall be present during testing. The complete and entire touchscreen control system shall be assembled for the demonstration. All touchscreen stations, PLCs, Administration computer, data terminals, printers, equipment enclosures, etc., shall be 100 percent networked and tested complete. One of each function, general features, and system performance shall all be demonstrated. Additionally, the Administration and Documentation software modules shall be demonstrated. Following successful completion of the Factory Demonstration, the touchscreen control and monitoring system shall be deemed substantially complete.

1.08 DOCUMENTATION SOFTWARE

A. All Security System documentation shall be provided by means of the Documentation Software Module. The Documentation Software shall be fully functional as specified herein. Submission of paper documents, a series of electronic files, or an electronic manual (PDF document or similar) is not acceptable.

B. Documentation Software Module

1. The primary purpose of the Documentation Software is to provide a means by which the construction team (on the front-end) and maintenance personnel (on the back end), of a project can access information pertaining to the Security Control System as simply and efficiently as possible. This is accomplished by means of an intuitive, dynamic, graphical interface. Selecting field device symbols on a floor plan or site graphic provides access to the information pertaining to that device. The Documentation Software shall be provided on the Administration Computer.

2. Main Components of Documentation Software:
   a. MAIN VIEW - area of the screen where the "current" document is viewed.
   b. NAVIGATION PANEL - presents a "tree structure" of all documents and information contained in the Graphical Documentation Software.
   c. TOOL BAR - provides a means of navigating and printing the documentation.

3. Graphic Operation:
   a. Provide dynamic images, without breaks, from which the user can intuitively access system documentation. The images shall be accurately and proportionally scaled to the actual building or Site layout and of sufficient size as to accommodate all monitored and controlled devices in the form of symbols. The symbols shall be positioned proportional to the devices' actual position relative to the building graphic. Each unique device shall be represented by a unique symbol.
      1) Site Plan (1 image).
2) Each floor of each building (1 image per floor).

b. It shall be possible to zoom in, zoom out, and pan any given image. This functionality shall be accessible via the tool bar or by selecting the right mouse button.

4. System Functionality:
   a. Selecting a “Field Set” symbol with the mouse shall make available all information pertinent to that specific device. That information shall be displayed directly or via a hyperlink and shall include at a minimum:
      1) Device ID and label.
      2) All “Field Set” information including name, number, power requirements, cable requirements, and bill of material.
      3) All “Function” information including name and full functional description.
      4) All PLC IO termination data including “Rack Set” (a piece of equipment mounted in a rack) name and location, equipment room and PLC names, IO type, memory address, termination point and description, and power requirements.
      5) All "Group" information including all members of each group and their respective PLC addresses.
      6) All device schedule information.
      7) All pertinent "Documents" including rough-in drawings, physical drawings, wiring diagrams, manufacturers' installation, operation, and maintenance manuals. All documents shall be viewable directly from the Documentation Software program.

b. The Documentation Software shall also allow the user to view all information contained in the Electronic Documentation System via the FOLDER ITEMS. The following is a list of the minimum "Folders" required, their respective contents, and operation:
   1) Floor Plans - Selecting the floor plans folder shall present a list of all floor plans available for viewing.
   2) Equipment Rooms - Selecting the equipment rooms folder shall present a list of all equipment rooms. Selecting a specific equipment room shall present a floor plan of that equipment room and present a list of all equipment racks within the specific equipment room. Selecting a specific equipment rack shall present a scaled elevation graphic of that rack. The elevation graphic shall show all the relevant views (front, back, left, and/or right). Selecting and highlighting a subpanel on the elevation graphic shall present all corresponding Rack Set information previously described above.
   3) PLCs - Selecting the PLCs folder shall present a list of all PLCs (programmable logic controllers) available for viewing. Selecting a specific PLC shall present an I/O (Input/Output) table for that PLC. I/O shall be presented such that an individual "cell" in the table represents each
bit. Rows shall represent channels or words. Columns shall represent bits 0 to 15. Cells shall be "color coded" based on I/O type. All "hard I/O" cells shall contain termination information including rack, rack set location, and terminal number. When a bit is associated with a group (example: Interlock group), that information shall also be provided. It shall be possible to filter the information contained in the I/O table cells. Selecting any cell within the table shall present all corresponding Rack Set information previously described in paragraph above.

4) Field Sets - Selecting the field sets folder shall present a list of all field set types available for viewing. Selecting a specific field set type shall present information common to the selected field set type and present a list of all available field devices (by architectural number) of that type. Selecting a specific field device shall present all corresponding Field Set information previously described in paragraph above.

5) Rack Sets (rack mounted equipment) - Selecting the rack sets folder shall present a list of all rack set types available for viewing. Selecting a specific rack set type shall present information common to the selected rack set type and present a list of all available rack sets (by rack location) of that type. Selecting a specific rack set shall present all corresponding termination information.

6) Functions - Selecting the functions folder shall present a list of all function types available for viewing. Selecting a specific function type shall present a list of available functions (by location) of that type. Selecting a specific function shall present all corresponding termination information.

7) Groups - Selecting the Groups folder shall present a list of all Group types available for viewing. Selecting a specific Group type shall present a list of available Groups (by location or name) of that type. Selecting a specific Group shall display all members of that group and their respective PLC addresses.

8) Schedules - Selecting the schedules folder shall present a list of all schedules available for viewing. Selecting a specific schedule shall present all data pertaining to that schedule. Selecting any "Field Set" device in a schedule by its architectural number shall present all Field Set information previously described in Paragraph 1.7.B.4. above.

9) Documents - Selecting the documents folder shall present a list of sub-folders for each document type:
   a) Maintenance and Troubleshooting
   b) Drawings Audio
   c) Drawings CCTV
   d) Drawings Computer
e) Drawings Door
f) Drawings Floorplan
g) Drawings PLC
h) Drawings Power
i) Drawings Rack
j) Drawings System
k) Functions
l) Manuals
m) Miscellaneous
n) Product Data

10) Selecting a document’s sub-folder shall present a list of all documents contained in that subfolder. Selecting a specific document shall display that document.

11) Suppliers - Selecting the Suppliers folder shall present a list of all suppliers with contact information and a link to their web site (Internet connection required).
   a) All schedules and tables included in the Documentation Software shall present "live" data, which can be filtered and sorted and shall contain hyperlinks as described above.
   b) All information contained in the Documentation System must be printable. The user shall be able to print customized reports by filtering and sorting the presented data.
   c) Whenever “Field Set” information is displayed, the “Field Set” device shall be zoomed and centered on the floor plan graphic automatically or by selecting the “Locate on Floor plan” hyperlink.

1.09 MAINTENANCE

A. Service Availability: A fully equipped service organization capable of guaranteeing response time within 8 hours to service calls shall be available 24 hours a day, 7 days a week to service the on-going installation and the completed system.

1.10 QUALITY ASSURANCE

A. Company Testing Facility: The Company producing the system shall have test facilities available which can demonstrate that the proposed system meets Contract requirements.

B. Equipment Qualifications For Products Other Than Those Specified:
   1. At the time of submission, provide written notice to the Director of the intent to propose an “or equal” for products other than those specified. Make the “or equal” submission in a timely manner to allow the Director sufficient time to review the proposed product, perform inspections and witness test demonstrations.
   2. If products other than those specified are proposed for use, furnish the name, address, and telephone numbers of at least 5 comparable
installations that can prove the proposed products have performed satisfactorily for 3 years. Certify in writing that the owners of the 5 comparable installations will allow inspection of their installation by the Director's Representative and the Manufacturer Technical Advisor.

a. Make arrangements with the owners of 2 installations (selected by the Director) for inspection of the installations by the Director's Representative. Also obtain the services of the Manufacturer Technical Advisor for the proposed products to be present. Notify the Director a minimum of 3 weeks prior to the availability of the installations for the inspection, and provide at least one alternative date for each inspection.

b. Only references from the actual owner or owner’s representative (Security Supervisor, Maintenance Supervisor, etc.) will be accepted. References from dealers, system installers, or others, who are not the actual owners of the proposed products, are not acceptable.

1) Verify the accuracy of all references submitted prior to submission and certify in writing that the accuracy of the information has been confirmed.

3. The product manufacturer shall have test facilities available that can demonstrate that the proposed products meet the Contract requirements.

a. Make arrangements with the test facility for the Director's Representative to witness test demonstrations. Also obtain the services of the Manufacturer Technical Advisor for the proposed product to be present at the test facility. Notify the Director a minimum of 3 weeks prior to the availability of the test facility, and provide at least one alternative date for the testing.

4. Provide written certification from the manufacturer that the proposed products are compatible for use with all other equipment proposed for use for this system and meet all contract requirements.

C. Manufacturer Technical Advisor: Secure the services of a Manufacturer Technical Advisor for a minimum of 40 working hours for the following:

1. Render advice regarding installation and final adjustment of the system.
2. Assist in initial programming of the system.
3. Witness final system test and then certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.
4. Train facility personnel on the operation and maintenance of the system (minimum of 3 one hour sessions).
5. Explain available service programs to facility supervisory personnel for their consideration.

D. Service Availability: A fully equipped service organization capable of guaranteeing response time within 24 hours to service calls shall be available to service the completed Work.

1.11 TOUCHSCREEN SYSTEM GENERAL FEATURES:

A. For systems with more than one PLC, failure or communication loss to one PLC shall not effect communication to the other PLCs or disrupt or delay control and
monitoring of any device unrelated to the failed PLC. Furthermore, when the failed PLC is restored, the control and monitoring of devices related to the restored PLC shall immediately continue without restarting the application.

B. Failure of any one touchscreen station, the administration station, or other networked computer shall not affect the operation of any other station. All touchscreen stations shall communicate directly with the PLCs for all control and monitoring functions. Systems that utilize a file or data server to facilitate communication are not acceptable. PLCs shall be located in each equipment room as indicated on the Drawings.

C. Each touchscreen station shall be configured with all the software and graphic files required for all locations. Each touchscreen shall automatically recognize its intended location upon startup and configure itself accordingly. If the intended location is not recognized (as in the case of a spare touchscreen), a window shall be displayed requiring selection of the current location. In the event that one touchscreen must be moved, its intended location identity shall be able to be changed allowing it to be operated in a new location without software changes or updates.

D. The system shall utilize voice instructions for alerting the operator to alarm conditions and critical control sequences such as interlock, interlock override, emergency release, and other functions. There shall also be a voice annunciation ON/OFF switch to enable and disable the voice instructions.

E. The Control Software Module shall be self-updating. All software updates shall be performed so that the operator needs only to exit and restart the Control Module for the updates to be recognized. File copies, program installs, etc., shall not be required. Furthermore, all software and data updates shall be made via dial-in communication over a facility provided phone line. Other than enabling the dial-in communication, all updates shall be done without requiring assistance from the facility.

F. All logged event data shall be initially stored on the local touchscreen station and then periodically transferred to the Administration computer at intervals adjustable by the facility. The default interval shall be every 60 minutes. The facility shall also have the means to immediately transfer all data at any time as necessary. Upon confirmation of transfer, the data shall be removed from the local touchscreen station so that its hard disk does not become full over time. All data shall be stored in an encrypted format to prevent alteration.

G. The computer mouse and touchscreen transducer shall operate interchangeably and simultaneously. The operator shall be able to hide the mouse pointer to minimize distraction.

1.12 TOUCHSCREEN SYSTEM - FUNCTIONS - GENERAL

A. Icon Functionality:
   1. OVERVIEW: All system control shall be accomplished through graphical buttons known as ICONS. System monitoring shall be accomplished through changes in the icon's bitmap graphic and
associated virtual LED. System activity shall be instigated from a field input (such as an intercom station) or from the touchscreen (such as pushing the “open” icon for a sliding gate). How the system reacts to this activity shall be defined by its FUNCTION. Each icon shall have one specific function and one unique description. For example, a function would be “intercom control and monitoring.” A description would be the architectural number for a specific intercom station. Each icon function shall be comprised of multiple icon states as required for proper operation. For example, the “intercom control and monitoring function” could have three possible states: idle, calling, and active. It could only be in one of the three possible states at any given time.

2. ICON STATES: Each icon state shall have, at a minimum, the following properties:
   a. ICON BITMAP - The bitmap graphic that appears on the icon in the zoom view. The bitmap shall graphically depict the current state of the device.
   b. ICON STATE NAME - Each icon shall always be in one and only one of the available states. The states shall always be the same for a given function.
   c. DESCRIPTION - Describes the Icon state.
   d. COLORS - Indicates the main color of the Icon and associated virtual LED. Red shall typically indicate non-secure, emergency or alarm functions, activities, or conditions. Yellow shall typically indicate caution conditions such as intermediate steps in control sequences and "access" conditions. Green shall typically indicate a secure condition. Other colors shall be utilized as necessary in a consistent manner.
   e. SOUND - An associated sound file that plays in repeating intervals (usually in the alarmed state) Alarm sounds shall be distinctly discernible from each other and from intercom call-in sounds and touchscreen feedback sounds.
   f. ALARMED - Indicates whether or not the Icon is alarmed. If alarmed, it shall also indicate what priority has been assigned. All alarms shall be displayed in the event queue sorted first by priority and second by date/time.
   g. FLASHING - Specifies whether the icon bitmap and associated virtual LED flashes on and off or remains constantly on.
   h. RECORD - Indicates if the event is recorded to the Administration computer.
   i. ICON VISIBLE - Indicates if the Icon is visible or hidden. Hidden Icons shall be used for functions such as PLC alarms where the Icon only needs to be visible in an alarmed state. This minimizes clutter on the graphics.
   j. LED VISIBLE - Indicates if the status LED is visible or hidden.

1.13 TOUCHSCREEN SYSTEM - FUNCTIONS - SPECIFIC:

A. Specific Icon Control Functions: The following descriptions may not include all control and monitoring functions for all icons required for this project but provides a representative sample to indicate the type and level of control and monitoring expected.
B. Door Control and Monitoring

1. SWING DOORS
   a. CONTROLLED AND MONITORED. Selecting the Door Icon will display a control bar with several options, Unlock Door, Activate Hold Open, and Hide. Selecting the Unlock Door option will energize the lock relay for a preset time. The Door Icon shall be unsecured as long as the door is open or unlocked. When the door is closed and locked, the Door Icon shall return to the secured state. Open relay times shall be adjustable via the Administration computer.
   b. HOLD OPEN. Selecting the Door Icon will display a control bar with several options, Unlock Door, Activate Hold Open, and Hide. Selecting the Activate Hold Open option will energize the lock relay. The Door Icon shall change to the hold state and the door relay shall be maintained. The Door Icon shall be unsecured as long as the door is open or unlocked. Selecting the Door Icon a second time shall de-energize the door relay. When the door is closed and locked, the Door Icon shall return to the secured state.

2. SLIDING DOORS
   a. CONTROLLED/ MONITORED. Selecting the Door Status Icon will display a control bar with several options, Open, Stop, and Close. Selecting the ‘Open’ option will energize the Open Relay for a preset time. When the door is open, the Door Status Icon shall change to the unsecured state. To close the door, touch the ‘Close’ option. The Close Relay energizes for a preset time. To stop a moving door, touch the ‘Stop’ option. To start a door moving again, touch the ‘Open’ or ‘Close’ option. When the door is closed, the Door Status Icon shall change to the secured state. Open and Close relay times shall be adjustable via the Administration computer.

3. MONITORED DOORS. When a monitored swing door opens, the Door Icon shall change to the alarmed state. Selecting the Door Icon shall change the Door Icon to the acknowledged state. When the door is closed, the Door Icon shall change to the field reset state. Selecting the Door Icon shall change the door Icon to the secured state.

4. CONTROLLED/ MONITORED EXTERIOR SLIDING GATE.
   Selecting the Door Status Icon will display a control bar with several options, Open, Stop, and Close. Selecting the ‘Open’ option will energize the Open Relay for a preset time. When the door is open, the Door Status Icon shall change to the unsecured state. To close the door, touch the ‘Close’ option. The Close Relay energizes for a preset time. To stop a moving door, touch the ‘Stop’ option. To start a door moving again, touch the ‘Open’ or ‘Close’ option. When the door is closed, the Door Status Icon shall change to the secured state. Open, Close and Stop relay times shall be adjustable via the Administration computer.

5. INTERLOCKS and INTERLOCK OVERRIDE. Icons for all doors and gates that are members of one or more interlock groups will display a large “I” in the middle. When one door or gate of an interlock becomes unsecured, all other door or gate icons interlocked with that door change to the disabled state. To open a disabled door and override the interlock, select the Door Icon in the disabled state. Selecting the ‘Override Door’
option will cause a pop-up window with a flashing “Warning” to be displayed for 2.5 seconds. A second pop-up window is displayed indicating that compromising the interlock is a serious security risk. Select OK to continue. A third pop-up window is displayed confirming operator intentions. Select OK to unlock the door and override the interlock. When all doors and gates interlocked with another door are secure, Door Icon will return to the secured state.

6. EMERGENCY RELEASE. An Emergency Release button shall be provided to allow the emergency release of selected doors and door groups. Selecting the Emergency Release button from the Global Keypad area shall present an emergency release screen with all available emergency release icons. Selecting an emergency release icon shall highlight the effected background graphic area yellow and display a warning message with OK and Cancel options. If OK is selected a confirming message is displayed. If confirmed, the effected background graphic area shall highlight red and the door(s) shall unlock. The doors in the emergency release group shall remain unlocked and in the Active state until reset. The emergency release group shall also be added to the event queue. Selecting the Emergency Release Group icon a second time shall highlight the effected background graphic area yellow and display a warning message with OK and Cancel options. If OK is selected the release is canceled. The emergency release icon changes to the “Inactive” state. All doors in the emergency release group shall be locked at a staggered rate. The emergency release group shall be removed from the event queue.

7. DOOR ALARM. When a swing door opens without the open control signal from the Security Control system, an alarm is initiated.
   a. DOOR DPS CHATTER. A door position switch (DPS) can chatter when a swing door is closed thereby causing a nuisance alarm. To prevent this, each door has an adjustable time period for which an alarm condition is ignored following a door being closed. For more information on setting door chatter timers, see Section 1.12 TOUCHSCREEN SYSTEM ADMINISTRATION.
   b. DOOR OPEN-TOO-LONG. When a door is not a member of an active ‘hold open’ group, and remains open longer than a predefined time, the icon changes to the OTL alarm state. Selecting the icon will return it to its previous state and restart the Open-Too-Long timer. Open-Too-Long times shall be adjustable via the Administration computer.

C. Audio Control

1. INTERCOM. When a call is initiated from a field intercom station, the touchscreen station shall “zoom” to the proper area of the facility, center the icon of the calling station on the display monitor, and change the icon to the calling state. Selecting the calling icon shall acknowledge the call and create a talk path. If applicable, an associated CCTV camera image shall display on the control room CCTV monitor. Selecting the icon a second time shall close the talk path and return the icon to the default idle state. If applicable, the associated CCTV camera image shall return to a default view. If a call is interrupted by an alarm with a higher priority, acknowledging that higher priority alarm shall return the graphic
display to its previous view of the intercom icon. The system shall be
configurable to allow the facility to handle incoming calls by selecting a
“Locate” icon rather than going to the calling icon automatically.
2. PUSH-TO-TALK. Touching the push-to-talk button shall open a talk
path to the current active intercom or paging zone. The push-to-talk
button shall be disabled when there is no active intercom or paging zone.
3. INTERCOM DURESS. If a field intercom call pushbutton is held in
longer then the pre-assigned time limit, a duress alarm is initiated. The
icon shall change to the “duress” state. TOUCHSCREEN SYSTEM
ADMINISTRATION.
4. CELL INTERCOM CALL DISABLE. To prevent nuisance calls from an
intercom, select the associated Door icon and the “Call Disable” option.
The Intercom icon changes to a ‘disabled’ state and intercom calls from
the cell intercom station are ignored. To return to normal operation,
select the associated Door icon and the “Call Enable” option. The
Intercom Icon changes to an ‘idle’ state and intercom calls are again
annunciated.
5. SPEAKERS.
a. INTERCOM. Selecting an idle IC Speaker Icon shall open a talk
path to the intercom speaker and change the icon to the active
state. Any other active intercom calls shall be canceled.
Selecting the IC Speaker Icon a second time shall close the talk
path and return the icon to the default idle state.

D. CCTV:
1. CAMERA. Touching a camera icon shall switch on the associated
camera for display on the control room CCTV monitor and changes the
camera icon to the active state. Selecting a second camera icon shall
change the previous icon to inactive and new icon to active. Selecting the
same camera icon a second time shall switch the camera image back to a
default view and change the icon to an inactive state.

E. Alarms:
1. UPS ALARMS: An UPS alarm shall be initiated whenever battery
backup is required. The associated icon shall change to the alarmed state.
Selecting the UPS icon shall acknowledge the alarm. The alarm
condition shall reset when battery backup is no longer required. The icon
shall change to the field reset state. Selecting the UPS Icon in the field-
reset state shall return the UPS Icon to the normal state. All UPS events
shall be recorded on the Administration computer. Adjustable timers
shall be provided to delay alarms. Timers shall be adjustable via the
Administration computer.

2. PLC ALARMS: A PLC alarm shall be initiated whenever a PLC loses
battery backup, loses communication with another PLC, or has a general
diagnostic alarm. The associated icon shall change to the alarmed state.
The alarm condition shall reset when the alarm clears from the PLC.

3. DURESS ALARMS: When a duress alarm occurs, the icon shall change
to the alarmed state. When the alarm condition is reset in the field, the
icon shall change to the field reset state. All Duress events shall be
recorded on the Administration computer.

4. ALARM HANDLING
a. **ALARM ACKNOWLEDGE/RESET.** When an alarm is first received, it will be added to the event queue in order of priority and time. A continuous alarming tone will sound and the device icon changes to the alarmed state. Selecting the device icon in the alarmed state will acknowledge the alarm, silence the audible tone, and change the device icon to the acknowledged state. Once the device is reset in the field, the device icon changes to the field reset state. To reset an alarm, select the device icon in the field reset state and it will change to the normal state.

b. **ADMINISTRATIVE ALARM SHUNT.** From the Security Administration computer, alarms can be ignored or shunted during a specified period of time. In this instance, devices normally alarmed will instead change to the ‘shunted’ state. When the time period is over, normal alarming will resume.

c. **CAMERA VIDEO-FOLLOW-EVENT (VFE).** Every security system device shall be able to have a camera(s) assigned to be displayed on an available alarm monitor(s) based on system events.

1) Assigned camera(s) shall display on the assigned alarm monitor(s) based on a “Video-On” flag.
2) Assigned camera(s) shall revert to default camera(s) based on a “Video-Off” flag.
3) When a device from the event queue is selected, the assigned camera(s) is displayed on the assigned alarm monitor(s) regardless of the device’s current state.
4) When a door’s control-bar closes, the default camera(s) is displayed on the assigned alarm monitor(s). This feature allows cameras to be displayed temporarily upon selecting a door icon (usually in the secured state).
5) VFE shall be user configurable from the Security Administration computer.

F. **Miscellaneous Functions**

1. **LOGIN:** Access to the system software shall be password protected and all operators shall log into the software module. A video keypad window shall be displayed that utilizes a "scramble" function so digits do not appear in the same location each time an operator logs onto the system. All log-in/log-out activities shall be recorded on the Administration computer.

2. **CONTROL TRANSFER:** Three methods of control/transfer shall be provided:

a. **Station Transfer:** To transfer a touchscreen station (send control to another location); select the Transfer icon in the Global Keypad Area. All control and monitoring functions are transferred to the designated alternate control station. The transferred station shall display the login window only.

b. **Station Takeover:** To takeover a touchscreen station (take control from another location), select the appropriate Takeover Icon at Master Control. All control and monitoring functions are transferred. The station that was taken over displays “Station Disabled” and the current operator of the transferred station is
logged out. Master Control receives a message indicating it now has control over the new designated control area.

c. Station Duress: To transfer a touchscreen station under duress, select the Duress icon in the Global Keypad Area. All control and monitoring functions are transferred to Master Control. An alarm is initiated and a message pops-up at Master Control indicating it has control of the duressed station’s designated control area. The station that is in duress displays “Station Disabled” and the current operator of the duressed station is logged out.

