DOCUMENT 00910

ADDENDUM NUMBER FIVE (5)
April 1, 2005

PROJECT: **The University of Alabama School of Law - Renovation and Addition**
University of Alabama
Tuscaloosa, Alabama
UA Project No. 025-03-127

FROM: KPS GROUP, INC.
2101 First Avenue North
Birmingham, Alabama 35203

TO: All of Record Holding Bidding Documents.

GENERAL:

This Addendum forms a part of the Contract Documents and modifies the **original Construction Documents dated February 21, 2005, Addendum Number 1, dated March 1, 2005, Addendum Number 2, dated March 4, 2005, Addendum Number 3, dated March 10, 2005** and **Addendum Number 4, dated March 15, 2005** as noted below. The following conditions, drawings, specification changes, etc. take precedence over items in the drawings and specifications of the Contract Documents. Portions of the Contract Documents not changed by this Addendum remain in effect.

Bidders are advised to call attention to all sub- bidders and suppliers for any changes which may affect their work.

Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

BIDDER'S PREQUALIFICATION:

1. The following Contractors have been placed back on the approved List of Bidders:

   Doster Construction Company, Inc.
   2100 International Park Drive
   Birmingham, Alabama 35243
   205-443-3800 Telephone
   205-951-2612 Facsimile

CLARIFICATIONS:

2. FENCING IN TREE SAVE AREAS: Chain link fencing is required in tree save areas.

3. PILING: As identified in the March 14, 2005 TTL, Inc. letter issued in Addendum Number 4, the Contractor is allowed to replace the current auger cast pile foundation system with a drilled pier foundation system. The Contractor shall submit the drilled pier foundation design, construction details and calculations, all stamped and signed by a Professional Engineer registered in the State of Alabama to LBYD, Inc. for review and approval of the drilled pier foundation system.

4. FACE BRICK: Face Brick shall be "Boral BH 200/232 FBA SW ASTM 216 Modular" and shall comply with all requirements stated in Section 04810 - UNIT MASONRY ASSEMBLIES: The Masonry contractor shall be responsible for taking delivery of the brick on June 15, 2005 and storing it until installation. The brick shall be stored on pallets. The pallets shall rest on gravel or pavement; not on bare earth.

5. WINDOW DESIGNATION: Refer to Drawing A-1.11. In Food Service Dining Area A106 there are only two "Fa" window types to be installed. Omit the "Fa" window tag reference shown in the south end of corridor A105 and adjacent to Door #A105a.

6. MARKER BOARDS: The marker board in Room A141 is MB-1.

7. MARKER BOARDS at INTERVIEW ROOMS: There are marker boards in the Interview Rooms on the First Level and NO marker boards on the Second Level.

8. Section 12491 - HORIZONTAL LOUVER BLINDS: Mini-blinds will be required in Rooms A155, A137 & A134.

9. TEXTURED ASBESTOS CONTAINING MATERIALS ABATEMENT:
   a. The Abatement Contractor is to assure that where removal of asbestos-containing textured surfacing material is to occur and drywall material is to remain, the Contractor shall make every effort to protect the remaining drywall surface and to avoid damage that will prevent finish work. Any repair or replacement of damaged drywall material will be at the Contractor's expense.
   b. The Abatement Contractor is responsible for the execution of the proper notification and receipt of approval to the regulatory agency (or agencies) of the proposed process for the abatement of the textured surfacing material on the drywall material. Copies of requests and subsequent responses shall be forwarded to Bhate a minimum of seven days prior to any commencement of site abatement activities.

10. DUCTWORK: All unlined return ductwork that is both exposed and concealed shall be externally insulated per the specifications.

11. TRANSFORMER: The University will not pre-purchase the transformer and applicable components.

12. ELECTRICAL POWER: Power to the existing building may be cut off for a weekend to make the new required electrical connections. Power cut off shall be carefully coordinated with the University. Power cut off shall be restricted to take place after 5:00 P.M. on Friday and completed by 7:00 A.M. on Monday.

13. EXISTING DUCT BANK: The Portion of duct bank beneath the building expansion must be removed. The balance of the duct bank can be abandoned, provided all conductors are removed.

14. COOLING TOWER RELOCATION: The cooling tower may be relocated adjacent to, or in-line with, the existing cooling tower provided the location is reviewed and approved by the University.

CHANGES TO SPECIFICATIONS (Divs 1 - 16):

15. Section 02935 - LANDSCAPE MAINTENANCE: In 1.11 A., delete second sentence, "Continue maintenance until termination of one-year warranty period." (Duration of maintenance service is stated on Sheet L1.02, General Note 19: "90 Days Plant Maintenance from substantial completion included in construction contract ")

16. Section 04810 - UNIT MASONRY ASSEMBLIES: Delete 2.7.A and replace with the following:

    "A. "Proprietary Acidic Cleaners: Sure Klean "Vana Trol" or approved equal.

17. Section 05811 - ARCHITECTURAL JOINT SYSTEMS: **Approved Substitution:**

"2.1.B. Substitutions:
3. "MM Systems Corporation"

18. Section 06100 - ROUGH CARPENTRY: Delete 2.5.B and replace with the following:

B. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
1. Approved Products/Manufacturers:
a. Fiberrock Brand Sheathing with Aqua Tough; USG Co.
b. Glasrock Sheathing; BPB, Tampa, FL.
c. (Note: "Dens-Glass Gold" by G-P Gypsum Corp. is Not Acceptable)"
2. Type and Thickness: Type X, 5/8 inch thick.

19. Section 07190 - WATER REPELLENTS: Delete Part 2, Article A and all its contents and replace with the following:
A. Water-Based Silicone Emulsion Water Repellent:
"1. Basis-of Design Manufacturer/Product: "Blok-Guard & Graffiti Control II" by ProSoCo."