3. STATION CONTROL. Touching the "STATION CONTROL" icon shall display the "Station Control" window. This window allows the operator to see the status of all touchscreen stations, take control of stations, and restore control to stations.

4. EVENT QUEUE. The event queue is a list of outstanding events that either need to be addressed or monitored by the operator. The event type, location, and time of occurrence are displayed.

5. UTILITIES. Touching the "UTILITIES" icon shall display the "Utilities" window. Based on the operator’s security level, this window allows administrative functions to be performed.

a. CLEAN SCREEN. Touching the “Clean Screen” button shall disable all touch points on the touchscreen station for 20 seconds.

b. SCREEN CALIBRATION. Touching the “Calibrate” button shall display a touchscreen calibration window.

c. VOLUME UP. Touching the volume up button allows the operator to increase the volume of the console speaker.

d. VOLUME DOWN. Touching the volume down button allows the operator to decrease the volume of the console speaker.

e. SHOW/HIDE CURSOR. Allows the cursor visibility to be toggled on and off.

f. SHOW/HIDE EXCEPTION ICONS. Allows the display of icons that normally are hidden.

g. DISABLE/ENABLE SPEECH. Toggles whether or not voice messages are annunciated. If enabled, a voice message will be annunciated whenever an icon changes to a state that is configured for voice messaging.

h. ADJUST SPEECH. Controls the features of digitized voice messaging.

1) Select voice from available list.

2) Test – Allows the operator to hear adjustments made to the digitized voice.

3) Save – Allows the operator to save the changes made to the digitized voice.

4) Exit – Closes speech adjustment window.

i. UPDATE APPLICATION. Allows the station to receive immediate application updates from Administration Software Module.

j. END PROGRAM. Shall end the Control Software Module. Access to this button shall require administrative security rights.
1.14 TOUCHSCREEN SYSTEM ADMINISTRATION:

A. The Touchscreen Control System shall be provided with an Administration Software Module, which shall be password protected and reside on the system’s Administration computer. The Administration software shall also be capable of being operated on multiple stations simultaneously.

B. GRAPHIC DISPLAY. A means of selecting any graphic image that is viewable on any Touchscreen Station shall be provided. Views shall be displayed in one of two formats – ‘zoomed in’ or ‘zoomed out’. From the ‘zoomed out’ format, all controlled and/or monitored areas shall be represented by colored squares (LEDs). From the ‘zoomed in’ format, all controlled and/or monitored areas shall be represented by selectable buttons (Icons).

1. THE ADMINISTRATIVE COMPUTER SHALL GRAPHICALLY MONITOR (BUT NOT CONTROL) SYSTEM ACTIVITY IN REAL TIME.

C. SYSTEM OPERATORS. It shall be possible to add, delete, and edit System Operators. Only operators with administrator privileges shall have access to this area. An administrator shall not be able to delete their record or remove their administrator privilege. Operator names and passwords shall not be duplicated. Passwords must contain at least 4 digits.

D. SECURITY LEVELS. It shall be possible to add, delete, and edit Security Levels. Each operator without administrator privileges must be assigned a security level. Only operators with administrator privileges shall be allowed access to this area. A security level in use cannot be deleted.

E. ICON STATES. Every field device in the Security System has an associated Icon Type. Multiple icons (example: Swing Door) can have the same icon type. Each icon type has multiple icon states. The following information shall be available and editable as indicated for each icon state as applicable: (Changes shall be made globally to all icons of same type)

1. Icon Type – Name given to the specific icon type to which the state applies. (Read only)
2. State No – A reference number for the icon state. (Read only)
3. Icon State – The icon state name. (Read only)
4. Annunciated Message – If voice annunciation is active for this state, then when this state becomes active, the following is annunciated: <Annunciated Message> <Icon Type> <Icon Label>. (Editable)
5. Graphic Image – The graphic image that shows on the icon when this state is active (Editable)
6. Graphic File – The name of the bitmap file for the graphic image. (Editable)
7. Sound File – The name of the sound file that is heard when this state is active. (Editable)
8. Led On – The flashing on led color when this state is active. This is also used for the event queue record background color if applicable. (Editable)
9. Led Off – The flashing off led color when this state is active. (Editable)
10. Event Priority – The order in which the icon state is displayed on the event queue when active (Editable)
11. Flash – Indicates whether or not the led and icon will flash when this state is active. (Editable)
12. Icon – Indicates whether or not an icon is visible when this state is active. Icons for monitored only devices in a safe state are normally not visible to reduce graphic clutter. (Editable)
13. Led – Indicates whether or not the led is visible when this state is active. LEDs for monitored only devices in a safe state are normally not visible to reduce graphic clutter. (Editable)
14. Record – Indicates whether or not a record is stored in the event database whenever this state becomes active. (Editable)
15. Print – Indicates whether or not a record is sent to the system printer whenever this state becomes active. (Editable)
16. Voice – Indicates whether or not a digitized voice message is annunciated whenever this state becomes active. (Editable)
17. Video On – Indicates whether or not assigned camera(s) is displayed on assigned alarm monitor(s) whenever this state becomes active (Editable)
18. Video Off – Indicates whether or not default camera(s) is displayed whenever this state becomes active. (Editable)

F. ICON FUNCTIONS. Each and every icon used by the Control Software Module shall be listed. The following information shall be available and editable as indicated for each icon location as applicable: (Changes shall only effect the Individual icon location)
1. Icon Type – Name given to the specific icon type. (Read only)
2. Arch No – The architectural number assigned to the field set that the icon represents. (Read only)
3. Label – The caption shown with the icon. (Editable)
4. Record All – Indicates that a record is stored in the event database every time the icon changes state (Editable)
5. Print All – Indicates that a record is sent to the system printer every time the icon changes state. (Editable)
6. Shunted Time Zone – Allows the Administrator to select a time zone when alarm events for this icon are ignored. (Editable – see TIMING ZONES)
7. Unlocked Time Zone – Allows the Administrator to select a time zone when a door icon is held open. (Editable – see TIMING ZONES)
8. Note – description or reference information for the icon (Editable)

G. TIMING ZONES. It shall be possible to add, delete, edit, or rename Time zones. Time zones allow actions to be performed on a scheduled basis. Time zones only apply to shunting alarms and opening doors.

H. DEVICE MAINTENANCE. The system shall record device operations every time a door is unlocked, an intercom is activated, a UPS is alarmed, or etc. The system will also allow the operator to input a ‘Maintenance Interval’ which specifies the number of cycles required before maintenance for that device is necessary. When device cycles reach the Maintenance Interval set value, the record is highlighted until the “Count Since Last Maintenance” value is set back to zero.
I. DEVICE TIMING. The system shall allow for specific device timing adjustments to be performed.

1. Door
   
   a. Chatter Length – Time allowed for the door position switch to oscillate between secure and unsecure. Once the time has expired, an unauthorized door opening will generate an alarm.
   
   b. OTL Length – Time allowed for a door to be unsecured before an ‘open too long’ alarm is generated.
   
   c. Unlock Length – Amount of time the unlock relay is energized.
   
   d. Open Length – Amount of time the unlock relay is energized.
   
   e. Close Length – Amount of time the unlock relay is energized.

2. Intercom
   
   a. IC Panic Length – Required duration for a field intercom button to be held down before a panic alarm is generated.

3. UPS
   
   a. UPS Battery Alarm Delay – Period of time when system is operating on UPS before an alarm is generated.

J. CAMERAS / VIDEO. It shall be possible to assign any security device to a unique camera/monitor combination. Also known as video follow event (VFE), the assigned camera(s) are displayed on alarm monitor(s) accordingly.

1. It shall be possible to add new cameras and associated icons to the system.

2. It shall be possible to add new monitors to the system.

K. EVENT HISTORY. Event data shall be available for viewing. By default, only the current day’s events will be displayed. Previous day’s events shall be able to be combined and retrieved as necessary. Previous day’s events shall be able to be archived to, and retrieved from, removable data storage. The data shall be able to be sorted, filtered, grouped, and printed as necessary. The following is sample data:

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Station</th>
<th>Operator</th>
<th>Event</th>
<th>Description</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>PCF</td>
<td></td>
<td>Unsuccessful Login Attempt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>PCF</td>
<td>J. Briggs</td>
<td>Successful Login</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Control Transfer</td>
<td>Takeover</td>
<td>PCF</td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Alarmed</td>
<td>Door Position Switch</td>
<td>A1103</td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Acknowledged</td>
<td>UPS Alarm</td>
<td>A1103</td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Unlocked</td>
<td>Access Door</td>
<td>A1103</td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Interlock Override</td>
<td>Access Door</td>
<td>A1103</td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Interlock Override</td>
<td>Access Door</td>
<td>A1103</td>
</tr>
<tr>
<td>2/14/99</td>
<td>8:23:16</td>
<td>MC</td>
<td>J. Briggs</td>
<td>Deadlock Enable</td>
<td>Cell Door</td>
<td>A1103</td>
</tr>
</tbody>
</table>
L. ARCHIVING. The system shall provide a means for archiving or Historical Event Data and Software Updates/System Settings to a removable data storage media.

1.15 SYSTEM PERFORMANCE:

A. The systems shall be configured to affect the following system performance criteria:

1. CONTROL: Outputs to field devices such as door locks shall activate within 250 milliseconds of the touchscreen or discrete control switch activation.

2. SCREEN UPDATES: All graphic display and icon changes at the touchscreen station shall occur in real time with no perceivable delay.

3. ANNUNCIATION: Inputs from field devices such as alarms or intercom calls shall annunciate at the touchscreen station or control panel within 250 milliseconds or the device being activated.

4. INTERDEPENDENCE: Touchscreen stations shall not be interdependent. The failure of one station shall not affect the operation of other stations. Failure of the Administration computer shall not affect the operation of any touchscreen station.

5. SYSTEM FAULTS: System faults, crashes, reset or reboots shall not be capable of activating field outputs such as door locks.

1.16 FAILURE RECOVERY

A. PLC

1. Each PLC location shall be provided with a flash memory card containing all PLC programs and settings for that location. In the event of a PLC processor failure, it shall be possible to replace the processor and reinstall all programs and settings in less than 5 minutes.

B. Touchscreen Stations

1. Failure of any single touchscreen station, file server, data server, or other networked computer shall not affect the operation of any other station.

2. There shall be multiple courses of action available to the facility concerning a Touchscreen Station computer failure:

   a. All touchscreen computers shall be configured so that by changing the intended location identity (IP Address), any touchscreen computer can replace any other touchscreen computer without software changes or updates.

   b. The control area affected by a failed touchscreen computer can be “taken over” by a higher level touchscreen station.

   c. The facility’s spare computer can replace any failed touchscreen station computer. The spare computer shall be configured with
all the software and graphic files required for all locations. Upon startup, a window shall be displayed on the spare computer to identify its current control location. Also upon startup, any updates to the security system software or data files applied after the initial system installation shall be retrieved from the Administration computer and applied equally to the spare.

C. Administration Computer

1. In the event of failure, the Administration computer shall not be necessary for normal system operation. However, the facility would be unable to make changes to the system or archive historical data.

2. The Administration computer shall be configured with redundant hard disk drives in a mirrored RAID1 configuration such that the computer will continue to operate in the event of a single disk drive failure. Replacing the failed disk drive with the provided spare drive will automatically restore the computer to full redundant operation.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Manufacturer’s names, catalog numbers, and trade names are used to establish a level of quality and the operational characteristics for the products and systems specified. Specified materials, products, and services shall be provided unless otherwise approved by change to the bidding or contract documents. Materials, products, and services of manufacturers listed as “acceptable” may only be substituted for approval provided they meet or exceed the specified requirements and meet or exceed the level of quality and service established by the “specified” manufacturer. Listing of a manufacturer as specified or acceptable does not relieve the manufacturer of the responsibility to comply with the complete specification.

B. Equivalent products of other manufacturers will be considered based on product data, manuals, demonstration software, and other technical information as necessary to show compliance with the specification. Information must be submitted at least twenty one (21) days prior to bid due date and be approved by addendum.

1. Firms desiring to be considered as a Touchscreen Control System Vendor, shall provide self-installing Software demonstrations on CD or DVD. The disc shall include demonstrations for the Control, Administration, and Documentation Software Modules demonstrating compliance with Touchscreen Control Systems specified herein. All graphic operations shall be functional. All building layouts, icon placements, supplementary windows, etc. shall be complete. The submittal shall essentially include working versions of all three (3) software modules less PLC communications. Demonstration shall be of software used previously on at least 2 completed projects. Provide the name and telephone number of an individual at each facility familiar with the performance, operation, and maintenance of the facility’s systems (preferably, the maintenance manager).
2. If self-installing demonstrations (Control, Administration, and Documentation) are not available on disc, provide an alternate demonstration method and project references as stated above. Acceptable alternate methods:
   a. Schedule and attend a meeting at the Security Consultant’s office at least twenty one (21) days prior to bid due date to demonstrate the proposed Software using TCSV’s computer hardware. Demonstration shall be of software used previously on at least 2 completed projects.
   b. Schedule and attend a demonstration at an operational facility at least twenty one (21) days prior to bid due date to demonstrate the proposed Software. Demonstration shall be of software used previously on at least 2 completed projects. (Note; an additional reference is still required.) All travel costs and expenses shall be borne by the proposing TCSV.

C. Contact Rob Johnson at Secured State for product information based on products listed in this specification: (618) 664-4292 x101.

2.02 TOUCHSCREEN SYSTEM

A. Control Software Module:

1. Purpose: The primary purpose of the Touchscreen System is to provide a means by which an operator can monitor and control specific aspects of a facility as simply and efficiently as possible. This is accomplished through an intuitive dynamic graphical operator interface. Events that occur without initiation by the operator (intercom calls, for example) shall be brought to the immediate attention of the operator so that they may deal with the event without searching or delay. Events that are initiated by the operator (station transfers, for example) shall as much as possible be grouped together for intuitive access.

2. Main Components: The Touchscreen System Graphical User Interface is comprised of six main components:
   a. MAIN VIEW – Provides an overall status of the current geographical area being monitored. The area graphic is displayed along with virtual LED lights that indicate the status of each controlled and/or monitored device.
   b. ZOOM/CONTROL VIEW – Provides a larger view of the current geographical area.
   c. AERIAL GRAPHIC VIEW – Provides a geographical reference. The portion of the zoom/control view that is currently visible is always highlighted in the aerial view.
   d. GLOBAL KEYPAD – All security system operations other than graphic positioning and icon controls are handled in this area through multiple button controls. Examples would be Interlock Override, Emergency Release, Control Transfer, System Enable / Disable, Duress, etc. Specific functionality can be unique to a given project and is described hereafter. The global keypad shall always be available and shall not be hidden by other windows.
   e. EVENT QUEUE – A tabular listing of all pending events listed first by priority and second by date/time. The background of each table record shall be colored to match the current state of its
related icon. Up and down arrow buttons shall be provided for scrolling from the touchscreen. A “Locate” button shall be provided to locate the associated icon of the current record and center it on the display. The Select button shall be disabled when the event queue is empty. The event queue shall always be available and shall not be hidden by other windows.

d.  STATUS AREA – Provides text information regarding current icon status, current system status and current date and time. The status area shall always be available and shall not be hidden by other windows.

3.  Graphic Operation:

a.  Provide a single dynamic image, (zoom/control view) without breaks, from which the operator can intuitively maneuver the entire geographical area for each of the following:

1)  Site Plan (1 image)
2)  Each floor of each building (1 image per floor)
3)  For Pod Control locations, provide one image for each pod area
4)  The image(s) shall be accurate and proportionally scaled to the actual building layout and of sufficient size as to accommodate all monitored and controlled devices in the form of icons. The icons shall be positioned proportional to the devices actual position relative to building graphic (leader lines are not acceptable). The icons as shown on the touchscreen monitor shall be no smaller than ½ inch square. The icons shall be spaced far enough apart so that an operator will not be at risk of inadvertently selecting the wrong icon. The image shall be oriented correctly from the perspective of the station operator for areas that are visible from the station location.

b.  Traditional systems that divide a geographical area (such as one floor of a building) into multiple, sometimes overlapping, “tiles”, “pages”, or “screens” are not acceptable.

c.  All graphic operations shall occur in real time without delay.

d.  Touching anywhere on the main or aerial views will zoom and center the specific location touched.

e.  Dragging the zoomed view will provide dynamic panning of that view.

f.  Dragging on the highlighted portion of the aerial view will dynamically reposition the zoomed view.

g.  All field initiated events, such as intercom calls, alarms, and etc., shall cause the proper view of the facility to be brought to the operator, zoomed in, with the associated Icon centered on the touchscreen monitor.

h.  Touching any graphical icon or button shall generate a short audible tone.

B.  LCD Touchscreen monitor

1.  The touchscreen monitor shall have, at a minimum, the following components and features:

a.  22” Active matrix TFT LCD
b. 1920 x 1080 resolution

c. Two (2) built-in speakers, 2 watt minimum

d. TouchPro™ PCAP touchscreen as manufactured by Elo TouchSystems, or approved equal.

e. Warranty:
   1) Monitor: 3 years
   2) Touch Technology: 10 years.
   3) Backlight lamp life: 40,000 hours to half brightness

f. Manufacturer:
   1) Specified: Elo TouchSystems 2201L

C. Computer Touchscreen Station:
   1. The computer touchscreen station shall include, at a minimum, the following components, and features:
      a. Microsoft® Windows® 10 Professional operating system with the latest service packs.
      b. Intel Pentium processor, Core 2 Duo 2.0GHz or faster
      c. 1 GB of RAM minimum. Provide additional RAM as necessary to optimize system performance.
      d. 80GB SATA 3.0Gb/s and 8MB DataBurst Cache hard disk drive or faster
      e. 256MB graphics card with support for 1280 x 1024 resolution at 85 MHz.
      f. 10/100 Network Interface as required to communicate with PLC, touchscreen transducer controller, and LAN.
      g. 16X DVD-ROM SATA.
      h. 32 bit sound card and speakers.
      i. USB Keyboard and 2 Button Optical Mouse with Scroll.
      j. Manufacturer: Dell, Micron, Gateway, or IBM

   2. The operation of the touchscreen software shall not depend on a keyboard. The keyboard shall be locked away in the security equipment closet and shall not be normally accessible from the console surface except as required for installation and maintenance purposes.

2.03 TOUCHSCREEN STATIONS

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>DESIGNATION</th>
<th>DESCRIPTION</th>
<th>MONITOR SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EY-1202</td>
<td>Control Room</td>
<td>Access Control Touch Screen</td>
<td>22”</td>
</tr>
</tbody>
</table>

A. Administration Computer:
   1. The Administration computer shall include, at a minimum, the following components, and features:
      a. Microsoft® Windows® 7 Professional operating system with the latest service packs.
      b. Intel Pentium processor, Core 2 Duo
      c. 1 GB of RAM, minimum. Provide additional RAM as necessary to optimize system performance.
      d. 160GB RAID1 (2x160GB) SATA 3.0Gb/s and 8MB DataBurst Cache hard disk drives
e. 256MB graphics card with support for 1280 x 1024 resolution at 85 MHz

f. 10/100 Network Interface as required to communicate with PLC, touchscreen transducer controller, and LAN.

g. 16X DVD+/-RW SATA

h. Internal Audio Speaker

i. USB Keyboard and 2 Button Optical Mouse with Scroll

j. V.92, PCI, Data/Fax Modem.

k. The Administration computer shall operate as the master clock for which all touchscreen stations shall be automatically synchronized once per hour.

l. Manufacturer:
   1) Specified: Dell, Hewlett Packard, IBM

m. System Printer:
   1) Hewlett Packard: P2055dn LaserJet Printer or approved equal.

B. Touchscreen Control System Vendor (TCSV):

2.04 PROGRAMMABLE LOGIC CONTROLLERS

A. General Specifications:
   1. Environmental ratings for all components of the PLC system, except programming equipment, shall meet or exceed the following requirements:
      a. Ambient Temperature rating of 0 to 60 DegC (32 to 140 DegF) operational and -20 to 70 DegC (-4 to 158 DegF) storage.
      b. Humidity rating of 10 to 90 percent Relative Humidity (non-condensing).
      c. All system modules shall be designed so as to provide for free airflow convection cooling. No internal fans or other means of cooling except heat sinks shall be required.
   2. The PLC shall meet the following standards: UL Listed, CSA Certified, and CE.
   3. The PLC system shall have been designed and tested to operate in an industrial environment.
   4. The PLC and I/O modules shall be of modular and rack mounted construction.
   5. The system power supplies shall be protected against short circuits.
   6. The PLC system shall be designed so that each control area operates totally independent of one another. Failure or loss of a controller shall not hamper the operation of any other controller.
   7. Programmable controller manufacturer must guarantee the availability of replacement/spare parts for a minimum of ten (10) years.
   8. All I/O modules and housings must be of a standard type and fully interchangeable with previous PLC series.
   9. All controllers and I/O structures of a single manufacturer shall be capable of being mounted on the same size fixing centers to allow for larger capacity controllers to be installed in the future should the facility...
require an expansion beyond the limits specified in the original contract
documents.

10. Controllers must be capable of driving local I/O racks, where local is
defined as up to one hundred (100) feet from the control unit, without the
need for further intelligent interface modules.

11. When required, the system must be capable of controlling remote I/O up
to a distance of 500 meters (1,640 feet) from the controller, using high-
speed links with a minimum data rate of one hundred and eighty seven
(187) Kbaud. Communications over this link shall be accomplished using
twisted-pair wires with an overall shield.

B. PLC Central Processing Unit:
1. The central processing unit (CPU) shall be microprocessor based,
encased in a shielded enclosure to provide RFI protection, and shall
provide the logic control functions and date transfer based upon the
program stored in memory and the status of the inputs and outputs. The
controller must be able to support up to 5,120 local I/O.

2. The minimum standard control functions of the CPU shall include:
   a. Relay Ladder Logic
   b. Latching relays
   c. Timer clock pulses (.02s, 0.1s, 0.2s, 1s & 1m) and timers (.01 &
      0.1 sec. Increments).
   d. Counters (up/down)
   e. Data comparison (=, <, >), data range comparison, and data table
      comparison.
   f. Data transfers (single register, blocks of registers, data
distribution and collection using pointer).
   g. Synchronous shift registers forward and reverse (multiple
      channel length bit shifts).
   h. One-shot output and input controls.
   i. Master control relays (interlocks).
   j. Bit reads and moves.
   k. I/O forcing and setting
   l. BCD to Binary or Hexadecimal conversion.
   m. Binary or Hexadecimal to BCD conversion.
   n. I/O Refresh on command, immediate I/O inputs, and scheduled
      interrupt on command.
   o. On-line program editing.

3. The following minimum modes of operation of the CPU must be
   selectable via a key operated switch or programming software
   commands:
   a. PROGRAM - Processor is not scanning program in memory and
      all outputs are held OFF.
   b. MONITOR - Processor is executing program and changes in
      user memory and data memory are allowed.
   c. RUN - Processor is executing program in memory and outputs
      are controlling to the program. No editing of program or data
      registers is allowed.

4. The above settings shall require either a key, a programming console
   with a key, or programming software loaded on a computer to change the
   operating mode of the CPU.
5. The processor shall incorporate extensive self-diagnostic features, which will not halt the processor. In addition, separate visual indicators will annunciate at the following conditions:
   a. POWER - Logic power is applied to the CPU and I/O rack from the power supply.
   b. RUN - Processor is executing the program in memory and outputs are being controlled according to the program.
   c. OUTPUT INHIBIT - Processor is executing program in memory according to input status, but outputs are being held in the OFF-state.
   d. ALARM - A non-fatal error (such as a low memory battery condition) has occurred in the PLC hardware or program software. The PLC is still running and the outputs are being controlled according to the program.
   e. ERROR - A fatal error (such as a memory parity error) has occurred, the CPU is not scanning the program, and the outputs are held in the OFF-state.
   f. COMM - Indicating the CPU is communicating with the device connected to the peripheral port or RS-232C port.

6. In addition to visual self-diagnostic indicators (LED’s) the processor shall have a specifically designated block of a least 100 words of internal diagnostic words and bits. These shall provide more detailed system status and fault diagnostic information accessible by programming equipment or intelligent peripherals.

7. The processor must contain an error log area. This area must be able to log what error occurred and when the error happened, giving exact time and date. This area must be able to store a minimum of 1000 records.

8. At a minimum, the internal diagnostic registers shall provide the following information:
   a. Type of digital (input or output) or intelligent (analog, ASCII, etc.) I/O unit inserted in a particular slot (I/O table listing). This data should be accessible via programming console or programming software.
   b. If an I/O module is improperly mounted (wrong slot) or not in a slot (I/O verify or I/O bus error).
   c. Error codes for intelligent I/O module errors.
   d. PLC operation mode.
   e. Present and maximum scan time.
   f. Local Area Network operation status and error status.
   g. Local Area Network data Send and Receive verification and error status.
   h. Serial Host Computer interface operation and error status.
   i. Remote I/O rack operation and error status.
   j. Memory Error Area.
   k. Startup time. The start time should be updated every time the power is turned ON.
   l. Power Interruption Time.

9. A single RS232 or RS422 compatible or Fiber Optic differential communication port shall be used for software based ladder logic programming and communications to other compatible devices. The PLC system must support up to three of these ports simultaneously.
10. The data rate of the serial communications port shall be switch selectable. The following shall be the minimum available data rates: 300, 1200, 2400, 4800, 9600, and 19,200 baud.

C. PLC Processor Memory:
1. The program storage medium shall be Battery Backed Random Access Memory (RAM). The memory shall be housed in the same enclosure as the processor.
2. Whenever any words (contacts, coils, entire rungs, etc.) of program memory have been deleted, the remaining program shall automatically be repositioned in memory so as to fill the void left by the deleted words. The automatic use of NOP’s to replace deleted words of program memory is not acceptable.
3. Program memory area shall not be used to store data values (numbers) or I/O image table. A unique memory register area which is separate from ladder logic (program) memory shall be used to store data values.
4. In addition to the program memory area, the processor must contain a word addressable only area, used for internal data storage and manipulation. This area must be a minimum of 8K words in size.
5. Typical scan time for 1K words of ladder program memory shall not be greater than 0.15 ms.
6. Memory word size shall not be less than 16 bits.
7. In order to detect short pulse duration on selected inputs, it shall be possible to use immediate bit refresh update I/O units or program an immediate I/O refresh command in the ladder logic program.
8. To minimize word utilization for program storage in the CPU, no words must be required wire spaces or wire connects within the rungs and no word space must be required to mark the start of a new rung.
9. Each word of memory shall incorporate a parity bit for memory error checking accompanied by a visual indication of a CPU memory error.
10. The CPU shall maintain its RAM program memory indefinitely, regardless of battery status, as long as AC power is applied to the system.
11. If AC power is removed from the system, the RAM memory backup battery shall retain program and register memory for a minimum of 5 years from date of purchase or for at least 2 weeks after the first appearance of the “battery low” warning.
12. The PLC must have the ability to utilize two methods of memory filing. The ability to utilize FLASH memory cards up to 30MB. The ability to utilize the PLC’s extended data memory areas as file memory. File memory can be used to store the entire user program, I/O memory contents, and/or parameter area contents.
13. All PLCs must have the ability to utilize a real-time clock. For monitoring:
   a. The time that power interruptions,
   b. The time that the plc was turned on, and
   c. The total time the PLC has been ON.

D. PLC Relay Equivalents, Special Functions Outputs & Instructions:
1. The processor shall be equipped with no less than 71,204 dedicated internal relay bits, used to store and manipulate data internally.
2. The number of normally open (NO) and normally closed (NC) contacts of an internal relay bit shall be unlimited, dependent only upon program memory capacity.

3. It shall be possible to make any internal coil into a one scan one-shot with a single command.

4. It shall be possible to program any internal coil as a latching relay with both a latch and an unlatch rung segment.

5. It shall be possible to program multiple Master Control Relay (MCR’s).
   It shall be possible to use programming equipment, host computers, or the actual ladder logic program to operate special PLC instructions, which perform the following functions:
   a. Halt the operation of the CPU.
   b. Place the CPU in the output inhibit mode.
   c. Return the processor to the RUN mode by clearing ladder halt commands or by mode change from a host computer or programming console.

E. PLC General Purpose Storage Registers
   1. Each register shall be 16 bits in length and capable of storing a four digit BCD (0000 to 9999) or Hexadecimal (0000 to FFFF) value.
   2. Programming techniques shall allow all registers to be programmed as a totalizing counter, totalizing timer, part of a shift register, or for numerical or ASCII data storage.
   3. It shall be possible to monitor and alter any register value via a programming console or host computer using programming software without halting the CPU.
   4. It shall be possible to alter individual bits of any storage register using a programming console or host computer using programming software halting the CPU.
   5. It shall be possible to set the value of any single storage register or any contiguous block of storage registers with the use of a single programming command.
   6. It shall be possible to preset any value into any single storage register or any contiguous block of storage registers with the use of a single programming command.
   7. Programming techniques shall allow the access and use of any single bit or of all individual bits of information from any zone of a shift register, regardless of size. The accessing of any individual bit shall be possible with a single rung of ladder programming.
   8. The CPU shall be equipped with no less than 32,767 general-purpose data memory registers. In addition, any internal relay registers not used for real I/O or as individual contacts and coils may be used as general-purpose data memory registers.
   9. Register data shall be retained in the event of AC power loss as long as the ladder program is retained.

F. PLC Counters and Timers
   1. There shall be no less than 4,096 timers and 4,096 counters in the CPU. All counters and timers shall be capable of storing four digit decimal values from 0000 to 9999.
2. Programming techniques shall allow for cascading of timers and counters. It shall be possible to program memory retentive times that can be started and halted without being automatically reset.

3. It shall be possible to program a reset contact or data comparison so that a timer can be halted and its present value reset to zero.

4. Programming techniques shall allow for programming ON delay and OFF delay timers.

5. It shall be possible to program UP, DOWN, and bi-directional counters.

6. It shall be possible to program a reset bit or data comparison command that will halt and reset a counter.

7. Programming techniques shall provide for as many timer or counter comparison values as desired.

8. Programming techniques will allow for decoding an interval of a timer or a counter (between range or compare instruction). Up to 16 ranges or intervals of a timer or counter shall be able to be acted upon with a single ladder command.

G. PLC Data Functions, Shift Registers
1. It shall be possible to program the transfer of data between one data storage register and another, between an input or output channel and a storage register, or to transfer a constant value to any data storage register using a single command.

2. It shall be possible to perform a block transfer of a contiguous block of data registers to any other non-overlapping contiguous block of data registers, regardless of block size with a single ladder command.

3. It shall be possible to transfer any one constant to any contiguous block of data registers, regardless of block size with a single ladder command.

4. It shall be possible to program data transfer, data comparison, data value increment, data value decrement or any other mathematical operation on a data register either once every scan as long as the controlling rung is true or to execute these functions for only one scan at the leading edge of the controlling rung going true.

5. It shall be possible to perform Binary to BCD or BCD to Binary conversion of data in any data register with a single instruction.

6. Shift registers must be capable of shifting individuals bits, digits, or entire words either once per scan or for only one scan when their controlling rung goes true. The bit and digit shift registers must be able to shift either up or down.

7. The only limit to shift register size shall be the amount of contiguous data words available in memory to be used by that shift register.

H. PLC Digital Inputs and Outputs
1. Each input or output module shall be a self-contained unit housed within an enclosure so that no part of its circuit board is exposed to contact by handling.

2. Input and output units shall be UL listed, CSA certified and CE.

3. Pressure type screw terminals will accept one No. 12 or two No. 14 stranded or solid wires.

4. Convenience marker strips shall be provided adjacent to the I/O field wiring terminals for user labeling of all I/O points.
5. It shall be possible to replace any I/O module without removing or disturbing user field wiring.

6. Input and output modules shall be available in 8, 16, 32, 64, and 96 points per unit. The 32, 64, and 96-point units shall not be multiplexed I/O and shall have a thumbscrew secured, high density connector capable of accepting individual soldered or crimped connector pins or ribbon cable via IDC type connector configuration.

7. All high-density DC input or output units shall be solid state in nature. The output units shall be transistor type for long life and high DC reliability. Reed relays are not acceptable.

I. PLC Remote Inputs and Outputs

1. The remote I/O system shall be compatible with all of the company’s modular mid-sized and large PLC’s and I/O units.

2. All power for the remote I/O on a rack will be supplied by that rack’s power supply unit.

3. The communication between the local PLC system and the remote I/O racks shall be continuous, full duplex, serial communications with a data rate of at least 1.5 Mbaud.

4. The remote I/O system shall support a total of at least 512 remote I/O points with one remote master.

5. The maximum number of remote I/O points at any single drop shall be determined by the number and density of the individual I/O units on the rack rather than any internal per-rack limitation.

6. The communications media for the remote I/O system shall be field terminable, 200-micron optical fiber with a maximum transmission distance of not less than 800 meters between drops without a repeating mechanism.

7. Remote I/O Network shall be available in fiber or wire options to allow greater flexibility.

8. The remote I/O system shall have a group of pre-assigned diagnostic registers which shall be used to report system faults to the main processor.

9. In the event of a failure of a particular drop on the remote I/O system, the CPU shall be capable of being configured to either issue an alarm and continue to run or to shutdown in an error condition as it would in the event of local I/O failure.

10. In the event of failure of a remote I/O drop, all output points on that drop shall be turned OFF.

11. In the event of a remote I/O drop failure, the remote I/O System must be capable of restarting automatically once the error is cleared.

12. Remote drops shall have the capability of supporting a programming/diagnostic port.

J. Network Options

1. Networking options must include Ethernet, Profibus DP, DeviceNet, and Omron’s SYSMAC bus remote I/O and ControllerLink network. Ethernet communications must support TCP, UDP, and FTP protocols. The PLC should have the ability to generate e-mail messages to be sent via WAN or LAN, to report errors, provide scheduled maintenance and status reports. In addition, FTP (file transfer protocol) can be used to
transfer data files between a host computer and or FLASH memory card and the PLC’s memory.

K. PLC Programming Equipment
1. It shall be possible to program and monitor any PLC from a single Host Computer via the LAN.
2. Programming software must be compatible Windows 7.
3. The programming software must not require the use of any hardware protection key, any special internal circuit board on the computer, or any sort of floppy disk to operate.
4. Programming Laptop Computer
   a. Core 2 Duo, 2.00GHz
   b. 80GB Hard Drive 5400RPM
   c. Microsoft® Windows 7 Professional operating system with the latest service packs.
   d. 10/100 Base-T Network Adapter
   e. 8X DVD+/-RW
   f. 56K internal modem
   g. Manufacturer:
      1) Specified: Dell
      2) Acceptable:
         a) Hewlett Packard
         b) IBM

L. PLC Programming
1. It shall be possible to program relay contacts in series using some form of “line wrap” software feature when the programmer runs out of horizontal space on a single line. The length of any rung, in parallel contacts, must be a maximum of at least 22 lines.
2. Any ladder or ladder element delete function must require at least two steps to prevent accidental deletion of any part of the ladder program.
3. If a programming console is used, it must provide display of I/O number, program address location, type of contact or element (coil or contact, series or parallel, bit or word, NO or NC, and etc.) status during monitoring and forcing indication.
4. It shall be possible to search the program for any contact number, coil number, storage register type and number, address location, or special function number that the CPU supports.
5. It shall be possible to delete all or part of anything without affecting the remainder of the program. In either case, the program must automatically recompile to accept the new addition or remove the gap left by any deletion.
6. It shall be possible to force any input, output, or internal bit ON or OFF using either the programming console or the computer-based programming software.
7. Programming of nested branches and rungs with multiple outputs must be possible.
8. It shall be possible to program any given I/O point or internal bit or register as often as desired.
9. Using the computer-based programming software, it shall be possible to simultaneously display the following information for any desired rung:
a. The ON or OFF state of any contact or coil.
b. The contents of any given storage register.
c. Whether a coil is standard, normally closed, one-shot, or a
   latching relay.

10. The computer-based programming software must be capable of
    displaying non-adjacent rungs during program monitoring operation.

11. If a rung of logic is satisfied then the complete line should be highlighted
    not just the contacts/coils.

12. Monitoring or any bit/word across the network from any PLC should be
    supported to aid troubleshooting.

13. It should also be able to:
   a. Operate without using the mouse.
   b. Navigate using directory tree displays.
   c. Enter bit input/output instructions with function keys.
   d. Split the screen 2 or 4 ways.
   e. Convert from text inputs to ladder programs by either inputting
      mnemonics to ladder diagram displays or convert text input with
      text editors or word processors.
   f. Program with names rather than specific addresses.
   g. Have the ability to utilize name, addresses, I/O comments, and
      other data from Microsoft Excel.
   h. Drag and drop DOS files between Memory Cards in the
      computer and in the PLC.
   i. Display error histories from the CPU Unit with time stamping.
   j. Protect programs from access using passwords.
   k. Have the ability to run and monitor multiple programs all at one
      time.

M. Manufacturer:
   1. Specified: OMRON CS1 Series
   2. Acceptable:
      a. GE Fanuc
      b. Modicon
      c. Allen Bradley

2.05 REDUNDANT COMMUNICATION NETWORK

A. Communications between all Touchscreen Control System devices, including
   Touchscreens, Servers, Terminals and PLCs, shall be provided via redundant
   10/100 Mbps Ethernet.

1. The communications network shall employ redundant Ethernet Switches
   (not hubs) using a redundant loop configuration for the system backbone
   wiring. Network Switches shall operate at near media-speed on all ports
   simultaneously, allowing data flow to different segments to occur
   simultaneously thereby lowering or eliminating traffic bottlenecks that
   might be present in a shared environment. Failure of any communication
   subsection on the redundant ring shall cause a diversion of data to
   alternate communication paths within 500ms. Switches shall support
   transmission rates of 10 or 100 Mbps. Each switch shall be provided with
   two (2) 100Base-FX, female, SC-type fiber optic connectors for fiber
   optic backbone connection. Additionally, a minimum of five (5)
10/100Base-T RJ45 female connectors for Touchscreen Control System devices shall be provided. Switches shall be suitable for industrial environments.

2. As a minimum, each equipment room shall be provided with an Ethernet Switch.

3. Manufacturer:
   a. Specified: Hirschmann
   b. Acceptable: Phoenix Contact
   c. Avaya

4. Wire and Cable:
   a. Backbone wiring from switch to switch shall be "loop" configured using 8.3 Fiber Optic cable. Wiring from individual switch to device shall be via Category 6 twisted pair cable.
   b. Category 6 wire and cable shall be furnished and installed in accordance with the manufacturer's recommendations for 100 Base-T Ethernet operations. If distances exceed manufacturer or industry recommended standards, then fiber optic cable and devices shall be utilized.

B. PLC to PLC Communications
   1. 10/100 Mbps Ethernet or Bi-directional, self-healing, token loop network with a deterministic transmission rate of 2Mbaud
   2. Provide as required to meet performance requirements specified in 1.2 SYSTEM PERFORMANCE. Network shall support 64 nodes maximum on 8.3 Single-mode fiber. Provide all PLC modules and hardware as necessary.

2.06 INTERFACE BOARDS

A. Interface boards shall be UL Listed or Recognized.

B. Interface Boards shall utilize standardized, multi-conductor cables for connections to the PLC input & output modules. All field terminations inside the equipment enclosures shall be made to Interface Boards. Terminations shall not be made directly to PLC modules.

C. Interface boards shall be constructed for mounting on standard 19" E.I.A. mounting rails and shall have 3/4" aluminum support angles at the top and bottom for maximum rigidity.

D. Interface boards shall be provided with a power LED that will indicate power is being supplied to the board.

E. Interface boards' control power busses shall be fused.

F. Interface Boards shall provide proper separation of Class 1 and Class 2 circuits as defined by Article 725 of the National Electric Code.

G. Interface boards shall contain no active circuitry or control logic.
H. All terminals shall be "quick disconnect" types such that no tools are required to disconnect wiring should a board replacement be necessary.

I. Interface Board labeling shall be consistent with the PLC so that no cross-reference is required to trace circuits.

J. All terminals shall be factory labeled using printed labels. Field installed or hand written labels are not acceptable. Labels shall be consistent with system documentation indicating project specific ID numbers.

K. Termination boards shall be warranted for 10 years from the date of shipment.

L. Board Types:
1. Interposing Relay Board
   a. 16 relays per board.
   b. Relays shall be plug-in, electro-mechanical type, rated at 10 amps each minimum.
      1) Omron
      2) Potter & Brumfield
   c. Each relay output shall be individually fused to protect field wiring to the device.
   d. Each relay shall have an associated LED to indicate when its' individual coil is energized.
   e. Manufacturer:
      1) Specified: Creative Technologies # RB-16

2. Input/Output Break-Out Board
   a. 16 Points
   b. 16 Inputs or Outputs per board. Boards shall be mounted in pairs for a total of 32 points in 19 inches of horizontal space (side-by-side)
   c. Each input/output point shall have an LED to indicate if the point is currently active. Each input/output termination point shall have its corresponding “common wire” termination point located adjacent for ease of troubleshooting field devices. Terminating all “common wires” at a separate location is not acceptable.
   d. Manufacturer:
      1) Specified: Creative Technologies # BOB-16

3. Control Panel Interface Board
   a. Field cable interfaces via standard 50 pin TELCO connector
   b. 48 Points per board
   c. Manufacturer:
      1) Specified: Creative Technologies # PIB-48

2.07 REQUIRED SPARE PARTS:

A. One PLC Processor

B. One PLC input module

C. One PLC output module
D. One PLC network communication module
E. One PLC power supply
F. One PLC backplane
G. One of each type of power supply used
H. One Network Ethernet Switch
I. One 22” touchscreen monitor
J. One 160GB RAID 1 hard drive, compatible with Administration computer
K. One computer configured identical to the other touchscreen computers, including all software and files to serve as a replacement for any other touchscreen computer.

PART 3 EXECUTION

3.01 GENERAL

A. All components/equipment (PLCs, termination boards, power supplies, network switches and etc.) shall be rack mounted in, Middle Atlantic Equipment Racks.
   1. All components/equipment shall be fabricated into racks conforming to the UL 508A standard. (Enclosure and all internal equipment and wiring as a single entity)

B. Prior to the installation of Security Control equipment:
   1. Verify that all construction activities within the Control & Equipment rooms are complete. Rooms should be temperature / humidity controlled, dust free, and secure. Do not install equipment until these conditions are met.
   2. When conditions dictate storing equipment prior to installation, the temporary storage location should meet the requirements of item 1. (Above)
   3. Verify that the permanent, surge protected, power source is available for connection to the equipment.
   4. Verify that all circuits feeding system processors have UPS backup.
   5. Verify phone lines are available for off-site access to system processors.
      a. Programmable Logic Controller Network
      b. Touchscreen Network

C. Contractor shall install all conductors and make final connections to the locking system hardware and controls as required to effect the locking and control functions defined in the Division 28 specifications.

D. All conductors from the security equipment enclosures to electrically operated door locks shall be minimum 14 Ga. Copper THWN. All conductors from the security equipment enclosures to door position switches and bolt position
switches shall be minimum 16 Ga. Copper THWN. Install the number of conductors required to provide the control and monitoring functions specified.

E. Programmable Logic Controllers (PLC) shall be utilized to perform functions as specified. PLC’s shall be as specified.

F. The door locking PLCs and Touchscreen Stations shall be powered from a UPS.

G. Division 26 shall furnish and install all panel boards, breakers, wiring, and etc. to provide protected branch circuits to all security equipment.

H. In each equipment room, UPS shall have the same power source (Emergency Panel) as Door lock circuits. PLCs shall monitor UPS for loss of power. Upon loss of power, all locks in an active group release shall be de-energized until power is regained, at which time locks shall be re-energized sequentially.

I. Disconnect the primary AC power circuits to all of the electronic door locking and monitoring system equipment and test for survivability and proper operation and provide battery load calculations for 10 minute intervals up to 1 hour (min).

J. Interposing relays for door lock control shall be plug-in type with hold down clip and LED indicator. AC or DC types shall be selected as appropriate for the application. Each door lock/relay circuit shall be individually fuse- protected to isolate shorted circuits.

K. Installation shall comply with the National Electric Code. Provide proper separation of all wiring and circuit types.

3.02 INSTALLATION

A. Install system in accordance with the Company’s printed instructions unless otherwise indicated.
    1. Locate equipment as indicated on Drawings.

B. Wiring:
    1. Install conductors in raceways after the raceway system is completed by others. Exception: Conductor types specifically indicated on the drawings not to be installed in raceways.
       a. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors.
    2. Connect system components requiring a primary power supply to dedicated branch circuits.
    3. Make connections and splices at system components, Electronic door locking and monitoring system interconnection cabinets, terminal strip cabinets, and console only. Connections or splices will not be allowed at any other location in the system.
    4. Use wire management products to bundle, route, and support wiring in junction boxes, pullboxes, wireways, gutters, channels, and other locations where wiring is accessible.

C. Mounting Hardware:
1. Mount all exposed equipment with security grade tamper proof center pin reject style Allen type mounting screws.

D. Surge Suppressors:
1. Install surge suppressors on each conductor entering and leaving Electronic door locking and monitoring system from outdoor components.
2. Ground the suppressors per NFPA 70 and manufacturer requirements.
3. Install surge suppressors for 120Vac input circuits prior to connections to power supplies.
4. Install suppressors within power supply cabinet or separate NEMA enclosure as recommended by manufacturer.

E. Earth ground of equipment as required by equipment manufacturer.
1. Do not use telephone ground connections as earth grounds.
2. Do not use connections to building structural steel as earth grounds.
3. Provide equipment-grounding conductors supplied from an existing established earth ground source or from a grounding bus in an existing panelboard.

F. Identification, Labeling, Marking:
1. Station Locators: Install adjacent to each workstation.
2. Wiring Diagram: Install adjacent to equipment in each BDF room computer closet.
3. Nameplates:
   a. Install laminate engraved nameplate with card reader designation over each card reader.
   b. Install nameplate with monitor designation over each monitor.
4. Identification of Circuits: Identify wires and cables by system and function in cabinets with premarked, self-adhesive, wraparound type markers. Designations shall correspond with point to point wiring diagrams.
5. Battery Data: Insert a copy of the battery warranty in each battery compartment and mark on batteries the date placed in service.

G. Provide training and enrollment software to the facility for enrollment of employees. Provide initial enrollment of 25 employees in the base contract.

3.03 SYSTEM TRAINING

A. After the system is substantially complete and operational, provide on-site training of facility security, security supervisory, and maintenance personnel. Provide training for 8 (4) hour sessions.
1. Provide a minimum of 1 week notice to the Director’s Representative, so that a training schedule can be set up with facility personnel and arrangements can be made for a location to hold the training.
2. Provide all materials necessary for training (training aides, handouts, overhead projector, etc.).
B. System Operation Training: Training shall be set-up so that at the end of training, facility (security, security supervisory, and maintenance) personnel shall have a complete understanding of:

1. How the system operates.
   a. Training should include precautionary concerns that personnel should be aware of that could affect proper operation of the system.

2. Knowledge of all components in the system and their function.
   a. How the system is interconnected with other security systems and how the system operates in conjunction with the other systems.

3. Weekly testing procedures for the system required to be performed.

C. System Maintenance Training: Training shall be set-up so that at the end of training, facility maintenance personnel shall have a complete understanding of:

1. Routine (monthly, quarterly or annual) maintenance required to the system and how to perform that maintenance.
   a. Training should include precautionary concerns that personnel should be aware of that could affect proper operation of the system.

2. Knowledge of all components in the system and adjustments to the components that they would be required to perform to maintain operation of the system.

3. Programming of the system:
   a. Training should include instruction in all programming required to the system necessary for the system to operate as outlined in the SYSTEM DESCRIPTION.
   b. Training should include precautionary concerns that personnel should be aware of that could affect proper operation of the system working on the system.

3.04 COMPLETION

A. General: Upon completion of the work, remove excess debris, materials, equipment, apparatus, tools, and the like and leave premises clean, neat and orderly. Vacuum clean all equipment and enclosures to remove any dirt, dust, or foreign matter that may have accumulated during installation.