20. Section 07540 - THERMOPLASTIC MEMBRANE ROOFING: Add new Section 07540 per **Attachment No. 4** at the end of this Addendum.

21. Section 08411 - ALUMINUM ENTRANCES AND STOREFRONTS: **Approved Substitution:**

"2.1.B. Substitutions:
5. "United States Aluminum Corporation"

22. Section 09271 - GLASS-REINFORCED GYPSUM FABRICATIONS: **Approved Substitution:**

"2.1.A.1. Available Manufacturers:
g. "Plaster Concepts, Inc."

23. Section 10155 - TOILET COMPARTMENTS: **Approved Substitution:**

"2.1.A. Available Manufacturers:
13. "Columbia Partitions, Inc."

24. Section 15060 - PIPING AND FITTINGS: 1.4 shall be revised to read: "WELDER CERTIFICATION: Provide copies of each welder's certification to the Owner prior to starting work. Certification must have been obtained with current employer within the last two years. Each weld shall be stamped by the welder. The stamp shall match the person's mark on their certification certificate."

25. Section 15140 - END-SUCTION, FLEXIBLE COUPLED PUMPS: **Approved Substitutions:** 1.3 shall be revised to read: "Pumps to be Bell & Gossett Series 1510, Ingersoll-Rand Type BT-E, Taco FM Series, Peerless, Thrush, or Aurora."

26. Section 15140 - END-SUCTION, FLEXIBLE COUPLED PUMPS: 3.2 shall be revised to read: "Make hot alignment check on couplings between motors and pumps. Operate equipment until components have reached operating temperature before hot check is made. Reposition equipment as required and repeat hot alignment check until parallel and angular alignments in both plan and elevation are within limits set by equipment manufacturer. Field alignment shall be performed by qualified personnel with the use of laser alignment equipment."

27. Section 15141 - IN-LINE, VERTICALLY MOUNTED PUMPS: **Approved Substitutions:** 1.2 shall be revised to read: "Pump to be Bell & Gossett Series 80, Armstrong Bulletin 6425, Thrush, Peerless, or Aurora."

28. Section 15142 - DOUBLE-SUCTION, HORIZONTAL SPLIT CASE PUMPS: **Approved Substitutions:** 1.3 shall be revised to read: "Pumps to be Bell & Gossett HSC, Aurora Pump Series 410, Model 411, Buffalo Forge Company, Class HS, Gould Pumps, Inc., Model 3405, Worthington Corporation, Type LR, or Peerless."

29. Section 15142 - DOUBLE-SUCTION, HORIZONTAL SPLIT CASE PUMPS: 3.2 shall be revised to read: "Make hot alignment check on all couplings between motors and pumps. Operate equipment until components have reached operating temperature before hot check is made. Reposition equipment as required and repeat hot alignment checks until both parallel and angular alignments in both plan and elevation are within limits set by equipment manufacturers. Field alignment shall be performed by qualified personnel with the use of laser alignment equipment."

30. Section 15242 - VIBRATION ISOLATION: **Approved Substitutions:** 2.5.A shall be revised to read: "Provide Metraflex or Southeastern Hose twin-sphere flexible rubber pipe connectors with female unions or floating flanges on piping connections to equipment subject to vibration."

31. Section 15440 - PLUMBING FIXTURE AND DRAIN LIST: **Approved Substitutions:** "PART 2 - PRODUCTS: Add TOTO, LTD to list of approved manufacturers."

32. Section 15515 - HYDRONIC SPECIALTIES: **Approved Substitutions:** 2.2.A 9 shall be revised to read: "Heat exchanger to be Bell & Gossett ITT Type SU, Thrush, or Adamson."

33. Section 15515 - HYDRONIC SPECIALTIES: **Approved Substitutions:** 2.2.B.7 shall be added to read: "Compression tank shall be provided by Bell & Gossett, Thrush, MRS, or American HVAC."

34. Section 15515 - HYDRONIC SPECIALTIES: **Approved Substitutions:** 2.2.C. 7 shall be revised to read: "Separator to be Spirotherm "SpiroVent HV Series, Thrush, or Bell & Gossett Model SRS."

35. Section 15515 - HYDRONIC SPECIALTIES: **Approved Substitutions:** 2.2.D.8 shall be revised to read: "Suction diffusers to be manufactured by Bell & Gossett ITT, Taco, Mueller, Thrush, or MRS."

36. Section 15515 - HYDRONIC SPECIALTIES: **Approved Substitutions:** 2.2.J.6 shall be added to read: "Hydronic system pressure reducing valves shall be by Thrush or approved equal."

37. Section 15515 - HYDRONIC SPECIALTIES: **Approved Substitutions:** 2.2.L.3 shall be revised to read: "Valves to be as manufactured by Bell & Gossett ITT, Taco, Mueller, Thrush, MRS, or Aurora."

38. Section 15554 - BOILER - ATMOSPHERIC COPPER FIN TUBE: **Approved Substitutions:** 2.1.D shall be added to read: "Laars Heating Systems."

39. Section 15583 - CONDENSATE RETURN UNIT: **Approved Substitutions:** 1.3 shall be revised to read: "Units to be by Aurora, Skidmore, ITT-Hoffman, Shipco, or Mepco."

40. Section 15725 - PLATE AND FRAME HEAT EXCHANGER: **Approved Substitutions:** 2.7 shall be added to read: "Plate and frame heat exchanger to be by APV or approved equal."

41. Section 15761 - UNIT HEATERS: **Approved Substitutions:** 1.1 shall be revised to read: "Unit heaters noted as horizontal projection type to be Trane Model S, Reznor, or approved equal."