B. Testing:

1. Factory Testing:
   a. All components of the door control system shall be operationally tested together with the exception of the end devices. At this time, all components of the system, such as Touchscreen Stations, Administration Computer, Network Switches, Control Panels, Power Supplies, Interface Boards, and interconnecting wiring shall be complete and fitted with their connectors. Factory testing shall take place at the TCSV’s fabrication facility.
   b. Give notice at least 4 weeks prior to system testing as the Owner may wish to be present to verify substantial completion of system.
2. Site Testing: After complete installation of the system in the field, all problems shall be corrected prior to final testing. Once the Contractor is satisfied that the system is operating satisfactorily, operation of the entire system shall be demonstrated to the Owner. If, during this final demonstration, it becomes evident that there are still problems with the system, the demonstration will be cancelled and rescheduled when all problems are corrected.

3.05 FIELD QUALITY CONTROL

A. Cable Test: Electronically meter test and documents all existing cables, control wiring, and twisted cables prior to installing new equipment and electronically test and document all new cables under the supervision of Company Field Advisor. Test for open, grounds, and shorts.

B. Make corrections to wiring prior to proceeding. Advise the Director’s Representative of any cable that cannot be repaired.

C. Provide written test results for all cables and certify operation.

D. Test all cables after installation and prior to connecting new equipment.

E. Preliminary System Test:
   1. Preparation: Have the Manufacturer’s Technical Advisor adjust the completed system and then operate it long enough to assure that it is performing properly:
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in suitable condition to conduct the acceptance test.
      b. Checking and adjusting equipment.
      c. Training facility personnel.

F. System Acceptance Test:
   1. Preparation: Notify the Director’s Representative at least 3 working days prior to the test so arrangements can be made to have a Facility Representative witness the test.
   2. Supply all equipment necessary for system adjustment and testing.
   3. Make the following tests:
      a. Test all software. Demonstrate that all features of the software are operable.
      b. Individually test each master station and sub-station.
      c. Test each system function step by step as summarized under TOUCHSCREEN SYSTEM – FUNCTION SPECIFIC.
      d. Individually test each door (card access and monitoring).
   4. Submit written report of test results signed by Manufacturer’s Field Advisor and Director’s Representative. Mount a copy of the final report in a Plexiglas enclosed frame assembly adjacent to the central controller.

3.06 INSULATED CONDUCTOR SCHEDULE – TYPES AND USE

A. Communication Circuits:
1. For interior wiring (in raceways), use communication and power cable types specified in PART 2.
2. Where wiring is specifically indicated on the drawings not to be run in raceway use plenum rated cable (concealed unless otherwise indicated).

B. Remote-Control, Signaling, and Power-Limited Circuits: Per manufacturer's requirements.

END OF SECTION
SECTION 320117

PAVEMENT REPAIR AND RESURFACING

PART 1   GENERAL

1.01  SUBMITTALS

A. Product Data: Manufacturer’s name and brand name for the following:
   1. Asphalt filler.
   2. Asphalt emulsion.

B. Quality Control Submittals:
   1. Plant name and location of asphalt concrete supplier.

1.02  QUALITY ASSURANCE

A. Comply with the applicable requirements of DOT Section 400-Bituminous Pavements.

PART 2   PRODUCTS

2.01  MATERIALS

A. Asphalt Filler: DOT Table 702-2 Asphalt Cements, Material Designation 702-0700.

B. Asphalt Emulsion Tack Coat: DOT Section 702, Table 702-9, Material Designation 702-90.

C. Asphalt Concrete Top Course: DOT Table 401-1, Type 7.

PART 3   EXECUTION

3.01  PREPARATION

A. Conditioning of Existing Pavement: Comply with DOT Section 633.

B. Applying Asphalt Emulsion Tack Coat: Comply with DOT Section 407-3.

C. Cold Milling: Comply with DOT Section 490.

3.02  RESURFACING WITH ASPHALT CONCRETE

A. Lay asphalt concrete top course in accordance with DOT Section 401-3.

END OF SECTION
SECTION 321216
ASPHALT CONCRETE PAVING

PART 1 GENERAL

1.01 SUMMARY

A. This section includes provisions for hot-mixed asphalt concrete paving over prepared subbase.

B. This section includes provisions for replacing pavement removed during the course of the Work, or damaged resulting from Contractor’s operations.

1.02 SUBMITTALS

A. Product Data: Manufacturer’s name, specifications, and installation instructions, for each item specified.

B. Quality Control Submittals:
   1. Plant name and location of asphalt concrete supplier.

1.03 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Discontinue paving when surface temperatures fall below requirements listed in DOT Table 402-2.
   2. Do not place asphalt concrete on wet surfaces, or when weather conditions otherwise prevent the proper handling or finishing of bituminous mixtures as determined by the Director’s Representative.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Asphalt concrete and all related items shall meet the requirements of NYSDOT, Section 400.

B. Performance Graded Binder: PG 64-22, NYS DOT Specification 702-6422

C. Asphalt Concrete Paving: Conform to DOT Section 400 Hot Mix Asphalt.
   1. Top Course: NYSDOT 402.098303
   2. Binder Course: NYSDOT 402.258903
   3. Truing and Leveling Course: NYSDOT 402.128303

D. Asphalt Cement Tack Coat: Diluted Tack Coat: 407.0102
E. Stabilization Fabric: Woven in accordance with Section “Earthwork.”

PART 3 EXECUTION

3.01 ASPHALT CONCRETE PAVING

A. Construct asphalt pavement in accordance with DOT, Section 402-3.

B. Apply asphalt cement tack coat at the recommended rate between all Asphalt Concrete Paving Courses and for the paving fabric.

C. Apply paving fabric to the indicated surface in accordance with manufacturer’s instructions.

END OF SECTION
SECTION 323113

CHAIN LINK FENCE AND GATES

PART 1   GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Wiring for Gate Systems: Section 260505 (Provided by E-Contract).

B. Gate Systems: Section 323114.

1.02 REFERENCES

A. Comply with ASTM A 53 for requirements of Schedule 40 piping.

B. Welding Standards: “Structural Welding Code - Steel, AWS D1.1” or “Structural Welding Code - Sheet Steel, AWS D1.3”, as applicable, by the American Welding Society (AWS Codes).


1.03 DEFINITIONS

A. Height of Fence: Distance measured from the top of concrete footing to the top of fabric. Fences with buried fabric measured from finished grade to the top of fabric.

B. Company Field Advisor: An employee of the company which markets the security coils under their name and who is certified in writing by the Company to be technically qualified in design and installation of security coils or an employee of an organization certified by the foregoing company to be technically qualified in design and installation of security coils.

1.04 SUBMITTALS

A. Shop Drawings: Complete detailed drawings for each height and style of fence and gate required. Include separate schedule for each listing all materials required and technical data such as size, weight, and finish, to ensure conformance to specifications.

B. Product Data: Manufacturer’s catalog cuts, specifications, and installation instructions for each item specified.

C. Samples:
   1. Fence Fabric: Minimum one square foot.
   2. Fence and Gate Posts: One foot long each.
3. Miscellaneous Materials and Accessories: One each.
4. If directed, provide samples from materials delivered to the Site for installation.

D. Re-Evaluation Fee: In accordance with Article 4.7 of the General Conditions, a re-evaluation processing fee will be levied against the Contractor for each re-evaluation of any Submittal Package submission that was returned for failure to comply with the submittal requirements relative to completeness, content or format. There will be a fee of $250 levied against the Contractor for each re-evaluation of any Submittal Package submission that was returned for failure to comply with the submittal requirements relative to completeness, content or format.

E. Quality Control Submittals:
2. Certificates: Letter required under Quality Assurance Article.

1.05 QUALITY ASSURANCE

A. Comply with standards of the Chain Link Fence Manufacturer’s Institute.

B. Provide steel fence and related gates as a complete compatible system including necessary erection accessories, fittings, and fastenings.

C. Posts and rails shall be continuous without splices.

D. Security Coils Installation Certification: Letter by the Company Field Advisor stating that the fence company is certified in the installation of the security coils and meets the Contract requirements.

E. Concrete batching plants shall be currently approved as concrete suppliers by the New York State Department of Transportation.

1.06 MAINTENANCE

A. Extra Materials: Furnish ratchet tool and 100 (one hundred) of stainless steel twistable wire ties for installation of coils by facility personnel.

1.07 DELIVERY

A. Coordinate delivery of anchors and other accessories to be built into other Work, to avoid delay. Furnish instructions and templates as required for accurate location.

B. The manufacturer of the prison lock keys shall notify the Director’s Representative at Harriet Tubman Residential Center, Chuck Butts (Office: 315-253-8282 or Cell: 315-575-7500) and the Director of Capital Services, Raymond Farina (518-473-7325), a minimum of two days in advance of shipping keys. Ship all prison lock keys direct from manufacturer, through the United States Postal Service, via Registered Mail, Restricted Delivery, Return Receipt Requested, to:
PART 2 PRODUCTS

2.01 COMPANIES

A. Allied Tube & Conduit Corp., 16100 S. Lathrop Ave., Harvey, IL 60426, (800) 882-5543.


C. Anchor Fence, 6500 Eastern Ave., Baltimore, MD, (410) 633-6500.


E. RhinoTube LLC, North American Steelworks, 17 Wood St., West Haven, CT 06516, (800) 466-8600


G. Wheatland Tube Company, One Council Ave., Wheatland, PA 16161, (724) 342-6851

2.02 MATERIALS

A. Class B Steel Tubing (Option):
   1. SS-40 Fence Pipe by Allied Tube & Conduit Corp.
   2. RhinoShield R-40 Tubing by RhinoTube LLC.
   3. WT-40 Fence Pipe by Wheatland Tube Company.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.03 STEEL FRAMEWORK (FOR FENCES 6’-1” - 10’-0” HIGH)

A. End Posts, Corner Posts and Pull Posts:
   1. Pipe: 2.875 inches OD, 5.79 pounds per linear foot (Schedule 40).

B. Line Posts:
   1. Pipe: 2.375 inches OD, 3.65 pounds per linear foot (Schedule 40).
2.04 STEEL FRAMEWORK (FOR FENCES 10'-1" - 16' HIGH)

A. End Posts, Corner Posts and Pull Posts:

B. Line Posts:

C. Light Posts:

2.05 STEEL FABRIC

A. One-piece widths for fence heights up to 12'-0".

B. Chain link, 2 inch mesh, No. 9 gauge; 3/8 inch mesh, No. 11 gauge.

C. Selvages: Top edge and bottom edge twisted and barbed.

2.06 SWING GATE POSTS

A. Single width of gate up to 6'-0" wide and less than 10'-0" high:
   1. Pipe: 2.875 inches OD, 5.79 pounds per linear foot (Schedule 40).

B. Single width of gate 6'-0" to 12'-0" wide or over 10'-0" high:

2.07 SWING GATE FRAMES

A. Up to 6'-0" high, and leaf width 8'-0" or less.
   1. Pipe: 1.660 inches OD, 2.27 pounds per linear foot (Schedule 40).
   2. Class B Steel Tubing: 1.660 inches OD, 1.84 pounds per linear foot.
   3. Square Tubing: 1.50 inches OD, 1.90 pounds per linear foot.

B. Height: 6'-0" - 12'-0", or leaf width exceeding 8'-0":
   1. Pipe: 1.90 inches OD, 2.72 pounds per linear foot (Schedule 40).
   2. Class B Steel Tubing: 1.90 inches OD, 2.28 pounds per linear foot.
   3. Square Tubing: 2 inches OD, 2.60 pounds per linear foot.

C. Assemble gate frames by welding or with special steel fittings and rivets for rigid connections. Install mid-height horizontal rails on gates over 10 feet high. When width of gate leaf exceeds 10 feet, install mid-distance vertical bracing of the same size and weight as frame members. When either horizontal or vertical bracing is not required, provide truss rods as cross bracing to prevent sag or twist.

2.08 SLIDING GATE FRAMEWORK

A. Posts
   2. Class B Steel Tubing: 4 inches OD, 6.56 pounds per linear foot.
B. Frames:
   1. Pipe 1.90 inches OD, 2.72 pounds per linear foot (Schedule 40).
   2. Class B Steel Tubing: 1.90 inches OD, 2.28 pounds per linear foot.
   3. Square Tubing: 2 inches OD, 2.60 pounds per linear foot.

2.09 SWING GATE HARDWARE

A. Type “A” Gates: As specified in Section 323114.

B. Type “B-1” Gates: As specified in Section 323114.

C. Type “C” Gates:
   1. Hinges: Pressed Steel Offset 180 degree gate hinge item no. 014005 or appropriate for use by Hearne Steel Company, Inc.
   2. Locks: Drop bar type complete with flush plate set in concrete. For double gates provide full height drop bar and keeper. Padlock eye shall be an integral part of latch construction.

2.10 SLIDING GATE HARDWARE

A. Overhead Type, Electrically Operated: As specified in Section 323114.

2.11 FABRICATION AND MANUFACTURE

A. Personnel Gates, Type “A” and “B-1”: As specified in Section 323114.

B. Thoroughly clean all steel prior to sending it to the galvanizer the entire assembly. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove steel mill stamp, loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, SSPC SP-6 “Commercial Blast Clean” or SSPC SP-7 “Brush-Off Blast Cleaning”. Do not ship the entire assembly from the fabricating shop to the galvanizer prior to QA inspection and approval by the State or designated inspection laboratory that the assembly is in conformance with the Contract Documents.

2.12 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Rails and Post Braces:
   1. Pipe: 1.660 inches OD, 2.27 pounds per linear foot (Schedule 40).
   2. Class B Steel Tubing: 1.660 inches OD, 1.84 pounds per linear foot.

B. Fittings and Post Tops: Steel, wrought iron, or malleable iron.
   1. Fasteners: Tamper-resistant cadmium plated steel screws.


D. Metal Bands (for securing stretcher bars): Steel, wrought iron, or malleable iron.
E. Wire Ties: Conform to American Steel Wire gauges.
   1. For tying fabric to line posts, rails and braces: 9 gauge (.1483 inch) steel wire.
   2. For tying tension wire to fabric: 11 gauge (.1205 inch) steel hog rings.
   3. For tying security coils to fence fabric, barbed wire, or adjacent coils: 16 gauge (.0625 inch) 300 Series stainless steel wire.
   4. For splicing adjoining sections of security coils: 16 gauge (.0625 inch) 300 Series stainless steel wire, or 11 gauge (.1205 inch) 300 Series stainless steel hog rings.
   5. For splicing overlapped fabric at bottom rail: 11 gauge (.1205 inch) steel hog rings.

F. Truss Rods: 3/8-inch diameter.

G. Concrete: Portland Cement concrete having a minimum compressive strength of 4000 psi at 28 days.

H. Spiral Paper Tubes:
   2. Sleek/tubes by Jefferson Smurfit Corp., P.O. Box 66820, St. Louis, MO 63166, (314) 746-1100.

I. Cold Galvanizing Compound: Single component compound giving 93 percent pure zinc in the dried film, and meeting the requirements of DOD-P-21035A (NAVY).

J. Tension Wire: 7 gauge coiled spring steel wire.


L. Bolts and Nuts: ASTM A 307, Grade A.

M. Expansion Anchors: 3/4 inch diameter with a minimum 4-3/4” embedment depth, Stainless Steel KWIK Bolt 3 (KB3) by Hilti, Inc. www.us.hilti.com ; 1-800-879-8000.

N. Shrink-Resistant Grout (Ferrous): Factory-packaged, non-catalyzed, ferrous aggregate mortar grouting compound selected from the following:
   1. Embeco 636 by Master Builders, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 227-3350.
   3. Ferro-Grout by L&M Construction Chemicals, 14851 Calhoun Rd., Omaha, NE 68152, (800) 362-3331.
   4. Vibra-Foil by A.C. Horn, Inc., Tamm Industries, 7405 Production Dr., Mentor, OH 44060, (800) 862-2667.
2.13 **BARBED WIRE**

A. Two strand 12-1/2 gauge steel wire, with 14 gauge 4-point steel barbs spaced 5 inches oc.

B. Extension Arms: Pressed steel, wrought iron, or malleable iron, complete with provision for anchorage to posts (including light posts) and attaching 3 rows of barbed wire to each arm.
   1. Type: Single 45-degree arm; one for each post.

2.14 **THIRTY INCH DIAMETER SECURITY COILS**

A. Concertina Type: Minimum 51 coil loops fabricated by wrapping a barbed tape made of AISI 430 stainless steel, whose hardness is optional, around a 300 series austenitic stainless steel core wire. Diameter of the core wire shall be 0.098 inch plus or minus 0.002 inch, and the tensile strength shall be a minimum of 140,000 psi. The barbs shall be offset from the plane of the core wire. Outside diameter of the coil loops shall be 30 inches (plus or minus 2 inches). Each loop shall consist of 24 (plus or minus one) clusters of four needle sharp barbs on four-inch centers, each barb measuring a minimum of 1.2 inches in length.
   1. Adjacent coil loops shall be attached alternately at 5 points of equal spacing about the circumference with stainless steel flat metal band type clips approximately 0.375 inch wide and 0.065 inch thick. These clips shall prevent the coil loops from being pulled apart at each point of attachment when a minimum 200-pound load is applied, as specified in the barbed tape test procedure. Wrapping of barbed tape about the line wire shall be accomplished within the tolerances specified in MIL-B-52489E, except that the tape shall be wrapped a minimum of 230 degrees and shall satisfy the push test specified therein.
   2. Extended length shall be 25 feet (plus or minus 2 feet), with a maximum spacing between loops of 12 inches.

2.15 **SOURCE QUALITY CONTROL**

A. Test Procedure - Barbed Tape Security Coils: The company producing the security coils shall have test facilities available which can demonstrate that the security coils meets the following requirements.
   1. Sampling; before delivery to job site: Samples for quality conformance inspections shall be selected in accordance with MIL-STD-105, sampling level S-1, AQL 2.5. A unit of product for sampling shall be one complete unit no less than ten feet in length.
   2. Test Equipment: The test equipment for applying and measuring force shall be capable of measuring a minimum force of 200 pounds and shall be calibrated prior to each test with standards traceable to the National Bureau of Standards.
   3. Test Specimen: The test specimen shall consist of 2 segments of barbed tape, taken from adjacent coil loops, each at least one- foot-long, containing and centered upon a point of attachment. This attachment shall be prepared in the normal course of production.
   4. Test Preparation: A pair of one inch, plus or minus 0.1 inch, cubic back-up blocks shall be centered on each side of the attachment point, in as
close as possible contact with the major surfaces of the barbed tape. Barbs adjacent to the attachment point may be removed to simplify the testing process. Each leg of each barbed tape segment shall be bent at a 90-degree angle so that each segment has a major surface in contact with 3 adjoining faces of a back-up cube and so that ends of each segment are parallel to each other and to the axis of the attachment. Each back-up cube shall then be restrained in place by spot welding a straining strap to each leg of a segment so that the strap is in continuous contact with the cube face opposite the point attaching the 2 segments.

5. Test: Two ends of one of the test segments, prepared per above, shall be joined and rigidly attached to a structure so that the retaining structure, with said attachment, will survive a minimum tensile load of 200 pounds without deflection or slippage. The 2 ends of the opposite segment shall be joined and attached to the test apparatus so that said attachment will survive a minimum tensile load of 200 pounds, without any slippage. The test equipment above shall then be used to apply up to a 200-pound minimum force (through the adjacent coil loop segment attachment point) away from the rigid retaining structure. After reaching a minimum 200 pound force, as measured by the test equipment, this force shall be maintained continuously for a least 30 seconds.

6. Test Results: At the completion of the 30-second pull test, the test specimen shall be removed from the attachments to the rigid retaining structure and to the test equipment. The back-up blocks shall be removed from the test specimen and each segment of the barbed tape shall be examined for breaks, cracks, or separation around their mutual attachment point. The test specimen shall have failed this test if any of the above have occurred or a 200-pound minimum pull cannot be applied continuously for 30 seconds.

2.16 FINISHES

A. Steel Framework:
   1. Pipe: Galvanized in accordance with ASTM A 53, 1.8 ounces zinc per square foot.
   2. Square Tubing: Galvanized in accordance with ASTM A 123, 2.0 ounces zinc per square foot.
   3. Class B Steel Tubing: Exterior; 1.0 ounces zinc per square foot plus chromate conversion coating and clear polyurethane. Interior; zinc rich organic coating.

B. Fabric; one of the following:
   1. Galvanized Finish: ASTM A 392 class II zinc coated after weaving, with 2.0 ounces per square foot.

C. Fence and Gate Hardware, Miscellaneous Materials, Accessories:
   1. Wire Ties and Hog Rings: Galvanized Finish, ASTM A 90 1.6 ounces zinc per square foot, or aluminized finish, ASTM A 809 0.40 ounces per square foot.
   2. Hardware and Miscellaneous Items: Galvanized Finish, ASTM A 153 (Table 1).
3. Extension Arms: Hot-dip galvanized after fabrication, ASTM 123, 2.0 ounces zinc per square foot.
4. Angle Beams, I Beams, and Steel Shapes: Galvanized in accordance with ASTM A 123, 2.0 ounces zinc per square foot.

D. Barbed Wire and Tension Wire:
   1. Galvanized Finish: ASTM A 121 class 3, 0.80 ounces per square foot.

PART 3 EXECUTION

3.01 PREPARATION

A. Do not begin installation of any fencing until finished grading has been completed.

B. Clear and grub along fence line as required to eliminate growth interfering with alignment. Remove debris from State property.

3.02 INSTALLATION

A. Space posts equidistant in the fence line with a maximum of 10 feet on center. For fences 16 feet and higher space posts a maximum of 8 feet on center.

B. Setting Posts in Earth: Drill holes for post footings. Set posts in center of hole and fill hole with concrete. Plumb and align posts. Vibrate or tamp concrete for consolidation. Finish concrete in a dome shape above finish grade elevation to shed water. Do not attach fabric to posts until concrete has cured a minimum of 7 days.

C. Setting Posts in Rock: Drill holes into solid rock one inch wider than post diameter, 18 inches deep for end, pull, corner, and gate posts, and 12 inches deep for line posts. Set posts into holes and fill annular space with shrink-resistant grout.

D. Brace assembled sections until permanently secured in place to prevent displacement or distortion of the members. Do not utilize metal bracing to support post when plumbing or securing posts.

E. If post tops or extension arms will not be installed prior to impending rain, provide temporary covers over tops of posts to prevent posts from filling with water.

F. Locate corner posts at corners and at changes in direction. Use pull posts at all abrupt changes in grade and at intervals no greater than 500 feet. On runs over 500 feet, space pull posts evenly between corner or end posts. On long curves, space pull posts so that the strain of the fence will not bend the line posts.

G. Install top rail continuously through post tops or extension arms, bending to radius for curved runs. Install expansion couplings as recommended by fencing manufacturers.
H. Install bottom and intermediate rails in one piece between posts and flush with post on fabric side using special offset fittings where necessary.

I. Diagonally brace corner posts, pull posts, end posts, and gate posts to adjacent line posts with truss rods and truss rod tighteners.

J. Attach fabric to security side of fence. Maintain a 2-inch clearance above finished grade except when indicated otherwise. Thread stretcher bars through fabric using one bar for each gate and end post and 2 for each corner and pull post. Pull fabric tight so that the maximum deflection of fabric is 2 inches when a 30-pound pull is exerted perpendicular to the center of a panel. Maintain tension by securing stretcher bars to posts with metal bands spaced 15 inches oc. Fasten fabric to steel framework with wire ties spaced 12 inches oc for line posts and 24 inches oc for rails and braces. Bend back wire ends to prevent injury. Tighten stretcher bar bands, wire ties, and other fasteners securely.
   1. When fabric is indicated to be buried, the buried portion of fabric shall be separate from the main fence fabric. Overlap fence fabric and buried fabric a minimum of 6 inches at the bottom rail. Secure fence fabric to bottom rail with wire ties spaced 24 inches oc. Secure buried fabric to fence fabric, above the bottom rail, with hog rings spaced 12 inches oc. The buried fabric shall not be secured directly to the bottom rail.
   
   **Note:** To prevent settlement of the buried fabric during backfill operations, the buried fabric may be temporarily attached to the bottom rail. Remove all such temporary ties after backfilling is complete. Should any fence components become distorted as a result of installation or settlement of buried fabric, untie all fabric, re-align fence members, and re-tie fabric.
   2. If approved pre-formed ties are used to secure the fence fabric, the “pigtail” for all ties at the 8 foot high level and below shall be bent down parallel with the fence posts and/or rails.

K. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of fence. Tighten nuts and cut off excess threads so no more than 1/8 inch is exposed. Peen ends of all bolts below a height of 10 feet to prevent loosening or removal of nuts.
   1. Secure post tops and extension arms with tamper-resistant screws.

L. Install gates plumb and level and adjust for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

M. Fence Alarm System: Where a fence mounted alarm/detection system is required, install the fence in a manner that will permit satisfactory operation of the alarm/detection system. Conform to the following:
   1. Eliminate all fabric vibrations and rattles caused by wind against posts and rails. Install additional wire ties above quantity specified if deemed necessary to prevent vibrations and rattles.
   2. Eliminate all rattles from stretcher bar bands, truss rods, rail and post clamps, and other hardware.
N. Tension Wire: Where tension wire is indicated or required, weave tension wire through fabric or fasten with hog rings spaced 24 inches oc. Tie tension wire to posts with 9 gauge wire ties.

O. Concertina Type Security Coils: Install in accordance with the manufacturer’s printed instructions and meeting the following minimum requirements:
1. Install security coils with coil loops (apertures) equally spaced 12 inches oc (plus or minus 2 inches).
2. Secure coils to the top of the fence by attaching each coil loop where it intersects the barbed wire and the top of the fabric with twistable stainless steel wire ties.
3. Secure coils to the side of the fence by attaching each coil loop wherever it intersects the fence fabric, and any adjacent coils, with twistable stainless steel wire ties. Attach adjacent coils to each other wherever every other loop intersects or at 36 inches oc maximum.
4. Where security coils are placed on the ground, anchor each coil to the ground at 5-foot intervals using anchors formed from galvanized No. 3 reinforcement bars. Each reinforcement bar anchor shall have a 2-inch hook formed at the top and shall be driven a minimum of 30 inches into the ground.
5. Splices: Splice successive units to adjacent coil loops by overlapping end loops a minimum of two barbed clusters to form one continuous obstacle.
   a. Permanently attach barb roots together with twistable stainless steel wire ties or stainless steel hog rings.
   b. Cross-tie barb roots with 2 stainless steel twistable wire ties or 2 stainless steel hog rings on both barbs of a 2-barb splice or the center barb of a 3-barb splice, and at all points of the splice where factory clips are installed on adjoining sections of continuous coil.

P. Wire brush and repair welded and abraded areas of galvanized surfaces with one coat of cold galvanizing compound.

Q. Restore disturbed ground areas to original condition. Topsoil and seed to match adjacent areas.

3.03 ADJUSTING

A. Adjust operative units and equipment to work freely and easily, ready for use. Field lubricate operating and locking systems in accordance with the manufacturer’s maintenance instructions. Adjust equipment when the temperature is approximately 70 degrees F.

END OF SECTION
PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Wiring for Gate Systems: Section 260505 (Provided by E-Contract)

B. Chain Link Fence and Gates: Section 323113.

1.02 REFERENCES

A. Welding Standards: “Structural Welding Code - Steel, AWS D1.1” or “Structural Welding Code - Sheet Steel, AWS D1.3”, as applicable, by the American Welding Society (AWS Codes).


1.03 DEFINITIONS

A. Technical Advisor(s); an individual meeting the requirements of either of the following subparagraphs:
   1. An employee of the company producing the system, or company which lists and markets the primary components of the system under their name, who is certified in writing by the company to be technically qualified in design, installation, and servicing of the required products. Personnel involved solely in sales do not qualify.
   2. An individual employed by an organization, other than the company producing the system, certified in writing by the company producing the system that the individual is technically qualified in design, installation and servicing of the required products and is capable to act as company field advisor in their behalf. Personnel involved solely in sales do not qualify.

B. Gate Control Console: The interior enclosure that houses the gate controls, typically desk or counter mounted.

C. Gate Control Cabinet: The exterior enclosure which houses the gate controls, typically mounted on railing of Control Tower.

D. Date: The calendar date within 30 days of submitting material for approval.
1.04 SUBMITTALS - GENERAL

A. Waiver of Submittals: The “Waiver of Certain Submittal Requirements” in Section 0133000 does not apply to this Section.

B. Submittal Packages: Submittals required by this section shall be submitted in packages as follows:
1. Submittals Package 1: Quality Assurance Package:
   a. Submit within 30 days of contract award.
2. Submittals Package 2: Gate Systems Package:
   a. Submit no later than 30 days after receipt of approval of Submittals Package 1.
4. Re-Evaluation Fee: In accordance with Article 4.7 of the General Conditions, a re-evaluation processing fee will be levied against the Contractor for each re-evaluation of any Submittal Package submission that was returned for failure to comply with the submittal requirements relative to completeness, content or format. There will be a fee of $250 levied against the Contractor for each re-evaluation of any Submittal Package submission that was returned for failure to comply with the submittal requirements relative to completeness, content or format.

C. It is the Contractor's responsibility to review and verify that all information required for each submittal package is included in the submittal package. Errors or omissions found by the Contractor shall be corrected prior to submission for approval. Incomplete Submittal Packages will be returned for correction with no action taken.
1. Contractor shall verify that portions of the submittal packages provided by a Sub-Contractor are complete.
2. Technical Advisors shall be responsible for reviewing each complete submittal package prior to its submission for review and approval.
   a. Letter(s) from the Technical Advisor shall be included in the Submittal Packages, stating that the Technical Advisor has reviewed the entire Submittals Package for accuracy and completeness and approves all materials and installation methods included in the Submittals Package.
   b. Errors or omissions found by the Technical Advisor shall be corrected prior to submission of the package for approval.

D. Submittal Package shall include.
1. The submittal shall include:
   a. Signed and dated documents of all documents that require signatures.
      1) Documents submitted without a signature and date will be disapproved.
      2) Photocopies, E-mails or Faxed copies of documents requiring signatures are not acceptable.
      3) Electronic signatures and rubber stamp signatures are not acceptable, only hand written signatures are acceptable.
   b. Each page shall be numbered.
c. Each page shall bear the Technical Advisor’s handwritten initials and date (in the lower right hand corner of the page) indicating that the Technical Advisor has reviewed the information presented on that page.

d. Drawings required to be included with the submittal package shall bear the Technical Advisor’s handwritten initials and date (in the lower right hand corner of the drawing or in the appropriate location in the drawing's title block) indicating that the Technical Advisor has reviewed the information presented on that drawing.

E. Quality Control Submittal Package.

1. Welder’s Certification: Submit each welder’s welding certification for each type weld and position before fabrication

1.05 SUBMITTALS PACKAGES

A. Submittals Package 1 - Quality Assurance: Submit required information on the “Quality Assurance Submittal Form” found at the end of this section. Include the following:

1. Equipment Qualifications:
   a. The New York State Department of Correctional Services and the New York State Office of General Services have tested and/or reviewed the manufacturers and/or their products listed in this section, and approve them for use at their facilities.
      1) Products listed by manufacturer’s name and model number have been approved for use by the New York State Department of Correctional Services.
      2) Products previously approved for use by the New York State Department of Correctional Services are NOT automatically approved. All products must be submitted for review to determine if they are acceptable for their proposed application.
   b. Products other than those specified:
      1) If products other than those specified, are proposed for use, furnish the name, address, and telephone number of at least 5 comparable installations that can prove the proposed products have operated satisfactorily for 1 year.
      2) The Company producing the product shall have test facilities available, which can demonstrate that the proposed product meets contract requirements.

2. Manufacturer’s Qualifications Data:
   a. Names, addresses and facility contacts of 4 similar projects where manufacturer’s equipment and hardware has been in operation for not less than 3 years.

3. Installation Company Qualifications Data:
   a. Name, business address and telephone numbers of the installation company.
   b. Name of person supervising installation and completion of Work of this section.
   c. Names, addresses and facility contacts of 4 similar projects this person has supervised in the past 3 years.
d. Include written verification from the manufacturer the person supervising the Work is trained and qualified in the installation of the accepted gate and detention products.

4. Technical Advisor’s Qualifications Data:
   a. Name, business address and telephone numbers of technical advisor(s).
   b. Written certification from gate systems equipment and detention hardware manufacturers that advisor is technically qualified in design, installation and servicing of products.

B. Submittals Package 2 - Gate Systems:
1. Written certification from the Technical Advisor for each gate system stating that the Gate Systems package has been reviewed for accuracy and completeness and all materials and installation methods are approved.
2. Shop Drawings:
   a. Complete detailed drawings for each height and style of gate required. Include separate schedule for each. List materials required, and technical data including size, weight, and finish to ensure conformance to specifications. Show relationship of gates with other Work. Include details of all major components. Include parts list showing manufacturers’ names and part numbers for the complete installation.
   b. If gates are to be installed in existing openings, field measure existing gate openings and other conditions, and indicate existing information on shop drawings.
   c. Complete detailed drawings for each console required. Indicate technical data, including size and finishes, to ensure conformance to specifications. Show relationship of all required components with respect to the console housing. Include parts list showing manufacturers’ names and part numbers for the complete installation.
   d. Wiring Diagrams: Show switches, controls, motors, and other electrical components. Include wiring diagrams of the complete system as proposed to be installed. Standard diagrams will not be acceptable.
3. Hardware Schedule: In addition to information included on Shop Drawings, consolidate detention hardware information for ALL gates in this project into a SINGLE hardware schedule. Examples of approved layout will be provided if required. Product quantities are not checked for accuracy. Include:
   a. Gate index, description, handing, swing or slide direction.
   b. Lock type for each gate. Include the handing number from the lock manufacturer’s Swing Chart indicating the cover plate side and keying.
   c. Closers.
   d. Hinges.
   e. Door position switch.
   f. Pulls.
   g. Cylinder shields.
   h. Keying schedule and keying instructions (key code).
i. All other detention hardware required to complete the Work of this section.

4. Product Data:
   a. Catalog sheets, specifications and installation instructions.
   b. Bill of Materials: Provide a Bill of Materials identifying each system device or component proposed to be used for this system as listed in PART 2 PRODUCTS of this section. The Bill of Materials shall provide the following information:
      1) Identify each item by name and model number.
      2) Indicate the page number(s) in the Submittal Package where information required for that item can be found.
      3) Identify the appropriate specification section, Article number, paragraph and subparagraph where that item is listed in the project manual.

5. Detailed sequence of operations. Submit in a format similar to Description of Completed System.

C. Submittals Package 3 - Contract Closeout:
1. Name, address and telephone number of nearest fully equipped service organization.
2. Operation and Maintenance Data for Gate System: Deliver 3 copies of instructions for operation, maintenance, recommendations, and parts manuals covering the installed products to the Director’s Representative.
3. Operation and Maintenance Data for Power and Control Wiring Products:
   a. Operation and maintenance data for each product.
   b. Complete point to point wiring diagrams (As-Built Drawings) of the modifications to the system as installed. Identify all conductors and show all terminations and splices. (Identification shall correspond to numbered tags installed on each conductor.)
   c. Name, address, and telephone number of nearest fully equipped service organization.
4. Deliver 3 copies of instructions, maintenance recommendations, and parts manuals covering each of the installed products to the Director’s Representative.
5. Certification: Deliver to the Director’s Representative written affidavit from the Gate System manufacturer(s) that the Gates systems, the Gate locks, motor operators and the accessories are installed correctly and operating properly.

1.06 DESCRIPTION OF COMPLETED SYSTEM – VEHICLE COMPOUND

A. The completed system shall operate as follows:
1. Each sliding gate operator shall be controlled and monitored by a three-position selector switch and indicator lights located in the gate control console. A matching three-position selector switch and indicator lights located in the gate control cabinet shall provide an alternate location for controlling and monitoring the gates.
a. Moving the switch to the “Open” position unlocks and opens the gate.
   1) As long as the switch’s handle is held in the “Open” position the gate shall continue moving until it comes to the fully open position.
   2) Releasing the switch’s handle, will cause the switch to move to the “Stop” position and all movement of the gate will stop.

b. The “Stop” position of the switch is the default position of the switch. Releasing the handle of the switch from either the “Open” or “Close” position will cause the switch to move to the stop position and all movement of the gate will stop.

c. Moving the switch to the “Close” position, closes and deadlocks the gate.
   1) As long as the switch’s handle is held in the “Close” position the gate shall continue moving until it comes to the fully closed position and is deadlocked.
   2) Releasing the switch’s handle, will cause the switch to move to the “Stop” position and all movement of the gate will stop.

d. Gate movement may be reversed in either direction of travel by setting the control switch to the appropriate position. The control system shall automatically stop the gate, pause for 2 seconds minimum, then cause the gate to travel in the opposite direction. There is an adjustable time delay to avoid mechanical damage.

e. Two control panel indicator lights at both gate control console and cabinet shall monitor the status of the gate.
   1) A “Green” indicator light shall illuminate when the gate is completely closed and deadlocked.
   2) A “Red” indicator light shall illuminate for all other conditions.

2. Pedestrian (Type “A”) gate shall be controlled and monitored by a pushbutton and indicator lights located in the gate control console. A pushbutton and indicator lights located in the gate control cabinet shall provide an alternate location for controlling and monitoring the gate.

   a. Depressing the pushbutton, the lock will unlock from the locked closed position and remain unlocked only while pushbutton is depressed. Lock will automatically deadlock when gate is closed.

   b. Two control panel indicator lights at both gate control console and cabinet shall monitor the status of the gate’s door position switch and lock.
      1) A “Green” indicator light shall illuminate when the gate is completely closed and deadlocked.
      2) A “Red” indicator light shall illuminate for all other conditions.

3. The electrical controls of all of the sliding gates and pedestrian gate shall be interlocked to prevent more than one gate to be open at any one time, except through the use of a key operated interlock bypass switch.
a. Each group of interlocked gates shall have an interlock by-pass circuit, to allow the interlocked gates to be opened simultaneously when the interlock by-pass circuit is activated. Each interlock by-pass circuit shall have a key operated interlock by-pass switch and a LED indicator light.
b. The interlock by-pass switch shall be a key-operated, 2-position maintained contact switch, key removable when in Off position only.
   1) When separate interlock by-pass circuits are required, by-pass switches are keyed alike, but unlike any other switch on the panel.
c. The LED indicator light illuminates only when the interlocks are in the by-pass mode.

4. Power switches in conjunction with magnetic contactors in gate control console and gate control cabinet shall allow the attendant to switch power on and off to the console or cabinet.
a. At the gate control console a key operated power switch in conjunction with a magnetic contactor in the console shall allow the attendant to switch power on and off to the console and make all gates functional or non-functional from the console.
   1) When the power switches are in the “OFF” position, no electrical power shall be available at the gate operators or locks. All power to the gates and locks shall be disconnected at the console. 
      Exception: The heater circuit shall be independent of control console power and the control console power switch. Heater circuit shall be routed from panel-board to control console to gate motor operator. Power shall be disconnected from panel-board for service.
   2) In the “On” position, the key shall be non-removable until the switch is returned to the “Off” position.
b. At the gate control cabinet an automatic plunger power switch in conjunction with a magnetic contactor shall automatically switch power on and off to the cabinet.
   1) When the cabinet door is opened, the plunger switch is released and power will be provided to the cabinet making all gates functional from the cabinet.
   2) When the cabinet door is closed, the plunger switch is depressed and power to the cabinet will be shut off making all gates non-functional from the cabinet.
c. At the gate control cabinet a two position selector “Maintenance” switch shall allow the attendant to switch power on and off to the cabinet and make all gates functional or non-functional from the cabinet when the cabinet door is open.

5. A lamp test push button on the gate control console and in the cabinet shall allow the attendant to test the status of all indicator lights at that console or cabinet. No other system operations shall be affected.

6. A circuit breaker adjacent to each gate’s control switch in the gate control console and in the cabinet will provide protection of the gate’s control circuit.
1.07 DESCRIPTION OF COMPLETED SYSTEM-PEDESTRIAN COMPOUND & INTERIOR SALLYPORT

A. The completed system shall operate as follows:

1. Each Pedestrian Type “A” gate (G-1 and G-2) shall be controlled and monitored by a pushbutton and indicator lights located in the gate control console in Building 1.
   a. Depressing the pushbutton, the lock will unlock from the locked closed position and remain unlocked only while pushbutton is depressed. Lock will automatically deadlock when gate is closed.
   b. Two control panel indicator lights at the gate control console shall monitor the status of the gate’s door position switch and lock.
      1) A “Green” indicator light shall illuminate when the gate is completely closed and deadlocked.
      2) A “Red” indicator light shall illuminate for all other conditions.

2. The front door Building 1 shall be controlled and monitored by a pushbutton and indicator lights located in the gate control console in the Control Room of Building 1.
   a. Depressing the pushbutton, the strike will unlock from the locked closed position and remain unlocked only while pushbutton is depressed.
   b. Two control panel indicator lights at the gate control console shall monitor the status of the door position switch and lock.
      1) A “Green” indicator light shall illuminate when the door is completely closed and deadlocked.
      2) A “Red” indicator light shall illuminate for all other conditions.

3. The electrical controls of the exterior pedestrian gates shall prevent more than one gate in each pair to be open at any one time, except through the use of a key operated interlock bypass switch.
   a. When either gate in a pair is open, relay interlocks associated with the gate shall cause the gate controls for the other gate in the pair to be non functional.
   b. Each group of interlocked gates shall have an interlock by-pass circuit, to allow the interlocked gates to be opened simultaneously when the interlock by-pass circuit is activated. Each interlock by-pass circuit shall have a key operated interlock by-pass switch and a LED indicator light.
   c. The interlock by-pass switch shall be a key-operated, 2-position maintained contact switch, key removable when in OFF position only.
      1) When separate interlock by-pass circuits are required, by-pass switches are keyed alike, but unlike any other switch on the panel.
   d. The LED indicator light illuminates only when the interlocks are in the by-pass mode.

4. Power switches in conjunction with magnetic contactors in the gate control console shall allow the attendant to switch power on and off to
the console and make all gates functional or non-functional from the console.
a. When the power switches are in the “OFF” position, no electrical power shall be available at the gate operators or locks. All power to the gates and locks shall be disconnected at the console.
b. In the “On” position, the key shall be non-removable.

1.08 TEMPLATES

A. After receipt of approved submittals, furnish updated, required templates to the affected trades to enable the fabricators to make proper provision for hardware without delaying job progress.

1.09 QUALITY ASSURANCE

A. List of Completed Installations: If brand names other than those specified are proposed for use, furnish the name, addresses, telephone number, and facility contact of a minimum of 4 comparable installations which can prove the proposed products have operated satisfactorily for a minimum of 2 years.

B. Manufacturer’s Qualifications: The manufacturer of gates and detention type hardware shall be regularly engaged in the production of such products, shall have furnished such products for 4 similar projects that have been in operation for not less than 3 years, and shall be subject to the approval of the Director.

C. Installation Company Qualifications: The Company installing the Work of this section, and the person supervising the Work, shall be experienced in gate system work, and shall have been engaged in the assembly and installation of the specified gates etc. for a minimum of three years.

D. Warranty: Manufacturer of gate system shall warranty all components furnished as part of the gate system.

E. Technical Advisor: In addition to reviewing and approving the Gate Systems Submittals Package, the Technical Advisor (for each type of gate system) shall provide the following on-site services:
   1. Render advice regarding installation and final adjustment of the gate system(s).
   2. Witness final system test and then certify with an affidavit that the gate system(s) is installed in accordance with the contract documents and is operating properly.
   3. Train facility personnel on the operation and maintenance of the gate system(s) a minimum of 2 one-hour sessions.
   4. Answer questions which might arise.

F. Galvanizing Stamp: Stamp galvanized items with name of the galvanizer, weight of coating, and applicable ASTM number.

G. Welders’ Qualifications: Welding shall be performed only by welders, welding operators, and tackers who have been qualified by tests as prescribed in the AWS Code to perform the type of welding required.
1.10 DELIVERY

A. Coordinate delivery of anchors and other accessories to be built into other Work, to avoid delay. Furnish instructions and templates as required for accurate location.

B. Promptly cover and protect steel and gate system items delivered to the site.

C. The manufacturer of the prison lock keys shall notify the Director’s Representative at Harriet Tubman Residential Center, Chuck Butts (Office: 315-253-8282 or Cell: 315-575-7500) and the Director of Capital Services, Raymond Farina (518-473-7325), a minimum of two days in advance of shipping keys. Ship all prison lock keys direct from manufacturer, through the United States Postal Service, via Registered Mail, Restricted Delivery, Return Receipt Requested, to:

Raymond Farina
Director of Capital Services
106 South Building
52 Washington St.
Rensselaer, NY 12144

1.11 MAINTENANCE

A. Spare Parts: Furnish the following and store at the site where directed:

1. Sliding Gate
   a. One motor.
   b. One reduction gear assembly.
   c. One full-length chain and repair links.
   d. Two of each type limit switch and part kit.
   e. One each reversing contact 24V.
   f. One each transformer 75Va-24V.

2. Type “A” and Type “B-I” Pedestrian Gates
   a. One complete lock set. (Handing and keying shall be as directed.)
   b. Two of each Lock Bolt Indication switch.
   c. One Door Position Indicator switch.

3. Control Panels:
   a. One of each type key operated control panel power cut-off switch required.
   b. One of each type two position selector switch required.
   c. Two of each type three-position selector switch required.
   d. One of each type momentary contact push button required.
   e. Two of each type of indicator lights required.
   f. Two of each type of circuit breakers required.
   g. One of each type of plug-in modular relay required.
   h. One power supply.
   i. Five of each class J fuses.
B. Maintenance Materials:
   1. Hand Tool Maintenance Kit(s): Lockable steel tool box each containing one set of all hand tools and fasteners necessary to perform preventative maintenance and repairs of gates and locking system devices. This list includes but is not limited to the following:
      a. Mechanics mirror.
      b. LED Flashlight.
      c. One complete Torx kit and driver.
   2. Required amounts of recommended lubricants for 3 years service.
   3. Test Unit that tests and operates the Folger Adam 50 Series or Southern Steel 1050 Series Electric Lock for proper functions.

1.12 INSPECTION

A. Quality Assurance (QA) inspection of structural steel fabrication and field welding and high-strength bolting may be made at the discretion of the Director. The qualification of welding procedures, welders, and tackers will be covered by such QA inspection. Representatives of the Director and/or designated inspection laboratory shall be given free and easy access to fabrication shop and field at all times that work is in progress. QA inspections will be made without cost to the Contractor.
   1. If QA inspection is made by the State, it shall not relieve the Contractor, fabricator, and erector of responsibility for their own QC programs.
   2. When QA inspection is made by the State, schedule and perform the Work as required to minimize the cost to the State for QA inspection. When failure to schedule and perform the Work, or to coordinate with the QA inspectors, results in excessive QA inspection costs, the State will backcharge such excess cost to the Contractor.

PART 2 PRODUCTS

2.01 COMPANIES

A. American Jail Products, LLC, 4 Van Buren St., Troy, NY  12180, (518) 271-6560.


C. The G-S Company, 7920 Stansbury Road, Baltimore, MD 21222, (410) 284-9549, www.g-sco.com


2.02 SLIDING GATE OPERATOR SYSTEM

A. Operator System: Tymetal Corp.’s Positive Locking Ultimate Sallyport System (PLUSS), or Folger Adam Co.’s Type “J” Electric Locking and Operating Device, including:

1. Locking which is accomplished by means of a keyless locking device, engaging gate at three places in the locking pilaster.
2. Gate movement from the closed position that is impossible except by electric or mechanical means.
3. Lock openings in the locking pilaster that are completely closed when the gate is an open position.
4. Gate movement not less than 30 feet per minute.
5. Emergency operation by manual crank operation, from an emergency release column. Equip cabinet door with plain bearing hinges, Folger Adam No. 12 or Southern Steel No.SS1010A-1 deadlock, and cylinder shield. Door pull if required. Galvanize assembly.
6. Electric heating element for gearbox, with thermostatic control, to ensure proper operation of the system to minus 20 degrees F.