42. Section 15761 - UNIT HEATERS: **Approved Substitutions:** 1.2 shall be revised to read: "Unit heaters noted as vertical projection type to be Trane Model P, Reznor, or approved equal."

43. Section 15855 - PREFABRICATED GAS VENT SYSTEM: **Approved Substitutions:** 2.1.E shall be revised to read: "Van Packer."

44. Section 15862 - CENTRIFUGAL EXHAUST FAN: **Approved Substitutions:** 2.1 shall be revised to read: "MANUFACTURERS: Greenheck, Acme, Cook, or Twin City Fan & Blower."

45. Section 15863 - PROPELLER FANS: **Approved Substitutions:** 2.1 shall be revised to read: "MANUFACTURERS: Greenheck, Acme, Cook, or Twin City Fan & Blower."

46. Section 15910 - SHEET METAL SPECIALTIES: **Approved Substitutions:** Air Balance shall be an acceptable manufacturer for the fire dampers, fire/smoke dampers, and smoke dampers. MetalAire shall be an acceptable manufacturer for all grilles, registers, and diffusers.

47. Section 15920 - SOUND ATTENUATORS: **Approved Substitutions:** 2.1 shall be revised to read: "ACCEPTABLE MANUFACTURERS: Titus, Rink, Industrial Acoustics Co., or Vibro-Acoustics."

48. Section 16115 - RACEWAYS - SURFACE METAL RACEWAYS: Replace Section 16115 with revised version per **Attachment No. 1** at the end of this Addendum.

49. Section 16601 - LIGHTNING PROTECTION: Add new Section 16601 per **Attachment No. 2** at the end of this Addendum.

50. Section 16722 - FIRE ALARM SYSTEM: Replace Section 16722 with revised version per **Attachment No. 3** at the end of this Addendum.

CHANGES TO DRAWINGS:

51. Landscape Drawing Sheets L1.02 & L1.04: Revise Plant Schedule as follows: Nellie Stevens height requirement shall be 6 - 8 ft. height.

52. Plumbing Sheet P4-04: Provide a 4" hub drain within the Food Service Dining Area space A106 in the north west corner for the addition of an ice maker. Connect the new hub drain to the 4" sanitary line which currently passes through this area. Provide a 4" vent from the hub drain routed to the Men's Toilet space A127 and connect to the waste vent system. Provide a 1/2" water supply line with a shut-off valve from the overhead water supply and drop in the wall. Provide the rough-in and final connection to the ice maker.

CHANGES TO DRAWINGS (ATTACHMENTS):

53. Architectural Drawing Sheet A-1.21:
Revise A6 - Parapet Flashing Detail per **Attached Drawing A-1.21a** (8 ½" x 11")

54. Architectural Drawing Sheet A-3.01:
Revise D1 - Partial Building Cross Section per **Attached Drawing A-3.01a** (8 ½" x 11")

55. Architectural Drawing Sheet A-3.01:
Revise C1 - Partial Building Cross Section per **Attached Drawing A-3.01b** (8 ½" x 11")

56. Architectural Drawing Sheet A-3.01:
Revise D2 – Slab Edge Detail per **Attached Drawing A-3.13a** (8 ½" x 11")

57. Electrical Drawings: (See clouded revisions)

E0-03	**Electrical - Site Lighting Plan - Base Bid**
E4-01a	**Systems Plan - Part A Main Level**
E4-01aa	**Systems Plan - Part AA Main Level**
E4-01b	**Systems Plan - Part B Main Level**
E4-01c	**Systems Plan - Part C Main Level**
E4-01d	**Systems Plan - Part D Main Level**
E4-01l	**Systems Plan - Part L Main Level Floor Plan**
E4-02e	**Systems Plan - Part E Second Level**
E4-02ee	**Systems Plan - Part EE Second Level**
E4-02f	**Systems - Part F Second Level**
E4-02g	**Systems - Part G Second Level**
E4-02h	**Systems Plan - Part H Second Level**
E4-03j	**Systems Plan - Parts J & K Third Level**
E7-04	**Electrical - Lightning Protection Details** (New Drawing)

THIS ADDENDUM CONSISTS OF SIX (6) TYPEWRITTEN PAGES, PLUS FOUR (4) ATTACHMENTS CONSISTING OF TWENTY-FOUR (24) PAGES, PLUS FOUR (4) 8 ½" X 11" DRAWINGS, PLUS FOURTEEN (14) 30" x 42" ATTACHED DRAWINGS, FOR A TOTAL OF FORTY-EIGHT (48) SHEETS.

END OF ADDENDUM NUMBER FIVE (5)

SECTION 16115

RACEWAYS - SURFACE METAL RACEWAYS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide surface metal raceway systems with elbows, fittings and outlets.

B. Surface metal raceway systems to be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.

C. Use surface metal raceway systems in laboratories and in other areas where multiple outlet assemblies are required and for extension of circuits along existing walls.

D. Coordinate surface metal raceway color with Architect.

PART 2 - PRODUCTS

2.1 SURFACE METAL RACEWAYS

A. Provide surface metal raceway systems as manufactured by Wiremold, Post Glover/Halsey, or approved substitute. Catalog numbers used below are those of Wiremold Corporation and are to be considered as standards by which equivalents are to be evaluated.

B. Provide 4000 series surface metal raceway systems for laboratory areas as shown on drawings.

C. Systems to be complete with elbows, fittings and outlets. Raceways shall be electrically continuous across all joints and fitting. Bonding jumpers shall be installed as required.

D. Provide No. 2127GA 15-amp, 125-volt receptacles, or No. IG2127GA isolated ground receptacles on centers as shown on drawings for the No. 2100 mold.