B. Finishes: Galvanize entire operator system except track, rollers and drive assembly.

1. Galvanizing process shall conform to:
   a. ASTM A 123 for plain and fabricated material and assembled products.
   b. ASTM A 153 for iron and steel hardware.
2. Stamp galvanized items with name of galvanizer, weight of coating, and applicable ASTM number.
C. Thoroughly clean all steel prior to sending it to the galvanizer the entire assembly. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove steel mill stamp, loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, SSPC SP-6 “Commercial Blast Clean” or SSPC SP-7 “Brush-Off Blast Cleaning”.
   a. Do not ship the entire assembly from the fabricating shop to the galvanizer prior to QA inspection and approval by the State or designated inspection laboratory that the assembly is in conformance with the Contract Documents.

D. Gate Frame: Furnished by the manufacturer of the sliding gate operator system.

E. Accessories: Include all accessories required to perform the functions summarized in DESCRIPTION OF COMPLETED SYSTEM and as indicated on the drawings.

2.03 TYPE ‘A’ GATE SYSTEM

A. Materials:
   1. Steel Tubing: Hot-formed, welded or seamless, structural tubing; ASTM A 501.
   2. Miscellaneous Steel Shapes and Bars: ASTM A 36, unless otherwise specified or shown.
   3. Steel Sheet:
   4. Steel Rods:
      a. Steel Rods Not To Be Galvanized: 3/8 inch diameter, oil tempered steel rods, with a hardness on the Rockwell C Scale between 38 and 42.
      b. Steel Rods To Be Galvanized: 3/8 inch diameter, mild steel, low carbon rod.

B. General Hardware Notes:
   1. Deadlocks to have bolt keepers with dust box.
   2. Locate centerline of mechanical deadbolt 3’-2” above finished grade.
   3. Locate centerline of Door Pull 4’-0” above finished grade.
   4. Weld hinges unless specified otherwise.
   5. Single Wing Escutcheons: Use on electric jamb locks.
   6. Template door closers for maximum gate swing allowed

C. Hardware for Type “A” Gate:
   1. Hinges: 3 ea Stanley BBK852, MSPK855, Brookfield I-8510 series, x rust inhibitor coating x weld 3 sides. Provide fittings for forced lubrication.
   2. Electric Prison Lock: 1 ea Folger Adam No. 56ELNN, or Southern Steel No. 1051E-2NL, or R.R. Brink No. 7050SMCLH-M, bolt remains
retracted only while switch is depressed. x dust box x galvanized case. Lock shall automatically deadlock when gate is closed. Provide weather tight fitting at wire penetrations and rubber gasket between frame and cover plate.

3. Cylinder Shields: 2 ea Folger Adam No. 2CS, or Southern Steel No. 219, OR R.R. Brink No. CS x US32D.

4. Door Pulls: 2 ea Folger Adam No. 2, or Southern Steel No. 212C x US26D.

5. Door Position Indicator Switch: 1 ea Southern Steel No. 220A-5 series x standard case x galvanized. Provide Type 1 sealant at cover to provide weather protection.

6. Door Closers:
   a. 1 ea LCN 4216 x case and internal parts steel and cast iron x constant viscosity fluid from 120 degrees F to -30 degrees F x SRI rust inhibitor paint x Torx screws x AL. Mount on push side of gate.
   b. Adjust closer for ease of operation.

7. Molex Plugs: Provide Molex connector for electric lock.

D. Fabrication and Manufacture:

1. Frames: Tubular steel members 3/16 inches thick. Miter and weld tubular members at corners.
   a. Stops: 3/4” x 1-1/4” steel, 3 sides. Secure to gate frame with countersunk Torx center pin security machine screws at 8” oc.

2. Gates: Stiles and rails shall be tubular in cross-section and shall conceal the rod mesh attachment.
   a. Formed Tubular members: 10 gage sheet steel. Fabricate using a formed channel shape, with welded cover plate.
   b. Reinforcement for Full Surface Hinge Application:
      1) Provide 1-1/2” x 2-1/2” x 3/16” x 6” long steel tubes to reinforce gate stiles at hinge locations.
      2) Weld steel tube reinforcement to stiles with two 1/2 inch dia. plug welds.
   c. Miter and weld tubular members at the corners, and notch to accommodate the rod mesh.
   d. Bevel lock edge.

3. Woven Rod Mesh: Two-inch square opening, arch/intermediate/lock crimped. Extend each rod end at least 1/2 inch into the frame and weld.

4. Lock Box:
   a. Lock Box: Frame pocket with channels or flat bars to suit lock specified. Close box with 3/16 inch thick steel cover plate held in place with Torx center pin security head machine screws.
   b. Locate removable cover plate on the STOP side of all Type “A” Gates.

5. Finishes: Galvanize entire assembly.
   a. Galvanizing process shall conform to:
      1) ASTM A 123 for plain and fabricated material and assembled products.
      2) ASTM A 153 for iron and steel hardware.
   b. Stamp galvanized items with name of galvanizer, weight of coating, and applicable ASTM number.
6. Thoroughly clean all steel prior to sending it to the galvanizer the entire assembly. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove steel mill stamp, loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, SSPC SP-6 “Commercial Blast Clean” or SSPC SP-7 “Brush-Off Blast Cleaning”.
   a. Do not ship the entire assembly from the fabricating shop to the galvanizer prior to QA inspection and approval by the State or designated inspection laboratory that the assembly is in conformance with the Contract Documents.

E. Accessories: Include all accessories required to perform the functions summarized in DESCRIPTION OF COMPLETED SYSTEM and as indicated on the drawings.

2.04 TYPE “B-1” GATE

A. Tymetal Corp.’s 2155 Pedestrian Swing Gate or equal.

B. Materials:
   1. Steel Tubing: Hot-formed, welded or seamless, structural tubing; ASTM A 501.
   2. Miscellaneous Steel Shapes and Bars: ASTM A 36, unless otherwise specified or shown.
   3. Steel Sheet:
   4. Steel Rods:
      a. Steel Rods Not To Be Galvanized: 1/4 inch diameter, oil tempered steel rods, with a hardness on the Rockwell C Scale between 38 and 42.

C. General Hardware Notes:
   1. Deadlocks to have bolt keepers with dust box.
   2. Locate centerline of mechanical deadbolt 3'-2" above finished grade.
   3. Locate centerline of Door Pull 4'-0" above finished grade.
   4. Weld hinges unless specified otherwise.
   5. Single Wing Escutcheons: Use on electric jamb locks.
   6. Template door closers for maximum gate swing allowed

D. Hardware for Type “B-1” Gate:
   1. Hinges: 3 ea Stanley BBK852, MSPK855, Brookfield I-8510 series, x rust inhibitor coating x weld 3 sides. Provide fittings for forced lubrication.
   2. Electric Prison Lock: 1 ea Folger Adam No. 56ELLNN bolt remains retracted only while switch is depressed, x dust box x galvanized case.
Lock shall automatically deadlock when gate is closed. Provide weather tight fitting at wire penetrations and rubber gasket between frame and cover plate.

3. Cylinder Shields: 2 ea Folger Adam No. 2CS.

4. Door Pulls: 2 ea Folger Adam No. 2, or Southern Steel No. 212C x US26D.

5. Door Position Indicator Switch: 1 ea Southern Steel No. 220A-5 series x standard case x galvanized. Provide Type 1 sealant at cover to provide weather protection.


E. Fabrication and Manufacture:

1. Frames: Tubular steel members 3/16 inches thick. Miter and weld tubular members at corners.
   a. Stops: 3/4” x 1-1/4” steel, 3 sides. Secure to gate frame with countersunk Torx center pin security machine screws at 8” oc.

2. Gates: Tubular steel members 3/16 inches thick. Miter and weld tubular members at corners.
   a. Miter and weld tubular members at the corners, and notch to accommodate the rod mesh.
   b. Bevel lock edge.

3. Woven Rod Mesh: Two-inch square opening, arch/intermediate/lock cramped. Extend each rod end at least 1/2 inch into the frame and weld.

4. Lock Box:
   a. Lock Box: Frame pocket with channels or flat bars to suit lock specified. Close box with 3/16 inch thick steel cover plate held in place with Torx center pin security head machine screws.
   b. Locate removable cover plate on the STOP side of all Type “B-1” Gates.

5. Finishes: Galvanize entire assembly.
   a. Galvanizing process shall conform to:
      1) ASTM A 123 for plain and fabricated material and assembled products.
      2) ASTM A 153 for iron and steel hardware.
   b. Stamp galvanized items with name of galvanizer, weight of coating, and applicable ASTM number.

6. Thoroughly clean all steel prior to sending it to the galvanizer the entire assembly. Remove oil, grease, and similar contaminants in accordance with SSPC SP-1 “Solvent Cleaning”. Remove steel mill stamp, loose mill scale, loose rust, weld slag and spatter, and other detrimental material in accordance with SSPC SP-2 “Hand Tool Cleaning”, SSPC SP-3 “Power Tool Cleaning”, SSPC SP-6 “Commercial Blast Clean” or SSPC SP-7 “Brush-Off Blast Cleaning”.
   a. Do not ship the entire assembly from the fabricating shop to the galvanizer prior to QA inspection and approval by the State or designated inspection laboratory that the assembly is in conformance with the Contract Documents.

F. Accessories: Include all accessories required to perform the functions summarized in DESCRIPTION OF COMPLETED SYSTEM and as indicated on the drawings.
2.05 CONTROL CONSOLES AND CABINETS

A. Control Consoles: Desk type, constructed of 3/16 inch thick steel plate. Consoles shall have steel plate back, front and sides. All exposed corners and edges of console shall be rounded at not less than a one inch radius.

1. Size: Width, depth and height as required to contain the control panel and related equipment, but within the limitations specified or shown. All switches and buttons shall be mounted within a distance that will make it unnecessary for the officer to move more than one step in either direction to reach them. Height of control panel shall be as shown on the Drawings, or if not shown, as directed.

B. Control Panels:

1. General: Fabricate panels of 11 gage stainless steel with holes to receive switches, circuit breakers, and indicator lights. Fabricate housings and fastening battens of 10 gage mild steel with hammer tone gray finish. Each gate controlled by panel shall have a control switch, circuit breaker, and two indicator lights mounted in a horizontal line. A green light shall go on only when the gate is locked close. A red light shall show all other conditions of the gate. Lights shall be accessible and replaceable. Identify each gate controlled from panel.

2. Panels for Control Consoles: Panels shall form the top, be inclined down from back to front between 10 and 20 degrees from horizontal, and turn down at least one inch over front and sides. Panel shall have a continuous stainless steel hinge at the back to allow it to swing up for maintenance, and be secured at the front, sides, and battens. Reinforce for security fasteners. Provide a pair of interior prop rods with automatic cam action to prevent accidental closing and to hold the panel in an open position for maintenance.

2.06 FASTENERS

A. Bolts and Nuts: ASTM A 307, Grade A.

1. Concealed Bolts: Standard common bolts with lock washers and nuts. For items requiring servicing or replacement, drill the bolts and equip them with cotter pins and flat washers.

2. Exposed Bolts: Countersunk flathead security head Torx center pin bolts, with lock washers and nuts, unless otherwise specified.


2. Exposed Machine Screws: Countersunk flat head security head Torx center pin screws, unless otherwise specified.

C. Carriage Bolts:

1. Exposed Bolts: Carriage bolts, with lock nuts and washers. (When mounting control console to counter top, install carriage bolt from the underside of counter top into the control console.)


2.07 ELECTRICAL COMPONENTS FOR ELECTRIC OPERATING AND LOCKING SYSTEM AND ELECTRIC LOCKING SYSTEM

A. General:
1. Sliding gate components and their controls shall be suitable for connection to a 15 ampere, 120/208 volt, 3 phase, 60 Hz, dedicated circuit per each gate.
2. Pedestrian gate components and their controls shall be suitable for connection to a 20 ampere, 120 volt, single phase, 60 Hz, dedicated circuit per each gate.
3. Electrical components for which Underwriters’ Laboratories, Inc. (UL) provides product listing service, shall be listed and bear the listing mark.
4. Electrical components shall be the standard product of the detention equipment manufacturer except for the qualifications, which follow.

B. Circuit Breaker: Individually protect control switch and circuit for each gate with a circuit breaker mounted in the panel adjacent to the switch: AIRPAX Series PR11-62-2 or 5, or Potter & Brumfield W28 series, 2 or 5 amp. Amperage as indicated on drawings.

C. Indicator Lights: Industrial Devices Inc. 1091QM1-24VDC (RED), 1091QM5-24VDC (GREEN), SUPER-BRITE series LEDs, red or green as indicated on drawings.

D. Three-Position Selector Switch: Allen-Bradley’s 800T series, Cutler-Hammer’s (Eaton) 10250T series switch, having:
   1. Size: 30mm diameter for insertion in 31mm keyed panel opening.
   3. Operator Action: Spring return to Center (STOP) position from either left (OPEN) or right (CLOSE) positions.
   4. Handle (Knob): Black Lever Handle (Gloved Hand Lever).
   5. Contact Blocks: Configuration and number of contact blocks as required.

E. Momentary Contact Push-button Switch: Allen-Bradley’s 800T series, Cutler-Hammer’s (Eaton) 10250T series switch, having:
   1. Size: 30mm diameter for insertion in 31mm keyed panel opening.
   2. Push-button: Black flush head
   3. Contact Blocks: Minimum of one contact block with 1 normally open (N.O.) contact and 1 normally closed (N.C.) contact. Provide additional contact blocks as required.

F. Key Operated Interlock Bypass Switch: Two Position Selector Switch: Allen-Bradley’s 800T series, Cutler-Hammer’s (Eaton) 10250T series switch, having:
   1. Size: 30mm diameter for insertion in 31mm keyed panel opening.
   2. Metal Legend Plate: “INTERLOCK BYPASS”.
   3. Operator Action: Maintained position for both positions. Key is non-removable when switch is in “Interlock Bypass” mode.
   4. Handle (Knob): Keyed switch, furnish three keys for each switch.
      a. All interlock bypass switches shall be keyed alike, but unlike any other keyed switch on the board.
5. Contact Blocks: Minimum of one contact block with 1 normally open (N.O.) contact and 1 normally closed (N.C.) contact. Provide additional contact blocks as required.

G. Key Operated Control Panel Power Cut-off Switch (which activates a magnetic contactor): Two Position Selector Switch: Allen-Bradley’s 800T series, Cutler-Hammer’s (Eaton) 10250T series switch, having:
   1. Size: 30mm diameter for insertion in 31mm keyed panel opening.
   2. Metal Legend Plate: “ON - OFF”.
   3. Operator Action: Maintained position for both positions. Key is non-removable when switch is in “Power On” mode.
   4. Handle (Knob): Keyed switch, furnish three keys for each switch.
      a. All Power Cut-off switches shall be keyed individually and unlike any other keyed switch.
   5. Contact Blocks: Minimum of one contact block with 1 normally open (N.O.) contact and 1 normally closed (N.C.) contact. Provide additional contact blocks as required.

H. Key Operated Maintenance Switch (which activates a magnetic contactor): Two Position Selector Switch: Allen-Bradley’s 800T series, Cutler-Hammer’s (Eaton) 10250T series switch, having:
   1. Size: 30mm diameter for insertion in 31mm keyed panel opening.
   2. Metal Legend Plate: “ON - OFF”.
   3. Operator Action: Maintained position for both positions. Key is removable in the ON position only.
   4. Handle (Knob): Keyed switch, furnish three keys for each switch.
      a. All maintenance switches shall be keyed alike, but unlike any other keyed switch on the board.
   5. Contact Blocks: Minimum of one contact block with 1 normally open (N.O.) contact and 1 normally closed (N.C.) contact. Provide additional contact blocks as required.

I. Plunger Power Switch: SPST (NC), Carlingswitch Model 170 (Granger #2X901) which activates a magnetic contactor; suitable for use with gate control cabinet and size as required.

J. 24 Volt Power Supply: Silver Line Linear Power Supplies, Model SLS-24-012T or Sola Heviduty Model No. SDP-24-100, output rating (24volt/1.2 amps). Screw terminal connections, temp range 0 degrees C to +50 degrees C, automatic current limiting, DC output adjustable 10 percent minimum.

K. Contactors and relays: ABB MDRC’s Modular DIN Rail Components.

L. Wiring Conductors: Provide wiring in accordance with Section 260505.

M. Protect motors with automatic reset type thermal overload controls, and limit switches.

N. Interlocking components: Provide all accessories (relays, contactors, etc.) required to perform the interlocking requirements summarized in DESCRIPTION OF COMPLETED SYSTEM, and elsewhere in this section.
O. Accessories: Include all accessories required to perform the functions summarized in DESCRIPTION OF COMPLETED SYSTEM and as indicated on the drawings.

P. Markers:
   1. Premarked self-adhesive; W. H. Brady Co.’s B940, Thomas and Betts Co.’s E-Z code WSL self-laminating, Ideal Industries’ Mylar/Cloth wire markers, or Markwick Corp.’s permanent wire markers.
   4. Thermal transfer (non-smearing), Brady’s ID PAL hand held labeling tool portable thermal transfer printer or equal.

2.08 INTERLOCKING

A. Electrically interlock the following gates at the control panel(s). Gates shall remain in the locked closed position, if more than one control switch is pressed simultaneously.
   1. Gates G-1 and G-2 shall be interlocked so only one of these gates can be unlocked (from the locked closed position) at any time.

B. Interlock bypass the following:

2.09 KEYING

A. Key locks as specified, and incorporate a keying schedule into the hardware schedule for approval.
   1. Key changes shall be different from changes previously used at this Facility.
   2. Record key changes to avoid future unintended duplication.
   3. Furnish seven keys for each change, except as noted.
   4. Furnish extended shank keys when required.
   5. Key locks as follows:
      d. Keyed individually: Gate Control Console Power Switch.
      e. Keyed individually: Each Maintenance Selector Switch.
      f. Keyed individually: Gate Control Cabinet door.

2.10 IDENTIFICATION PLATES

A. Locking Systems and Control Consoles/Cabinets: Each locking system and control console/cabinet shall have an engraved plate containing the following information:
   1. Manufacturer’s name, telephone number, type of system (Locking), date of installation, and name of installer.
2. Permanently attach plate to the inside of the motor cabinet of sliding gates, and inside the housing of control consoles and cabinets.

B. Gate Identification: Provide at each gate a stainless steel identification plate(s), sized 2” x 4”, with individual gate numbers (G-1, G-2, etc.) laser cut from the plate stock. Height of letters/numbers shall be 1” min. Prior to applying plates, paint the area immediately behind the plate with black paint to provide contrast between the plate and incised numbers/letters. Attach plate with 4 Torx screws. Unless shown or directed otherwise, locate plates as follows:
1. Type “A” Gates: Attach to the frame above the lock, on both sides of each gate.
2. Sliding Gates: Attach to the cover of the motor cabinet or emergency release column.

C. Sliding Gate Operator Motor Housing Cabinet: Inside the motor housing cabinet of each sliding gate operator system provide a warning label, 3” x 6” minimum in size, red with white lettering, engraved with the following inscription:

“WARNING
(PRIOR TO SERVICING)
DISCONNECT BOTH THE
MOTOR OPERATOR CIRCUIT
AND THE GEARBOX HEATER
CIRCUIT”

1. Phenolic: Two color laminated engravers stock, 1/16 inch minimum thickness, machine engraved to expose inner core color (white).
2. Precision engrave letters and numbers with uniform margins, character size minimum 3/16 inch high.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this Section in accordance with the Company’s printed instructions and approved shop drawings.

B. Brace assembled sections until permanently secured in place to prevent displacement or distortion of the members. Do not utilize metal bracing to support gate post when plumbing or securing posts. No welding allowed.

C. Comply with the requirements of FABRICATION AND MANUFACTURE Article. Touch-up abraded areas as required, with compatible primer and finish paint, or cold galvanizing compound.
   b. Galvanized Metal: Allow new galvanized surfaces to weather as long as possible before cleaning. Remove surface contaminants using clean rags and petroleum spirits.
   c. Remove “white rust” using appropriate solvent and, if necessary, wire brushing.
d. Use appropriate Structural Steel Painting Council Standard SSPC-SP1 to SSPC-SP6 to clean steel substances where galvanized protection has been removed.

D. Use only rotary power drills where masonry or concrete is required to be drilled. Drill holes to exact size required.

E. Perform welding in accordance with the AWS Codes.
   1. Hinges: Attach ground so welding current will not be carried through the hinge barrel.

F. Neatly install and securely fasten hardware. Keep polished hardware and handles free from scratches and defacement with temporary protective covers.

G. Identify conductors with markers at terminal strips, cabinets, consoles and pullboxes. Designations shall correspond with point to point wiring diagrams.

H. If post tops or extension arms will not be installed prior to impending rain, provide temporary covers over tops of posts to prevent posts from filling with water.

I. Field Welding: Comply with AWS Codes for the procedures for shielded metal arc welding, for the appearance and quality of welds, and for the methods used in correcting welding Work.

3.02 FIELD QUALITY CONTROL

A. Site Inspections:
   1. General: Selected manufacturer shall visit the construction site during the various phases of construction to inspect and approve the installation contractor’s work. Schedule of inspections are as follows:
      a. Pre-Construction Meeting: Manufacturer of each type of gate shall meet with the construction team to review facility specific site conditions including any grade issues, electrical and control wiring issues, and to develop a written schedule to complete the balance of site inspections.
      b. Concrete Embedment Beam: Manufacturer’s representative shall be on site prior to the concrete pour to inspect the support post alignment. Factory representative shall also inspect the finish grade to be sure the installation is within the manufacturer’s specifications. Inspection service shall not be less than four working hours per gate installation.
      c. Track Assembly: Manufacturer’s representative shall be on site prior to the installation of the track Assembly to inspect the support post alignment and provide technical advice in installing the Track Assembly. Inspection service shall not be less than eight working hours per gate installation.
B. Final Site Inspection and Staff Training:
   1. Manufacturer’s representative shall visit the site and review the work of
      the various trades (i.e., fence, electrical and controls contractors),
      involved with the construction of the gate system. All trades shall attend
      the final inspection meeting in the event corrective work needs to take
      place. The site inspection will be ongoing until the manufacturer’s
      representative signs off on the equipment.
   2. Facility Training Day: Facility equipment training course shall last for a
      minimum of five working hours.

C. Preliminary System Test:
   1. Preparation: Have the Technical Advisor adjust the completed system
      and then operate it long enough to assure that it is performing properly.
   2. Run a preliminary test for the purpose of:
      a. Determining whether the system is in a suitable condition to
         conduct the acceptance test.
      b. Checking and adjusting equipment.
      c. Training facility personnel.

D. Remove protective covering from hardware, etc., before Systems Acceptance
   Test.

E. System Acceptance Test:
   1. Preparation: Notify the Director’s Representative at least three working
      days prior to the test so arrangements can be made to have a Facility
      Representative witness the test.
   2. Test each system function step by step as summarized under
      DESCRIPTION OF COMPLETED SYSTEM for each gate.
   3. Supply all equipment necessary for system adjustment and testing.
   4. Submit written report of test results signed and dated by Technical
      Advisor and the Director’s Representative.

3.03 ADJUSTING
   A. Adjust operative units and equipment to work freely and easily, ready for use.
      Field lubricate operating and locking systems in accordance with the
      manufacturer’s maintenance instructions. Adjust equipment when the
      temperature is approximately 70 degrees F.

3.04 TURNOVERS
   A. All existing locks and associated detention hardware removed and/or replaced
      during the work of this contract shall be turned over to the facility.

   END OF SECTION
## QUALITY ASSURANCE SUBMITTAL FORM

### A. Manufacturer’s Qualification Data:

Provide below the names, addresses and Facility contacts of 4 similar projects where manufacturer’s equipment and hardware has been in operation for not less than 3 years.

*Description of Gate System*

Manufacturer: ___________________________________________________________

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*Description of Gate System*

Manufacturer: ___________________________________________________________

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B. **Installation Qualification Data:**

a. Provide the name, business address, and telephone numbers of the installation company.

b. Provide name of person supervising installation and completion of Work of this Section.

c. Provide names, addresses and Facility contacts of 4 similar projects this person has supervised for a minimum of 3 years.

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D. Attach written verification from the manufacturer that the person supervising the work is trained and qualified in the installation of the accepted gate and detention products.

C. **Technical Advisor’s Qualifications Data:**

a. Provide name, business address and telephone numbers of technical advisor(s) for each Gate System.

b. Attach written certification from gate systems equipment and detention hardware manufacturers that advisor is technically qualified in design, installation and servicing of products.

**END OF FORM**
SECTION 333104

PLASTIC DRAINAGE PIPE (SANITARY)

PART 1   GENERAL

1.01   SUMMARY

A. This section includes the installation of polyvinyl chloride piping systems.

B. All piping, fittings, and appurtenances shall be new, clean and in accordance with material specifications. In no instance will second-hand or damaged materials be acceptable.

1.02   QUALITY ASSURANCE

A. Product Markings: Plainly and permanently mark each pipe length with the following information:

   1. Nominal pipe size.
   2. Plastic pipe material designation.
   4. Pressure rating.
   5. ASTM designation.
   6. Manufacturers name or trademark and date of manufacture.

1.03   SUBMITTALS

A. Product Data: Manufacturer’s specifications with all pertinent information regarding dimensions, fittings and installation instructions.

PART 2   PRODUCTS

2.01   DRAINAGE PIPE AND FITTINGS

A. PVC Sewer Pipe and Fittings; (4 inches Diameter and Larger): Conform to ASTM D2241 made from Class 12454-B virgin compounds in accordance with ASTM D1784, SDR 26.

B. Plastic Pipe (4 and 6 inches Diameter, Solid and Perforated) for Building Drains, Cleanout Pipes, Discharge Lines, Leaching Fields, Drain Tiles, etc: PVC meeting ASTM D 2729 or SR (Styrene Rubber) meeting ASTM D 2852.

C. Plastic Pipe (Pressure Pipe less than 4-inches):
   1. Buried: HDPE DR 11, ASTM D3035 (3” & smaller) ASTM F714
   2. Exposed: In accordance with Section “Packaged Pump Station”
D. Joints:
1. Join pipe joints, including fittings, shall be joined with an integral bell and spigot type rubber gasketed joint.
2. Conform to ASTM F477 for gaskets and mark to indicate nominal pipe size and proper insertion direction.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect all pipe and fittings before installation. Remove defective pipe and fittings from the site.

B. Do not backfill before installation is inspected by the Director’s Representative.

3.02 GENERAL

A. Install pipe in accordance with the manufacturer’s recommendations and as specified in ASTM D 2321.

B. Use Cushion Material for bedding and backfill to the depth shown on the drawings for solid pipe.

C. Use No. 2 Coarse Aggregate for bedding and backfill to the depth shown on the drawings for perforated pipe.

3.03 INSTALLATION

A. Laying Pipe: Lay pipe to indicated line and grade with a firm uniform bearing for the entire length of the pipe. Excavate sufficient clearance at each bell or coupling to allow uniform bearing along the pipe barrel. Fill excess excavation with suitable material and tamp.

B. Joints:
1. Wipe inside of sockets and outside of pipe to be jointed, clean and dry.
2. Install rubber gaskets in accordance with the manufacturer’s specifications.

C. Connections:
1. Make connections to existing manholes by cutting into the floor or bench of the manhole and forming a new channel.
2. If the pipe, manholes or other structures with which connection is to be made has not yet been installed, install the pipe to a point directed by the Director’s Representative and plug or cap the end in a satisfactory manner.

D. Lay perforated pipe on a tamped bed of underdrain filter material.
E. Cleanouts:
1. Construct cleanouts at the locations shown and as detailed on the drawings.
2. Use PVC wyes, bends and pipe as indicated.
3. Extend cleanout piping to grade and terminate with deck plug installed in accordance with manufacturer’s instructions.
4. Install deck plug flush with grade with grade and encase with 2500 psi - concrete pad as shown.

3.04 TESTING

A. Required Tests for Gravity Sanitary Sewers: Perform the following tests after all the sewer pipe has been installed and prior to final acceptance.
1. Deflection Test
2. Alignment Test
3. Low Pressure Air Test
4. Corroborative Infiltration/Exfiltration Test
5. Television Inspection, if required based on results of (c) and (d) above.

B. Perform tests prior to placement of pavement, or other construction which may, in the opinion of the Engineer, be detrimentally effected by excavation required for repairs.

C. Perform the tests only after the backfill has been in place to its full depth for a minimum of 30 days.

D. Submit details prior to making tests of proposed testing procedures with a description of methods and equipment to the Engineer for approval.

E. Deflection Test:
1. Deflection test all flexible sewer pipe with a “go/no-go” mandrel with a diameter equal to 95% of the inside diameter of the pipe.
2. Maximum pipe deflection: 5 percent.

F. Alignment Test:
1. Alignment test all sewer pipe with the hand-lamp method.
2. The full diameter of the pipe shall be visible when viewed between consecutive manholes.

G. Air Test:
1. Air test all sewer pipe, including laterals, in conformance with ASTM F1417. The length of lateral piping shall not be considered in the calculation of acceptance times.
2. Commensurately increase test pressure for groundwater elevations above the pipe, in accordance with UNI-B-6 by Uni-Bell Plastic Pipe Association.
3. Method:
   a. Clean and wet thoroughly the inside of the pipe before test is performed.
   b. Insert test plugs in ends of pipe to be tested.
   c. Slowly fill the pipe with air to a pressure of 4 psig. Maintain pressure between 4 and 3.5 psig for at least 2 minutes for temperature stabilization.
d. Check all plugs for tightness.

e. With a pressure of approximately 4 psig in pipe, disconnect air supply.

f. Allow pressure to decrease to 3.5 psig.

g. Determine elapsed time for pressure drop from 3.5 psig to 2.5 psig.

4. The line is considered acceptable if the time for the pressure to decrease from 3.5 psig to 2.5 psig is not less than the amount determined by the following table, except that Reinforced Concrete Pipe shall be half this duration.

<table>
<thead>
<tr>
<th>PIPE DIAMETER (IN.)</th>
<th>MINIMUM TIME (MIN:SEC)</th>
<th>LENGTH FOR MINIMUM TIME (FT.)</th>
<th>TIME FOR LONGER LENGTH (SEC.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>3:46</td>
<td>597</td>
<td>0.380 L</td>
</tr>
<tr>
<td>6</td>
<td>5:40</td>
<td>398</td>
<td>0.854 L</td>
</tr>
<tr>
<td>8</td>
<td>7:34</td>
<td>298</td>
<td>1.520 L</td>
</tr>
<tr>
<td>10</td>
<td>9:26</td>
<td>239</td>
<td>2.374 L</td>
</tr>
<tr>
<td>12</td>
<td>11:20</td>
<td>194</td>
<td>3.418 L</td>
</tr>
<tr>
<td>15</td>
<td>14:10</td>
<td>159</td>
<td>5.342 L</td>
</tr>
<tr>
<td>18</td>
<td>17:00</td>
<td>133</td>
<td>7.692 L</td>
</tr>
<tr>
<td>21</td>
<td>19:50</td>
<td>114</td>
<td>10.470 L</td>
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<td>24</td>
<td>22:40</td>
<td>99</td>
<td>13.674 L</td>
</tr>
<tr>
<td>27</td>
<td>25:30</td>
<td>88</td>
<td>17.306 L</td>
</tr>
<tr>
<td>30</td>
<td>28:20</td>
<td>80</td>
<td>21.366 L</td>
</tr>
<tr>
<td>33</td>
<td>21:10</td>
<td>72</td>
<td>25.852 L</td>
</tr>
<tr>
<td>36</td>
<td>34:00</td>
<td>66</td>
<td>30.768 L</td>
</tr>
</tbody>
</table>

Where L is the test length.

5. If the leakage in the section tested exceeds the specified amount, repair or replace the section tested to reduce the leakage to within the specified limits and repeat the test until the leakage requirements are met.

6. The Contractor may, at his option, infiltration/exfiltration test all sewer pipe in lieu of the air test.

H. Corroborative Infiltration/Exfiltration Test:

1. Where air testing is used for leakage testing, corroborative infiltration/exfiltration testing shall be performed.

2. Test the 3 sewer sections which indicate the greatest rate of air loss.

3. If the infiltration/exfiltration tests prove acceptable no additional testing is required; however, if the air test is not verified by the corroborative testing, complete infiltration/exfiltration testing shall be required as the basis for final acceptance.

I. Infiltration Test:

1. Use the infiltration test when groundwater levels are at least 2 feet above the top of the pipe for the lengths of the section tested during the period of the tests.

2. Measure leakage by a watertight well, weir, or other approved means installed at the lower end of each section under test.
3. Test for a period of at least 3 days.

4. Total leakage of any section tested shall not exceed the rate of 200 or 50 gallons per mile of pipe per 24 hours per inch of nominal internal diameter for concrete and PVC pipe, respectively.

5. If the leakage in the section tested exceeds the specified amount, repair or replace the sections to reduce the leakage to within the specified limits and repeat until the leakage requirements are met.

J. Exfiltration Test:
1. Use the exfiltration test if the groundwater levels are less than 2 feet above the top of the pipe for the lengths of the section tested during the period of the test.

2. Fill the pipe and manhole with water to provide a positive differential head of at least 2 feet on the top of the pipe (or the top of the groundwater) at the highest point of the pipeline under test.

3. During exfiltration testing the maximum internal pipe pressure at the lowest end shall not exceed 25 feet of water.

4. The amount of water added to maintain this head shall be the leakage.

5. Test for a period of at least 4 hours.

6. Total leakage of any section tested shall not exceed the rate of 200 gallons or 50 gallons per mile of pipe per 24 hours per inch of nominal internal diameter for concrete and PVC pipe, respectively.

7. If the leakage in the section tested exceeds the specified amount, repair or replace sections to reduce the leakage to within the specified limits and repeat the test until the leakage requirements is met.

8. On steep grades it may be necessary to place plugs in the pipe between manholes to avoid excessive pressures in the sewer pipe and against the caps at the end of house and building connections.

K. Television Inspection:
1. If a section of sewer has failed the air and exfiltration/infiltration tests, or is proven poorly aligned by the lamp test, inspect the sewer by closed-circuit television to locate and repair defective section of sewer.

2. The Engineer will notify the Contractor in writing which completed sewers shall be inspected by closed-circuit television and commence the television inspection within 15 days of the Engineer’s written notification.

3. Notify the Engineer at least 5 days prior to commencement of television inspection.

4. No television inspection shall be performed without the Engineer or his representative present to witness the inspection.

5. Provide the Engineer with 3 copies of a report of the televising inspection of each section of completed sewer inspected. Show the exact location and extent of all cracks, loose joints, holes, vertical and horizontal, misalignment, faulty service connections, caved-in pipe, points of infiltration, obstructions, debris and all else detrimental to the proper functioning and service of the completed sewer. Provide the actual television inspection video with the report showing all the above conditions found, at all wyes, tees, and laterals and as directed by the Engineer. The Engineer will review the report and will instruct the Contractor, to repair any conditions which, in the opinion of the Engineer, are detrimental to the proper function and service of the sewer.
L. Visual Inspection: Prior to final acceptance, a visual inspection of all appurtenance structures (i.e. manholes, chambers, etc.) will be required. Repair visual leaks, regardless of their magnitude.

END OF SECTION
PART 1 GENERAL

1.01 SUMMARY

A. This section includes provisions for a packaged pumping station system with pumps, controls, piping, fittings, valves, supports, control panel, precast concrete wet well, precast concrete valve vault, and miscellaneous appurtenances required for a complete installation as shown on the Drawings and specified herein.

B. The Drawings are for the purpose of guidance and to show functional features and required external connections. They do not necessarily show all components necessary to accomplish the desired results nor do they necessarily show all components required to interface with the equipment. The Contractor shall provide all parts, equipment, wiring, piping, and devices necessary to meet the functional requirements of the system.

C. The Drawings are intended to show the general arrangement of the equipment including, but not limited to, pumps, motors, piping, fittings, valves, supports, wet well, and valve vault. They are not intended to show exact dimensions. Connection piping may have to be modified in order to accommodate the actual equipment furnished. The costs of such modifications are considered as being in the bid price and, therefore, no payment will be made for such modifications.

D. Equipment and appurtenances vary by manufacturer. If modifications to the Drawings are required to change equipment configuration, piping, equipment supports or, appurtenances, the Contractor shall submit drawings stamped by a Professional Engineer who is licensed in the state of New York to the Director’s Representative for approval. All related design and construction costs associated with any modifications will be the responsibility of the Contractor.

1.02 REFERENCES

A. Reference Standards: Comply with applicable provisions and recommendations of the following except otherwise shown or specified:
   4. Underwriter’s Laboratory, Inc. (UL).
   5. American Institute of Steel Construction (AISC).
   6. American Iron and Steel Institution (AISI).
1.03 SYSTEM DESCRIPTION

A. Summary:
   1. The packaged pump station and required accessories furnished as a package shall include, but not limited to the following:
      a. Precast concrete wetwell and valve vault with access hatches, gaskets, and piping penetrations where required and as detailed on the Drawings.
      b. Submersible pumps with base mounting elbows and guide rail system.
      c. Pump controls mounted in a control panel, level indicator, alarms, dry control contacts, and electrical wiring.
      d. Internal piping, fittings, check valves, plug valves, level indicator mounting hardware, and pipe supports.
      e. Portable hoist for submersible pump lifting, with lifting chain, mounting sockets, eye grip system, complete with cast iron eye grip, pump connection chains, and nylon guide cables for each pump furnished under this section.

B. Submersible Pump Performance: The pumps shall have the following minimum performance requirements:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>FLOW RATE (GPM)</th>
<th>TDH (FT)</th>
<th>EFFICIENCY (%)</th>
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<tbody>
<tr>
<td>Design Point</td>
<td>160</td>
<td>43.6</td>
<td>55</td>
</tr>
<tr>
<td>Shutoff</td>
<td>0</td>
<td>104</td>
<td>N/A</td>
</tr>
</tbody>
</table>

C. Basis of Design Requirements:
   1. The submersible pump shall comply with the following minimum design requirements:
      b. Type: Effluent.
      c. Location: Wetwell.
      d. Number Required: 2.
      e. Discharge Size: 2.5 inches. Minimum Sphere Passed: 3 inches.
      f. Performance: As noted above.
      g. Pump/Dose Volume: 573 gallons
      h. Reserve Volume: 825 gallons

1.04 SUBMITTALS

A. General:
   1. Submit all equipment supplied under this Section at the same time.

B. For approval: Submit product data and shop drawings as follows:
   1. Manufacturer’s information, specifications, and data showing dimensions, materials of construction, and weight of all major items of equipment specified in this Section.
   2. Installation diagrams showing location, arrangement, and size of all anchor bolts required for the equipment, if applicable.
   3. Pump Performance curves showing total dynamic head (TDH), flow rate, efficiency, horsepower, and net positive suction head (NPSH) requirements from the shut off head to the minimum head condition.
4. Motor information including manufacturer, model, frame number, type of enclosure, volts, cycle (i.e., hertz), phase, NEMA design designation, NEMA insulation class, nameplate horsepower, locked rotor torque, locked rotor amps, percent slip, rpm at full nameplate load, service factor, maximum ambient temperature, maximum temperature rise, shop coating, nominal efficiency, guaranteed minimum efficiency at 50, 75, and 100 percent of full load, and power factor at 50, 75, and 100 percent of full load.

5. Control panel wiring schematic and layout drawings.

C. For information: Submit an Operation and Maintenance Manual as follows:
   1. Operation and maintenance manuals shall include all approved shop drawings associated with this Section, complete instructions for installation, parts list for all components, and wiring schematics and diagrams.
   2. Include a list and frequency of specific maintenance activities. Include lubrication frequency, application points, lubricant type, and method of application.

1.05 QUALITY ASSURANCE

A. All equipment provided under this Section shall be a standard product in regular production by manufacturers having a minimum of 5 years and 20 installations of proven and reliable experience in providing the equipment and services intended for this project. Supplier shall provide a list of names and dates, if requested, of installations for verification by the Engineer.

B. A factory-authorized maintenance and parts facility shall be located within a 500-mile radius from equipment installation. The manufacturers shall show evidence of a parts inventory for all routine maintenance items associated with the supplied equipment.

C. Each completed and assembled pump/motor shall undergo the following factory tests at the manufacturer's plant prior to shipment:
   1. Minimum 3-point hydraulic performance test.
   2. No-Leak seal integrity test.
   3. Electrical integrity test.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products on site.

B. Accept products on the site in factory packing.

C. Protect components from physical damage including effects of weather, water, dust, and construction debris.

1.07 PROJECT SITE CONDITIONS

A. Verify that all dimensions shown on Drawings and shop drawings match field conditions.

B. Verify actual dimensions of equipment specified in this Section prior to installation.
1.08 WARRANTY

A. Provide written warranty to the Owner for all materials and workmanship of equipment provided under this Section for a period of 1 year from the date of start-up or 18 months from date of shipment, whichever is sooner. Any defects due to the use of improper materials or workmanship occurring within that time shall be promptly rectified, as approved by the Director’s Representative, without cost to the Owner.

B. The equipment furnished under this Section shall be guaranteed to be free of defects in workmanship, design, and material. The Contractor shall replace, without cost to the Owner, any equipment or part that is defective or shows undue wear, within 1 year after Substantial Completion.

C. The Contractor shall include the services of a factory-trained representative to provide repair service for the equipment under this Section for a period of 1 year from Substantial Completion. The cost of all replacement parts required during this 1-year period shall be included.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Provide precast concrete pump station and valve vault including all internal components described herein and on the Drawings from an approved manufacturer.

2.02 SUBMERSIBLE PUMPS

A. Close-coupled submersible pumps with squirrel-cage electric motors:
   1. Stainless steel guide bar mount with machined metal seal to discharge elbow.
   3. Exposed nuts and bolts AISI Type 304 stainless steel or brass.
   4. Exposed Surfaces other than stainless steel or brass: Protected with a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.
   5. Pump Casing Seals: Machined metal to metal seals. Fit water tight seals with nitrile or viton rubber o-rings installed in machined recesses.
   6. Motor:
      a. The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber.
      b. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free polyester resin resulting in a winding fill factor of at least 95%.
      c. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.
      d. The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of bolts, pins or other fastening devices requiring penetration of the stator housing is not acceptable.
e. The motor shall be designed for continuous duty handling pumped media of 40°C (104°F) and capable of at least 15 evenly spaced starts per hour.
f. The rotor bars and short circuit rings shall be made of cast aluminum.
g. Thermal switches set to open at 125°C (260°F) shall be embedded in the stator end coils to monitor the temperature of each phase winding. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the control panel.
h. The junction chamber containing the terminal board shall be hermetically sealed from the motor by an elastomer compression seal.
i. Connection between the cable conductors and stator leads shall be made with threaded compression type binding posts permanently affixed to a terminal board.
j. The motor and the pump shall be produced by the same manufacturer.
k. The combined service factor (combined effect of voltage, frequency and specific gravity) shall be a minimum of 1.10.
l. The motor shall have a voltage tolerance of plus or minus 10%.
m. The motor shall be designed for operation up to 40°C (104°F) ambient and with a temperature rise not to exceed 80°C.
n. A performance chart shall be provided showing curves for torque, current, power factor, input/output kW and efficiency. This chart shall also include data on starting and no-load characteristics.
o. The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out.

7. Bearings: 2 permanently grease lubricated bearings with calculated B10 life of 40,000 hours minimum. Upper bearing: single deep groove ball bearing. Lower bearing: two row angular contact bearing designed for axial thrust and radial forces.

8. Mechanical Seal: Provide tandem mechanical shaft seal consisting of two independent assemblies.
   a. Lubrication: Hydrodynamic oil from surrounding reservoir.
   b. Lower seal: One stationary and one positively lubricated tungsten carbide ring.
   c. Upper Seal: Located between motor housing and oil chamber, with one positively driven and one fixed tungsten carbide seal ring. Provide seals which function independent of rotational direction.

10. Impeller: Grey cast iron, ASTM A48 Class 30B, dynamically-balanced, single-shrouded, keyed to end of motor shaft with allen head set screw, coated with acrylic dispersion zinc phosphate primer. Impeller shall be capable of handling solids, fibrous materials, heavy sludge and other matter found in wastewater.
11. Wear Rings: Brass or nitrile rubber coated steel wear rings drive fitted into volute inlet.
13. Protection:
   b. Leakage sensor in stator chamber: float switch.
c. Control and status panel: Flygt MINI CAS 120 or approved equal shall be provided in the control panel to monitor pump status.

14. Factory Tests:
   a. Impeller, motor rating, and electrical connections.
   b. Motor and cable insulation test.
   c. Dry run mechanical integrity and rotation check.

15. Power cable: The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall be oil resistant chlorinated polyethylene rubber. The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

16. Cable entry seal: Cylindrical elastomeric seal grommet flanked by washers with integral strain relief. Epoxy or silicon "potting" will not be acceptable.

17. Lifting Chain: Hot dip galvanized steel size 510 straight coil with galvanized end shackles and Flygt galvanized safety hook.

18. Cable Holder: Corrosion proof PVC coated cable holder designed to accommodate mounting liquid level sensor and suspending pump power cables.

B. Control Panel:
1. Controls shall be mounted in NEMA 4X 304 stainless steel enclosure near the pump station as shown on the drawings, or as directed by the Director’s Representative. All control and alarm components associated with the pumps shall be housed in the control panel.

2. An alternator shall be provided in the control panel to automatically alternate the lead pump at each operating cycle.

3. The control panel shall include the provisions to indicate the following alarm conditions:
   a. Start/run failure for each pump (2).
   b. High level alarm.
      1) High level alarm shall be interconnected with a water shut off for each of the buildings.
      2) Three (3) high level alarm output relays to be used for building 1 water supply shutoff, building 2 supply water shutoff and BAS alarm input.
   c. Low level alarm.
   d. Pump seal leak failure for each pump (2).
   e. Pump motor thermal sensor for each pump (2).
   f. Connection to the facilities generator.

4. Visual and audible alarm devices shall be mounted on the outside of the panel. A silence pushbutton shall be provided for the audible alarm. The visual alarm shall consist of one red light.

5. Alarm conditions shall also be indicated within the Building Control System.

4. Internally mounted HOA switches shall be provided to bypass pump on and off liquid level controls.

6. An elapsed time meter shall be provided for each pump, measuring time in 0.1-minute increments.

7. Panel enclosure shall be dead front construction with incoming power circuit breaker, and all control switches and control circuit breakers internally mounted except for alarm light, alarm horn and alarm horn silence switch. No controls shall be operable...
and/or there shall be no access to power from exterior outlets without opening panel door except for alarm silence.

a. Control panel shall accept a 480-volt, 3-phase feeder. Provide a step down transformer as required for 120-volt control circuitry.

b. Provide enclosure with a lockable disconnect.

8. Panel shall be lockable and master-keyed as specified by the Owner. Enclosure shall have padlocking provisions and be of tamper resistant construction.

9. Provide a thermostat and heater for panel.

10. Terminal strip shall be provided for connecting control wires.

11. Terminals shall be provided to connect the high level alarm, pump motor thermal sensor, and pump seal leak failure. Each alarm shall have a parallel circuit, which shall be wired to a single common terminal block. Provide alarm reset button for each pump.

12. High level alarms shall automatically reset when liquid level returns to normal.

13. An auxiliary duplex grounding receptacle, 2-pole, 3-wire 120-volt AC, shall be provided in the panel.

14. Provide a breaker for each pump motor and one for the control panel.

15. Provide phenolic identification tags for all indicators, switches, programmable timers, and reset buttons.

16. Provide control panel with pressure transducer transmitter and ensure complete compatibility with pressure transducer.

C. Liquid Level Sensing:

1. Liquid level measurement shall be accomplished through a submersible pressure transducer as manufactured by Flygt Model LS100 or approved equal.