E. Provide 15-amp, 125-volt duplex receptacles on 4000 series Wiremold.

F. Provide device plates on 4000 series Wiremold as specified under Section 16140.

G. Provide 700 series surface metal raceway systems for exposed fire alarm raceways. Coordinate color with Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Secure raceway to wall using pan head type toggle bolts with one located at each end of each run plus additional bolts spaced 24" on center. All fasteners shall be concealed type.

B. Run surface metal raceways parallel and at right angles to building lines.

C. Locate raceways above countertops or casework where shown. They shall be mounted with centers 4 inches above the countertop. If the counter has a backsplash, receptacles shall be mounted with centers 4 inches above top of backsplash.

D. Provide separate insulated green grounding conductors in surface metal raceways for all receptacles.

END OF SECTION

SECTION 16601

LIGHTNING PROTECTION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Contractor shall provide all labor, materials and items of service required for the completion of a functional and unobtrusive system of air terminals, conductor, grounds and other components necessary for the protection of the building against damage by lightning.

B. The system shall be completely concealed where possible, with only the air terminals and roof conductor visible, and complying in all respects with the following Codes:
   1. Underwriters' Laboratories, Inc. - No. UL96A.
   2. National Fire Protection Association - No. NFPA780.

C. The installing contractor shall be actively engaged in the installation of lightning protection systems, and shall be so listed by Underwriters' Laboratories. He shall have a minimum of three years experience in this work.

D. If so requested by the State where the project is being constructed, the Vendor shall have the shop drawings signed and sealed by a registered engineer - specializing in lightning protection design.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All materials used shall be new and be the product of a manufacturer member of Lightning Protection Institute, approved and labeled by U.L. and L.P.I.

B. All conductors, terminals and fittings shall be copper or bronze.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Submit a list of materials and system shop drawings to Architect for review.

B. Install all conductors in a downward direction, avoiding trapping or any sharp bends of cables.

C. Upon completion of the installation, the contractor shall complete the application for the U.L. "Master Label" and forward to the manufacturer for processing. The Contractor shall provide a copy of such application to the Architect. A copy of the application shall be made a part of the project closing files.

D. If it is determined that the existing buildings do not have UL approved and labeled lightning protection systems, proceed with the new installation, using all labeled materials and meeting all the

requirements of the UL 96A Code. Upon completion, the manufacturer shall certify, in writing to the architect, that the installation on the new building meets all requirements for the "Master Label" so that the owner may obtain the UL label at a later date, when an approved installation is made on the older buildings.

END OF SECTION

SECTION 16722

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 SUMMARY NETWORK FIRE ALARM CONTROL PANEL (NODE)

A. Network fire alarm control panels shall include all features as described in this specification for stand-alone FACPs and shall have network communication capabilities as described herein.
   1. All points monitored and controlled by a single node shall be capable of being programmed as "Public". Each point made public to the network may be programmed to be operated by any other node connected to the network.
   2. Network communications shall be capable of supporting "point lists" that can be handled as though they were a single point.

B. The network shall provide a means to log into any node on the system via a laptop computer or CRT/Keyboard and have complete network access (Set Host) for diagnostics, maintenance reporting, and information gathering of all nodes in the system. Systems not meeting this requirement must provide all diagnostic tools required to support this function from selected points on the network. This Section covers fire alarm systems, including initiating devices, notification appliances, controls, and supervisory devices.

C. Work covered by this section includes the furnishing of labor, equipment, and materials for installation of the fire alarm system as indicated on the drawings and specifications.

D. The Fire Alarm System shall consist of all necessary hardware equipment and software programming to perform the following functions:
   1. Fire alarm and detection operations.
   2. Control and monitoring of elevators, smoke control equipment, door hold-open devices, fire suppression systems, emergency power systems, and other equipment as indicated in the drawings and specifications.

1.2 ACCEPTABLE MANUFACTURERS

A. Manufacturers: The equipment and service described in this specification are those supplied and supported by SimplexGrinnell and represent the base bid for the equipment.
   1. Subject to compliance with requirements, provide alternate products by one of the following:
      a. SimplexGrinnell.

B. Being listed as an acceptable Manufacturer in no way relieves obligation to provide all equipment and features in accordance with these specifications.

C. The Manufacturer shall be a nationally recognized company specializing in fire alarm and detection systems. This organization shall employ factory trained and NICET certified technicians, and shall maintain a service organization within 100 miles of this project location. The Manufacturer and service organization shall have a minimum of 10 years experience in the fire protective signaling systems industry.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

B. The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:
   1. Division 16: "Basic Electrical Materials and Methods."
   2. Division 16: "Wiring Methods."
   3. Division 13: "Fire Suppression."
   4. Division 15: "Fire Protection."
   5. Division 15: "HVAC Systems."
   6. Division 13: "Building Automation and Control."

C. The system and all associated operations shall be in accordance with the following:
   1. Guidelines of the following Building Code: IBC.
   2. NFPA 72, National Fire Alarm Code.
   3. NFPA 70, National Electrical Code.
   4. NFPA 101, Life Safety Code.
   5. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.
   6. Other applicable NFPA standards.
   7. Local Jurisdictional Adopted Codes and Standards.
   8. ADA Accessibility Guidelines.

1.4 SYSTEM DESCRIPTION

A. General: Provide a complete, non-coded, addressable/conventional, microprocessor-based fire alarm system with initiating devices, notification appliances, and monitoring and control devices as indicated on the drawings and as specified herein.

B. Software: The fire alarm system shall allow for loading and editing instructions and operating sequences as necessary. The system shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control unit. Loss of primary and secondary power shall not erase the instructions stored in memory. System shall be capable of storing dual configuration programs with one active and one in reserve. Panel shall be capable of full system operation during a new configuration download.