2. The range shall be 0-16.0 ft. with an accuracy of ±0.1%.

3. The sensor shall be a non-fouling, solid state semiconductor type. The sensor output shall be 4-20 mA.

4. The sensor shall be 316 stainless steel, complete with 50 feet of cable and rated for Class I, Division I, Group D space.

5. The submersible pressure transducer shall be furnished with a cable clamp, 2" electrical conduit fitting, and stainless steel mounting bracket.

6. The submersible pressure transducer transmitter mounted inside the pump control panel shall provide operator interface to allow setting and adjusting the pump-on/off and alarm levels.

7. Two float switches shall be provided as a backup to the submersible level transducer as manufactured by Flygt Model ENM-10 or approved equal. One float switch shall activate a high-high level alarm to energize the pumps and 1 float switch shall activate low alarm and de-energize the pumps.

D. Rail System:

1. A rail system shall be provided to allow full access to the pumps.

2. The pumps shall be mounted in the wetwell on a rail removal system. The rail system shall consist of stainless steel vertical rails for each pump, which allow the pumps to be lowered or raised without any personnel access to the wetwell. Rails shall have intermediate supports spaced at a distance of not more than 10 feet.

3. Stainless steel lifting chains shall be provided for each pump.

4. All rails, braces, supports, and hardware located within the wetwell shall be stainless steel.

5. Provide a spark proof connection between the pump and rail system.
6. Contractor shall ensure pump removal system; lifting chains, rails, and pumps are integrated and compatible.

2.03 VALVES

A. General:
1. All valves shall have manufacturer’s name and working pressure cast in raised letters on valve body. All manual valve operators shall turn clockwise to close unless otherwise specified. Valves shall indicate the direction of operation.
2. All bolts and studs embedded in concrete and studs required for wall pipe shall be of stainless steel.
3. All other bolts, nuts, and studs shall, unless otherwise approved, conform to ASTM A307, Grade B; or ASTM A354.
4. Bolts and nuts shall have hexagon heads and nuts.

B. Design Criteria:
1. All valves and appurtenances shall be new and in perfect working condition. In no case will second-hand or damaged valves be acceptable. The selection of equipment to meet the specified design conditions is the responsibility of the Contractor.

C. Shop Tests:
1. Valves shall be shop tested in accordance with AWWA specifications.

D. Ball Check Valves:
1. Ball check valve shall be designed to be non-clog, fully automatic, maintenance free and specifically suited for operation in sewage as manufactured by Flygt-HDL Type-5087 or approved equal.
2. The body and cover shall be cast iron with flanged ends conforming to ANSI B16.10, Class 125.
3. The ball shall have an exterior coating of vulcanized nitrile rubber.
4. The only moving part shall be the ball, which rolls out of the path of flow providing an unobstructed full flow equal to nominal size. Upon discontinuation of flow the ball automatically rolls back to the closed position, providing a positive seal against back pressure. Valve shall absolutely prevent the return of flow back through the valve as downstream pressure increases above upstream pressure.
5. The ball shall be field replaceable without removing the main valve from the pipeline.

E. Plug Valves:
1. Plug valve shall be 1/4-turn eccentric plug-type, cast iron ANSI Class 125 flanged, with 100% port area and shall be suitable for the intended purpose.

2.04 WET WELL

A. Wet well shall conform to Section “Precast Concrete Wastewater Structures”

B. Pipe penetrations shall be made secure and watertight.

C. Cover/Access Hatch:
1. The TOP station cover shall be of ¼-inch thick Type-5086 aluminum diamond plate with an integral Safe-Hatch access cover.

2. All bars, angles and shapes shall be type 6061-T6 aluminum. The access cover frame shall be a minimum of 4-inches deep and shall be adequately sized to allow for easy passage of the submersible pumps. The Safe-Hatch access cover shall be designed to support the weight of the pump unit plus pedestrian traffic. The access door(s) shall be equipped with a hold-open arm, held open in the 90-degree position. Cover door hinges shall be heavy-duty design and be cast 1/4-inch thick Type 316 stainless steel with 3/8-inch diameter stainless steel hinge pins. All fasteners shall be type-316 stainless steel. Each hatch shall be supplied with a type-316 stainless steel slam lock, having a key-way protected by a threaded plug. The plug shall be flush with the diamond plate cover. The hatch shall be equipped with an aluminum lift handle that shall be flush to the top of the diamond plate cover.

3. The access cover unit shall be equipped with a Safe-Hatch hinged safety grate to provide protection against fall-through and to control access into the confined space. Grate openings shall be sized to allow for routine maintenance inspection without having to open the safety grate. The closed safety grate shall be designed to support the weight of one pump to facilitate site pump wash-down and inspection. The hatch opening will have a 4” elevated toe board to prevent tools from being kicked into the wet well (per OSHA 1926.502 (j)).

4. Access hatch sizes shall be as shown on the Drawings.

D. Vent:
1. A wall penetration shall be provided where indicated on the Drawings for a 4” SDR 35 PVC vent pipe to be installed. Penetration shall be watertight.

**2.05 VALVE VAULT**

A. Valve Vault shall conform to Section “Precast Concrete Wastewater Structures”

B. The valve vault shall be equipped with an integral drain to facilitate drainage from the valve vault back into the pump station.

C. Steps: Provide manhole steps or ladder to allow access into the valve vault.

D. Cover/Access Hatch:
1. Cover and access hatch shall be constructed of the same methods and materials as the wet well cover and access hatch.
2. Access hatch size shall be as shown on the Drawings.

**2.06 PIPING**

A. Polyvinyl Chloride (PVC) Pipe and Fittings:
1. All exposed pressurized PVC pipe and fittings shall be Schedule 80 and manufactured from Type I, Grade I Polyvinyl Chloride compound with a Cell Classification of 12454 per ASTM D1784. The pipe shall be manufactured in compliance with ASTM D1785. All PVC fittings shall be socket type and manufactured in compliance with ASTM D2467.
PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive pumping station.
B. Verify that dimensions, elevations, and electrical service are as described on shop drawings.

3.02 PREPARATION

A. Level installation site of wet well and valve vault to required elevation or slope.

3.03 INSTALLATION

A. Install wetwell, piping, and valve vault to required lines and grades.
B. Perform installation in accordance with manufacturer's requirements.
C. Backfill in accordance with the manufacturer's spec.

3.04 FIELD START-UP AND TESTING

A. After installation, a pump station start-up shall be performed by the installing contractor under the supervision of the manufacture’s authorized representative.
B. One day of field service (startup and training) shall be provided by an authorized, factory trained representative of the pump manufacturer.
C. Services shall include, but not be limited to,
   1. Inspection of the completed pump station installation to ensure that it has been performed in accordance with the manufacturer’s instructions and recommendations
   2. Supervision of all field-testing and activation of the Pump Manufacturer’s Warranty.
   3. The test shall demonstrate to the satisfaction of the Owner that the equipment meets all specified performance criteria, is properly installed and anchored, and operates smoothly without exceeding the full load amperage rating of the motor.
   4. The pump manufacturer's representative shall provide a start-up report prior to final acceptance of pumps.
D. The Contractor shall be responsible for coordinating the required field services with the Pump Manufacturer.

3.05 CLEANING

A. Clean work under the provisions of Division 1.
B. Remove all debris from site.
3.06 PROTECTION OF FINISHED WORK

A. Protect finished installation under the provisions of Division 1.

END OF SECTION
SECTION 333913

MANHOLES AND DRAINAGE STRUCTURES WITH FRAMES AND COVERS

PART 1   GENERAL

1.01 SUMMARY

A. Installation of manholes, catchbasins, precast concrete structures, frames, grates, covers, steps, and piping connections as shown on the Drawings and as specified herein.
B. Alteration of existing structures as shown on the Drawings and as specified herein.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of pavement.

1.03 SUBMITTALS

A. Shop Drawings: Show fabrication details and connections to adjacent Work.
B. Product Data: Manufacturer’s catalog cuts, specifications, and installation instructions.

PART 2   PRODUCTS

2.01 MATERIALS

A. Precast Reinforced Concrete Manholes:
2. Joints Between Riser Sections-One of the following:
3. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.
4. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

B. Precast Reinforced Square and Rectangular Concrete Structures:
2. Keyed Joints:
a. Joint Sealant - Select One:
   1) Mortar
   2) Rubber Gasket
   3) Butyl Joint Sealant

3. Load Rating: AASHTO HS-20 with 30% impact and 130 lb/cf equivalent soil pressure.

4. Concrete for Precast Units: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength of 4,000 psi after 28 days.

C. Cast-in-Place Concrete for Manhole Invert Channels: Normal weight, air entrained concrete with a minimum compressive strength of 4,000 psi after 28 days.
   1. Design Air Content: 6 percent by volume plus or minus 1.5 percent.
   2. Cement: Minimum 610 pounds per cubic yard.
   3. Slump: Between 2 and 3 inches.

D. Frames, Covers and Grates for Manholes and Catch Basins:
   1. Design of each shall be the same throughout the project unless otherwise specified or indicated on the drawings.
   3. Material:
      a. Cast iron: ASTM A48, Class 30B or 35B.
      b. Delivered to Site free of any coatings, unless otherwise specified.
   4. Frames:
      a. Round with a 30-inch clear opening, unless otherwise noted on the Drawings.
   5. Covers:
      a. Round.
      b. Solid lid, top surface checkered and provided with suitable concealed lifting notches, and lettering cast into cover to indicate type of structure.
   6. Grates:
      a. Round.
      b. Minimum open area: 232 sq inches.
      c. Bicycle safe.
   7. Provide frames, covers, and gratings of the locking type when indicated on the drawings.
      a. Acceptable Locking Devices: Type J or Type H by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Type A Cam Lock, Pattern 1490 by Syracuse Casting Sales Corporation, P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.
8. Acceptable Manhole Frames and Covers: Pattern R-1557-A with platen cover by Neenah Foundry Company, P. O. Box 729, Neenah, WI 54957, (414) 729-3661; Pattern 1016A with platen cover by Syracuse Castings Sales Corp., P. O. Box 190, South Bay Rd., Cicero, NY 13039, (315) 699-2601.


E. Pipe-to-Manhole/Drainage Structure Connections-One of the following:
   1. A-Lok Flexible Connector by A-Lok Products, Inc., 697 Main St., Tullytown, PA 19007, (215) 547-3366.
   3. Kor-N-Seal Flexible Connector by NPC, Inc., 250 Elm St., Milford, NH 03055, (603) 673-8680.
   4. Link-Seal Flexible Connector by Thunderline Link-Seal, Inc., 6525 Goforth St., Houston, TX 77021, (713) 747-8819.

F. Mortar: ASTM C 270, Type M.

PART 3 EXECUTION

3.01 PREPARATION

   A. Sewer Lateral Openings in Precast Concrete Risers: Provide openings and install pipe connectors in strict accordance with the recommendation of the connector manufacturer.

3.02 INSTALLATION

   A. Construct concrete structures with precast reinforced riser sections to the dimensions shown. Seal joints between precast riser sections with material specified.

      1. Wall thickness for circular structures 12 feet deep or less: 5 inches.
      2. Wall thickness for circular structures greater than 12 feet deep: 6 inches.

   B. Position manhole castings of structures flush with finished grade.

   C. Form inverts in manholes on straight runs by the use of channel pipe. Form inverts in manholes at changes in direction or grade by making curved channels of concrete. Channels shall have a smooth surface free from irregularities.

   D. Cut laterals which will enter above the invert to correct length before installation. Do not cut after installation. Construct drops as shown.
E. Install manholes as detailed on the Drawing and in accordance with the manufacturer’s printed installation procedures.

3.03 CONNECTION TO EXISTING STRUCTURES

A. The Contractor shall make connections to existing manholes as shown on the Drawings or as specified herein.

B. For connections to precast or cast-in-place concrete manholes, the Contractor shall core drill a hole 1 inch larger than the O.D. of the sewer pipe into the existing manhole at the location and elevation shown on the Drawings.

C. For connections to masonry manholes, the Contractor shall open the sidewall of the existing manhole by removing masonry units no more than necessary to accommodate the sewer pipe.

D. Connection methods shall be in accordance with the details shown on the Drawings. Any open spaces around the new pipe entry shall be sealed with non-shrink grout to prevent leakage.

E. The existing bench and channel shall be removed and reconstructed to permit flow through the manhole as it now exists and also for the new sewer pipe. Bench and channel reconstruction shall conform with the details on the Drawings, or as directed by the Engineer.

F. The Contractor shall be responsible for diverting flow through the manhole in order to allow bench and channel construction.

3.04 CHANGING ELEVATIONS OF EXISTING STRUCTURES

A. Lower existing frames of manholes by the removal of appropriate masonry courses, to the elevations shown on the Drawings or as directed by the Engineer.

B. Raise the existing frames of manholes by the addition appropriate grade rings to the elevations shown on the Drawings or as directed by the Engineer.

C. Where the manhole frames cannot be lowered by removal of masonry courses, such as may be the case with precast concrete manholes, the upper barrel section shall be removed and/or replaced with a section of less depth, to permit the necessary adjustment of the frame.

D. Frames and covers damaged during the Work shall be replaced at the Contractor’s expense.

END OF SECTION
PRECAST CONCRETE WASTEWATER STRUCTURES (SANITARY)

PART 1   GENERAL

1.01  SUMMARY

A. This Section includes grease trap, septic tank, dosing pump chamber, valve vault, and distribution box.

1.02  DESIGN REQUIREMENTS

A. Design: In accordance with ASTM C890 - Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
B. Loading: AASHTO HS20 with 30 percent impact and 130 lb/cu ft equivalent soil pressure.

1.03  SUBMITTALS

A. Waiver of Submittals: The "Waiver of Certain Submittal Requirements" in Section 01330 does not apply to this Section.
B. Product Data: Catalog cuts with dimensions, weights, and fabrication details and product specifications.
C. Admixture certification
D. Design and construction details of all precast concrete units.
E. Fabrication, assembly, and installation details for all castings and miscellaneous metal works.
F. Precast concrete structure design calculations verifying the structures have been designed to withstand the burial, submergence and anticipated live and dead loads. Design calculations for uplift forces shall incorporate a minimum factor of safety of 1.15.

PART 2   PRODUCTS

2.01  GENERAL

A. All precast components to use Xypex admix C-500 by precaster at time of fabrication. Precaster to provide certification of use during fabrication.
2.02 GREASE TRAP

A. Working Capacity: 6000 gallons.

B. Tank Configuration: Rectangular with effective tank length not less than two nor more than four times the effective width.
   1. When the effective length of the tank exceeds nine feet, provide reinforced 4 inch thick concrete baffle wall to create two compartments within the septic tank. The inlet compartment shall contain 65 to 75 percent of the total tank capacity. The baffle (transverse wall) shall extend from the bottom of the tank to at least 6 inches above the liquid level. The baffle shall have a 6 by 18 inch slot located 18 inches below the liquid surface. Provide a minimum 6 inch air space between the top of the baffle and the underside of the top of the tank to permit venting.

C. Pipe Connections:
   1. Cut or cast openings in tank 2 inches larger than the outside diameter of the connecting pipe.
   2. There shall be a minimum 3 inch difference in elevation between the inverts of the inlet and outlet piping.
   3. Inlet and outlet piping shall be provided with sanitary tees or concrete baffles. The inlet tee shall discharge to the tank 15 inches below the liquid surface. The outlet tee shall draw from the tank 18 inches below the liquid surface. Baffles shall be of like dimensions.

D. Access Manholes:
   1. Provide at least one access manhole per tank compartment. The access manhole opening shall have a minimum 24 inch clear opening.
   2. Provide inspection manholes, 1 sq ft nominal size, over inlet and outlet pipe connections. Inspection manholes shall have concrete plug type covers. The placement of an access manhole over a pipe connection will eliminate the need for an inspection manhole at that location.

2.03 SEPTIC TANK

A. Type: Heavy duty precast concrete.

C. Tank Configuration: Rectangular with effective tank length not less than two nor more than four times the effective width.
   1. When the effective length of the tank exceeds nine feet, provide reinforced 4 inch thick concrete baffle wall to create two compartments within the septic tank. The inlet compartment shall contain 65 to 75 percent of the total tank capacity. The baffle (transverse wall) shall extend from the bottom of the tank to at least 6 inches above the liquid level. The baffle shall have a 6 by 18 inch slot located 18 inches below the liquid surface. Provide a minimum 6 inch air space between the top of the baffle and the underside of the top of the tank to permit venting.
D. Pipe Connections:
1. Cut or cast openings in tank 2 inches larger than the outside diameter of the connecting pipe.
2. There shall be a minimum 3 inch difference in elevation between the inverts of the inlet and outlet piping.
3. Inlet and outlet piping shall be provided with sanitary tees or concrete baffles. The inlet tee shall discharge to the tank 15 inches below the liquid surface. The outlet tee shall draw from the tank 18 inches below the liquid surface. Baffles shall be of like dimensions.

E. Access Manholes:
1. Provide at least one access manhole per tank compartment. The access manhole opening shall have a minimum 24 inch clear opening.
2. Provide inspection manholes, 1 sq ft nominal size, over inlet and outlet pipe connections. Inspection manholes shall have concrete plug type covers. The placement of an access manhole over a pipe connection will eliminate the need for an inspection manhole at that location.

2.04 DOsing Pump Chamber

A. The tank and pumps shall provide a minimum dosing volume per discharge per the Details and Section “Packaged Pump Station.”.

B. Dosing Pumps: Provide two alternating dosing septic tank effluent pumps. The dosing pumps shall be constructed of material suitable for septic tank effluent in accordance with Section “Packaged Pump Station”

2.05 Distribution Box

A. Configuration: As shown on the drawings with proper inlet and outlet openings.

B. Covers: Removable concrete.
   1. Covers on boxes designed for traffic loadings shall be provided with tapered concrete inspection plugs.

C. Boxes shall be provided with inlet baffles.

D. Pipe Connections Openings:
   1. General: Size openings 2 inches larger than the outside diameter of the connecting pipe.
   2. Inlet: Cut or cast opening during fabrication of the box.
   3. Outlet: Provide sufficient knockouts or knockout panel areas for 20 active 4 inch distribution lines.
   4. There shall be a minimum 2 inch difference in elevation between the inverts of inlet and outlet piping.

E. Outlet inverts shall be 1 to 5 inches above the distribution box floor to allow water leveling of the box.
2.06 MISCELLANEOUS MATERIALS

A. Concrete for Precast Structures: Air content 6 percent by volume with an allowable tolerance of plus or minus 1.5 percent. Minimum compressive strength, 4,000 psi after 28 days.

B. Reinforcing Steel:
   2. Steel Bars: ASTM A615.

C. Access Manhole Frames and Covers:
   1. Frames: Round, cast iron, minimum weight 380 pounds. Unless otherwise indicated, the frame shall be 9 inches high with a minimum 21 inch clear opening.
   2. Covers: Cast iron, 1-3/4 inches thick, minimum weight 160 pounds, reinforced or ribbed on the underside and without perforations. The top surface shall be checkered and provided with suitable lifting notches.
   3. Machining: Seats of manhole frames and covers shall be machined to a horizontal bearing surface.


E. Concrete Masonry Units for Manholes: ASTM C 139.

F. Butyl Rope Sealant: Federal Specifications SS-S-210A.

G. Mortar: ASTM C270, Type M.

H. Non-shrink Grout: Water Plug, Hallemite Manhole Pipe Cement or grout utilizing Sika Set.

I. Pipe and Fittings: Cast iron soil pipe, ASTM A74.

PART 3 EXECUTION

3.01 INSTALLATION OF SEPTIC TANK

A. Construct the septic tank with precast concrete sections on a compacted, 6 inch leveling bed of sand or broken stone at required location and elevations. Seal construction joints with butyl rope sealant.

B. Extend access manholes approximately to grade utilizing precast concrete riser sections/grade rings. The extensions shall finish so that the tops of cast iron manhole frames and covers will be flush with grade.
   1. Install sewer brick, concrete masonry units, and precast concrete riser sections with full beds of mortar.
   2. Plaster interior and exterior surfaces of brick and concrete masonry extensions smooth with a minimum 1/2 inch thickness of mortar.
C. Install cast iron manhole frames and covers to finish flush with grade. Set frames in a full bed of mortar.

D. Make piping connections to septic tank. Set piping and sanitary tees at required elevations. Fill annular space between pipe and structure with non-shrink grout to provide a watertight joint.

E. Fill lifting holes and unused knockouts with non-shrink grout.

F. Paint interior of septic tank, including baffles and access manhole extensions, from a point 12 inches below the normal liquid surface to the top of the access manhole extensions with two coats of coal tar epoxy applied at 8-12 mils DFT per coat.

3.02 INSTALLATION OF DISTRIBUTION BOX

A. Install distribution boxes level on a 12 inch deep compacted bed of sand or pea gravel.

B. Reinforce unused knockouts or knockout panels by plastering the unused areas with a minimum 3/4 inch thickness of mortar.

D. Make required piping connections to the boxes. Fill annular space around the pipe with non-shrink grout to provide a watertight joint between the pipe and structure.

E. Paint interior of the distribution box, including baffle and underside of the box cover, with two coats of coal tar epoxy applied at 8-12 mils DFT per coat.

END OF SECTION
SECTION 334105

PLASTIC DRAINAGE PIPE (STORM DRAINAGE)

PART 1   GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE
A. Earthwork: Section 310000.
B. Manholes: Section 333913.

1.02 SUBMITTALS
A. Product Data: Manufacturer’s specifications with all pertinent information regarding dimensions, fittings and installation instructions.

PART 2   PRODUCTS

2.01 GENERAL
A. Each length of pipe and each fitting shall be marked in accordance with the applicable ASTM Designation.

2.02 DRAINAGE PIPE AND FITTINGS
A. PVC Sewer Pipe and Fittings; (6 inches Diameter and Larger): SDR 35 and ASTM D 3034.
B. Plastic Pipe (4 and 6 inches Diameter, Solid and Perforated) for Building Drains, Cleanout Pipes, Discharge Lines, Leaching Fields, Drain Tiles, etc: PVC meeting ASTM D 2729 or SR (Styrene Rubber) meeting ASTM D 2852.

2.03 SOLVENT CEMENTS
A. Solvent cement used for joining plastic pipe and fittings shall meet the following designations for the various types of plastic pipe listed.
   1. PVC: ASTM D 2564.
   2. ABS: ASTM D 2235.
PART 3 EXECUTION

3.01 INSPECTION

A. Inspect all pipe and fittings before installation. Remove defective pipe and fittings from the site.

B. Do not backfill before installation is inspected by the Director’s Representative.

3.02 GENERAL

A. Install pipe in accordance with the manufacturer’s recommendations and as specified in ASTM D 2321.

B. Join PVC pipe with solvent cemented joints as recommended by ASTM D 2855.

C. Use Cushion Material for bedding and backfill to the depth shown on the drawings for solid pipe.

D. Use No. 2 Coarse Aggregate for bedding and backfill to the depth shown on the drawings for perforated pipe.

3.03 INSTALLATION

A. Laying Pipe: Lay pipe to indicated line and grade with a firm uniform bearing for the entire length of the pipe. Excavate sufficient clearance at each bell or coupling to allow uniform bearing along the pipe barrel. Fill excess excavation with suitable material and tamp.

B. Joints:
   1. Wipe inside of sockets and outside of pipe to be jointed, clean and dry.
   2. Install rubber gaskets in accordance with the manufacturer’s specifications.

C. Connections:
   1. Make connections to existing manholes by cutting into the floor or bench of the manhole and forming a new channel.
   2. If the pipe, manholes or other structures with which connection is to be made has not yet been installed, install the pipe to a point directed by the Director’s Representative and plug or cap the end in a satisfactory manner.

D. Lay perforated pipe on a tamped bed of underdrain filter material.

E. Cleanouts:
   1. Construct cleanouts at the locations shown and as detailed on the drawings.
   2. Use PVC wyes, bends and pipe as indicated.
   3. Extend cleanout piping to grade and terminate with deck plug installed in accordance with manufacturer’s instructions.
4. Install deck plug flush with grade and encase with 2500 psi concrete pad as shown.

END OF SECTION