C. History Logs: The system shall provide a means to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history. A separate alarm and trouble log shall be provided.

D. Recording of Events: Record all alarm, supervisory, and trouble events by means of system printer. The printout shall include the type of signal (alarm, supervisory, or trouble) the device identification, date and time of the occurrence. The printout differentiates alarm signals from all other printed indications.

E. Wiring/Signal Transmission:
   1. Transmission shall be hard-wired using separate individual circuits for each zone of alarm operation, as required or addressable signal transmission, dedicated to fire alarm service only.

2. System connections for initiating, signaling line circuits and notification appliance circuits shall be Class B.
3. Circuit Supervision: Circuit faults shall be indicated by a trouble signal at the FACP. Provide a distinctive indicating audible tone and alphanumeric annunciation.
4. Constant Supervision Audio: When provided, audio notification appliance circuits shall be supervised during standby by monitoring for DC continuity to end-of-line resistors.
5. Provide plenum-rated cabling in all return air plenums.

F. Remote Access:
1. FACP shall have the capability to provide Remote Access through a Dial-Up Service Modem using the public switched telephone system of a private switched telephone system.
2. A personal computer or technician's laptop, configured with terminal emulation software shall have the ability to access the FACP for diagnostics, maintenance reporting and information gathering.
3. FACP shall have the capability to provide third party access through a serial interface connection and be agency listed for specific interfaces and for the purpose.
4. FACP shall have the capability to provide remote access via an Internet/Intranet Interface. The Internet interface shall provide an alternative access to system information using the familiar interface of a standard Internet browser. A remotely located fire professional can use this access to analyze control panel status during non-alarm conditions and can also use this information to assist local fire responders during alarm conditions.

G. Network communication:
1. Network node communication shall be through a token ring, hub, or star topology configuration, or combination thereof.
2. A single open, ground or short on the network communication loop shall not degrade network communications. Token shall be passed in opposite direction to maintain communications throughout all network nodes. At the same time the status of the communication link shall be reported.
3. If a group of nodes becomes isolated from the rest of the network due to multiple fault conditions, that group shall automatically form a sub-network with all common interaction of monitoring and control remaining intact. The network shall be notified with the exact details of the lost communications.
4. Fiber optics communication shall be provided as an option via a fiber optics modem. Modem shall multiplex audio signals and digital communication via full duplex transmission over a single fiber optic cable, either single mode or multi mode.
5. The communication method shall be NFPA 72 style 7.

H. Required Functions: The following are required system functions and operating features:
1. Priority of Signals: Fire alarm events have highest priority. Subsequent alarm events are queued in the order received and do not affect existing alarm conditions. Priority Two, Supervisory and Trouble events have second-, third-, and fourth-level priority respectively. Signals of a higher-level priority take precedence over signals of lower priority even though the lower-priority condition occurred first. Annunciate all events regardless of priority or order received.
2. Noninterfering: An event on one zone does not prevent the receipt of signals from any other zone. All zones are manually resettable from the FACP after the initiating device or devices are restored to normal. The activation of an addressable device does not prevent the receipt of signals from subsequent addressable device activations.

3. Transmission to Remote Central Station: Automatically route alarm, supervisory, and trouble signals to a remote central station service transmitter provided under another contract.
4. Annunciation: Operation of alarm and supervisory initiating devices shall be annunciated at the FACP and the remote annunciator, indicating the location and type of device.
5. Selective Alarm: A system alarm shall include:
   a. Indication of alarm condition at the FACP and the annunciator(s).
   b. Identification of the device /zone that is the source of the alarm at the FACP and the annunciator(s).
   c. Operation of audible and visible notification devices on the fire floor, floor above and floor below until silenced at FACP.
   d. Selectively closing doors normally held open by magnetic door holders on the fire floor, floor above and floor below.
   e. Unlocking designated doors.
   f. Shutting down supply and return fans serving zone where alarm is initiated.
   g. Closing smoke dampers on system serving zone where alarm is initiated.
   h. Initiation of smoke control sequence through the building temperature control system.
   i. Notifying the local fire department.
   j. Initiation of elevator recall in accordance with ASME/ANSI A17.1, when specified detectors or sensors are activated.
   k. Supervisory Operations: Upon activation of a supervisory device such as fire pump power failure, low air pressure switch, and tamper switch, the system shall operate as follows:
      (1) Activate the system supervisory service audible signal and illuminate the LED at the control unit and the remote annunciator.
      (2) Pressing the Supervisory Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory LED "on" indicating off-normal condition.
      (3) Record the event in the FACP historical log.
      (4) Transmission of supervisory signal to remote central station.
      (5) Restoring the condition shall cause the Supervisory LED to clear and restore the system to normal.
   l. Alarm Silencing: If the "Alarm Silence" button is pressed, all audible alarm signals shall cease operation.
   m. System Reset:
      (1) The "System Reset" button shall be used to return the system to its normal state. Display messages shall provide operator assurance of the sequential steps ("IN PROGRESS", "RESET COMPLETED") as they occur. The system shall verify all circuits or devices are restored prior to resetting the system to avoid the potential for re-alarming the system. The display message shall indicate "ALARM PRESENT, SYSTEM RESET ABORTED."
      (2) Should an alarm condition continue, the system will remain in an alarmed state.
   n. A manual evacuation (drill) switch shall be provided to operate the notification appliances without causing other control circuits to be activated.
   o. WALKTEST: The system shall have the capacity of 8 programmable passcode protected one person testing groups, such that only a portion of the system need be disabled during testing. The actuation of the "enable one person test" program at the control unit shall activate the "One Person Testing" mode of the system as follows:
      (1) The city circuit connection and any suppression release circuits shall be bypassed for the testing group.
      (2) Control relay functions associated to one of the 8 testing groups shall be bypassed.

(3) The control unit shall indicate a trouble condition.
(4) The alarm activation of any initiation device in the testing group shall cause the audible notification appliances assigned only to that group to sound a code to identify the device or zone.
(5) The unit shall automatically reset itself after signaling is complete.
(6) Any opening of an initiating or notification appliance circuit wiring shall cause the audible signals to sound for 4 seconds indicating the trouble condition.

I. Analog Smoke Sensors:

1. Monitoring: FACP shall individually monitor sensors for calibration, sensitivity, and alarm condition, and shall individually adjust for sensitivity. The control unit shall determine the condition of each sensor by comparing the sensor value to the stored values.
2. Environmental Compensation: The FACP shall maintain a moving average of the sensor's smoke chamber value to automatically compensate for dust, dirt, and other conditions that could affect detection operations.
3. Programmable Sensitivity: Photoelectric Smoke Sensors shall have 7 selectable sensitivity levels ranging from 0.2% to 3.7%, programmed and monitored from the FACP.
4. Sensitivity Testing Reports: The FACP shall provide sensor reports that meet NFPA 72 calibrated test method requirements. The reports shall be viewed on a CRT Display or printed for annual recording and logging of the calibration maintenance schedule.
5. The FACP shall automatically indicate when an individual sensor needs cleaning. The system shall provide a means to automatically indicate when a sensor requires cleaning. When a sensor's average value reaches a predetermined value, (3) progressive levels of reporting are provided. The first level shall indicate if a sensor is close to a trouble reporting condition and will be indicated on the FACP as "ALMOST DIRTY." This condition provides a means to alert maintenance staff of a sensor approaching dirty without creating a trouble in the system. If this indicator is ignored and the second level is reached, a "DIRTY SENSOR" condition shall be indicated at the FACP and subsequently a system trouble is reported . The sensor base LED shall glow steady giving a visible indication at the sensor location. The "DIRTY SENSOR" condition shall not affect the sensitivity level required to alarm the sensor. If a "DIRTY SENSOR" is left unattended, and its average value increases to a third predetermined value, an "EXCESSIVELY DIRTY SENSOR" trouble condition shall be indicated at the control unit.
6. The FACP shall continuously perform an automatic self-test on each sensor which will check sensor electronics and ensure the accuracy of the values being transmitted. Any sensor that fails this test shall indicate a "SELF TEST ABNORMAL" trouble condition.]
7. Multi-Sensors shall combine photoelectric smoke sensing and heat sensing technologies. An alarm shall be determined by either smoke detection, with selectable sensitivity from 0.2 to 3.7 %/ft obscuration; or heat detection, selectable as fixed temperature or fixed with selectable rate-of-rise; or based on an analysis of the combination of smoke and heat activity.
8. Programmable bases. It shall be possible to program relay and sounder bases to operate independently of their associated sensor.
9. Magnet test activation of smoke sensors shall be distinguished by its label and history log entry as being activated by a magnet.

J. Audible Alarm Notification: By voice evacuation and tone signals on loudspeakers in areas as indicated on drawings.

1. Automatic Voice Evacuation Sequence:

a. The audio alarm signal shall consist of an alarm tone for a maximum of five seconds followed by an automatic digital voice message. At the end of the voice message, the alarm tone shall resume. This sequence shall sound continuously until the "Alarm Silence" switch is activated.
b. All audio operations shall be activated by the system software so that any required future changes can be facilitated by authorized personnel without any component rewiring or hardware additions.

K. Speaker: Speaker notification appliances shall be listed to UL 1480.
1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted/shielded wire.
2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
3. The speaker shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.

L. Fire Suppression Monitoring:
1. Water flow: Activation of a water flow switch shall initiate general alarm operations.
2. Sprinkler valve tamper switch: The activation of any valve tamper switch shall activate system supervisory operations.
3. WSO: Water flow switch and sprinkler valve tamper switch shall be capable of existing on the same initiating zone. Activation of either device shall distinctly report which device is in alarm on the initiating zone.

M. Power Requirements:
1. The control unit shall receive AC power via a dedicated fused disconnect circuit.
2. The system shall be provided with sufficient battery capacity to operate the entire system upon loss of normal AC power in a normal supervisory mode for a period of 24 hours with 5 minutes of alarm operation at the end of this period. The system shall automatically transfer to battery standby upon power failure. All battery charging and recharging operations shall be automatic.
3. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control unit.
4. The incoming power to the system shall be supervised so that any power failure will be indicated at the control unit. A green "power on" LED shall be displayed continuously at the user interface while incoming power is present.
5. The system batteries shall be supervised so that a low battery or a depleted battery condition, or disconnection of the battery shall be indicated at the control unit and displayed for the specific fault type.
6. The system shall support NAC Lockout feature to prevent subsequent activation of Notification Appliance Circuits after a Depleted Battery condition occurs in order to make use of battery reserve for front panel annunciation and control.
7. The system shall support 100% of addressable devices in alarm or operated at the same time, under both primary (AC) and secondary (battery) power conditions.
8. Loss of primary power shall sound a trouble signal at the FACP. FACP shall indicate when the system is operating on an alternate power supply.

1.5 SUBMITTALS

A. General: Submit the following according to Conditions of Contract and Division 1 Specification Sections.

1. Product data sheets for system components highlighted to indicate the specific products, features, or functions required to meet this specification. Alternate or as-equal products submitted under this contract must provide a detailed line-by-line comparison of how the submitted product meets, exceeds, or does not comply with this specification.
2. Wiring diagrams from manufacturer.
3. Shop drawings showing system details including location of FACP, all devices, circuiting and details of graphic annunciator.
4. System Power and battery charts with performance graphs and voltage drop calculations to assure that the system will operate per the prescribed backup time periods and under all voltage conditions per UL and NFPA standards.
5. System operation description including method of operation and supervision of each type of circuit and sequence of operations for all manually and automatically initiated system inputs and outputs. A list of all input and output points in the system shall be provided with a label indicating location or use of IDC, NAC, relay, Sensor, and auxiliary control circuits.
6. Operating instructions for FACP.
7. Operation and maintenance data for inclusion in Operating and Maintenance Manual. Include data for each type product, including all features and operating sequences, both automatic and manual. Provide the names, addresses, and telephone numbers of service organizations.
8. Product certification signed by the manufacturer of the fire alarm system components certifying that their products comply with indicated requirements.
9. Record of field tests of system.

B. Submission to Authority Having Jurisdiction: In addition to routine submission of the above material, make an identical submission to the authority having jurisdiction. Include copies of shop drawings as required to depict component locations to facilitate review. Upon receipt of comments from the Authority, make resubmissions if required to make clarifications or revisions to obtain approval.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A factory authorized installer is to perform the work of this section.

B. Each and all items of the Fire Alarm System shall be listed as a product of a single fire alarm system manufacturer under the appropriate category by Underwriters Laboratories, Inc. (UL), and shall bear the "UL" label.

1.7 MAINTENANCE SERVICE

A. Maintenance Service Contract: Provide maintenance of fire alarm systems and equipment for a period of 12 months, using factory-authorized service representatives.

B. Basic Services: Systematic, routine maintenance visits on a quarterly basis at times scheduled with the Owner. In addition, respond to service calls within 24 hours of notification of system trouble. Adjust and replace defective parts and components with original manufacturer's replacement parts, components, and supplies.

C. Additional Services: Perform services within the above 12-month period not classified as routine maintenance or as warranty work when authorized in writing. Compensation for additional services must be agreed upon in writing prior to performing services.

D. Renewal of Maintenance Service Contract: No later than 60 days prior to the expiration of the maintenance services contract, deliver to the Owner a proposal to provide contract maintenance and repair services for an additional one-year term. Owner will be under no obligation to accept maintenance service contract renewal proposal.

1.8 EXTRA MATERIALS

A. General: Furnish extra materials, packaged with protective covering for storage, and identified with labels clearly describing contents as follows:
   1. Break Rods for Manual Stations: Furnish quantity equal to 15 percent of the number of manual stations installed; minimum of 6 rods.
   2. Strobe Units: Furnish quantity equal to 10 percent of the number of units installed, but not less than one.
   3. Smoke Detectors or Sensors, Fire Detectors, and Flame Detectors: Furnish quantity equal to 10 percent of the number of units of each type installed but not less than one of each type.
   4. Detector or Sensor Bases: Furnish quantity equal to 2 percent of the number of units of each type installed but not less than one of each type.
   5. Printer Ribbons: Furnish 6 spare printer ribbons

PART 2 - PRODUCTS

2.1 FIRE ALARM CONTROL PANEL (FACP)

A. General: Comply with UL 864, "Control Units for Fire-Protective Signaling Systems."

B. The following FACP hardware shall be provided:
   1. Power Limited base panel with beige cabinet and door, 120 VAC input power.
   2. 2,000 point capacity where (1) point equals (1) monitor (input) or (1) control (output).
   3. 2,000 points of Network Annunciation at FACP Display when applied as a Network Node.
   4. 2000 points of annunciation where one (1) point of annunciation equals:
      a. 1 LED driver output on a graphic driver or 1 switch input on a graphic switch input module.
      b. 1 LED on panel or 1 switch on panel.
   5. From all battery charging circuits in the system provide battery voltage and ammeter readouts on the FCP LCD Display.
   6. Municipal City Circuit Connection with Disconnect switch, 24VDC Remote Station (reverse polarity), local energy, shunt master box, or a form "C" contact output .
   7. One Auxiliary electronically resettable fused 2A @24VDC Output, with programmable disconnect operation for 4-wire detector reset.
   8. One Auxiliary Relay, SPDT 2A @32VDC, programmable as a trouble relay, either as normally energized or de-energized, or as an auxiliary control.
   9. Where required provide Intelligent Remote Battery Charger for charging up to 110Ah batteries.
   10. Power Supplies with integral intelligent Notification Appliance Circuit Class B for system expansion.
   11. Four (4) form "C" Auxiliary Relay Circuits (Form C contacts rated 2A @ 24VDC, resistive), operation is programmable for trouble, alarm, supervisory of other fire response functions. Relays shall be capable of switching up to ½ A @ 120VAC, inductive.
   12. The FACP shall support (6) RS-232-C ports and one service port.

13. Remote Unit Interface: supervised serial communication channel for control and monitoring of remotely located annunciators and I/O panels.
14. Modular Network Communications Card.
15. Programmable DACT for either Common Event Reporting or per Point Reporting.
16. Service Port Modem for dial in passcode access to all fire control panel information.

C. Voice Alarm: Provide an emergency communication system, integral with the FACP, including voice alarm system components, microphones, amplifiers, and tone generators in areas where required. Features include:
1. Amplifiers comply with UL 1711, "Amplifiers for Fire Protective Signaling Systems." Amplifiers shall provide an onboard local mode temporal coded horn tone as a default backup tone. Test switches on the amplifier shall be provided to test and observe amplifier backup switchover. Each amplifier shall communicate to the host panel amplifier and NAC circuit voltage and current levels for display on the user interface. Each amplifier shall be capable of performing constant supervision for non-alarm audio functions such as background music and general paging.
2. All announcements are made over dedicated, supervised communication lines. All risers shall support Class B wiring for each audio channel.
3. Emergency voice communication audio controller module shall provide up to 32 minutes of message memory for digitally stored messages. Provide supervised connections for master microphone and up to 5 remote microphones.
4. Status annunciator indicating the status of the various voice alarm speaker zones and the status of fire fighter telephone two-way communication zones.
5. When required, Redundant Voice Command Centers shall be capable of generating voice paging from more than one node in a network audio system.

D. Distributed Module Operation: FACP shall be capable of allowing remote location of the following modules; interface of such modules shall be through a Style 4 (Class B) supervised serial communications channel (SLC):
1. Amplifiers, voice and telephone control circuits.
2. Addressable Signaling Line Circuits.
3. Initiating Device Circuits.
4. Notification Appliance Circuits.
5. Auxiliary Control Circuits.
6. Graphic Annunciator LED/Switch Control Modules.

E. Cabinet: Lockable steel enclosure. Arrange unit so all operations required for testing or for normal care and maintenance of the system are performed from the front of the enclosure. If more than a single unit is required to form a complete control unit, provide exactly matching modular unit enclosures.

F. Alphanumeric Display and System Controls: Panel shall include an 80 character LCD display to indicate alarm, supervisory, and component status messages and shall include a keypad for use in entering and executing control commands.

2.2 REMOTE CRTS, PC ANNUNCIATOR AND PRINTERS

A. Fire Alarm Control Unit shall be capable of operating remote CRT's and/or printers; output shall be ASCII from an RS-232-C connection with an adjustable baud rate.

B. Fire Alarm Control Unit shall be capable of operating a PC Annunciator which provides status annunciation and limited system control using a convenient and familiar Microsoft Windows® 2000 operating system based interface. PC Annunciator shall provide the following functions:
   1. Login/logout password protection with time duration selectable automatic logout.
   2. Displays Alarm, Supervisory, Priority 2, and Trouble conditions with numerical tallies for each.
   3. Displays first and last alarms.
   4. Different event types have separate visible indicators with a common audible indicator.
   5. Event logs can be searched and printed.
   6. View and/or print TrueAlarm status reports and service reports (printing requires an available local or network printer).
   7. Alarm Silence; System Reset; and Priority 2 Reset.
   8. Global and individual point acknowledge.
   9. Set system time and date; and clear event log.
   10. Individual point access for control or parameter revisions.

C. Each RS-232-C port shall be capable of supporting and supervising a remote Printer; the FACP shall support as many as two (2) remote displays. The Fire Alarm Control Panel shall support five (5) RS-232-C ports.

2.3 REMOTE LCD ANNUNCIATOR

A. Provide where required a remote LCD Annunciator with the same "look and feel" as the FACP operator interface. The Remote LCD Annunciator shall use the same Primary Acknowledge, Silence, and Reset Keys, Status LEDs and LCD Display as the FACP.

B. Annunciator shall have super-twist LCD display with two lines of 40 characters each. Annunciator shall be provided with four (4) programmable control switches and associated LEDs.

C. Under normal conditions the LCD shall display a "SYSTEM IS NORMAL" message and the current time and date.

D. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory or Trouble) shall flash. The unit audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

E. The LCD shall display the following information relative to the abnormal condition of a point in the system:
   1. 40 character custom location label.
   2. Type of device (e.g., smoke, pull station, waterflow).
   3. Point status (e.g., alarm, trouble).

F. Operator keys shall be key switch enabled to prevent unauthorized use. The key shall only be removable in the disabled position. Acknowledge, Silence and Reset operation shall be the same as the FACP.

2.4 NETWORK ANNUNCIATORS

2.5 GRAPHIC ANNUNCIATOR - LED TYPE

A. Annunciator Unit zoned system: Provide an LED-indicating light located on the floor plan for each zone. Mark zone boundaries on the annunciator floor plan.

B. Annunciator Unit addressable system: Provide an LED-indicating light located on the floor plan for each device indicating the type of device and floor on which a signal was actuated.

C. Provide individual LED indicators for each alarm and supervisory device or zone and a LED to indicate system trouble. Additional LEDs indicate normal power and emergency power modes for the system. A toggle or push-button switch tests the LEDs mounted on the unit. The test switch does not require key operation.

D. Enclosure: finish to match Fire Alarm Control Units. The locking cover/display assembly is hinged on the left. Key and lock shall be common to all secured fire alarm system enclosures.

2.6 EMERGENCY POWER SUPPLY

A. General: Components include battery, charger, and an automatic transfer switch.

B. Battery: Sealed lead-acid or nickel cadmium type. Provide sufficient capacity to operate the complete alarm system in normal or supervisory (non-alarm) mode for a period of 24 hours. Following this period of operation on battery power, the battery shall have sufficient capacity to operate all components of the system, including all alarm indicating devices in alarm or supervisory mode for a period of 5 minutes.

2.7 ADDRESSABLE MANUAL PULL STATIONS

A. Description: Addressable single- or double-action type, red LEXAN, with molded, raised-letter operating instructions of contrasting color. Station will mechanically latch upon operation and remain so until manually reset by opening with a key common with the control units.

B. Protective Shield: Where required provide a tamperproof, clear LEXAN shield and red frame that easily fits over manual pull stations. When shield is lifted to gain access to the station, a battery powered piercing warning horn shall be activated. The horn shall be silenced by lowering and realigning the shield. The horn shall provide 85dB at 10 feet and shall be powered by a 9 VDC battery.]

2.8 SMOKE SENSORS

A. General: Comply with UL 268, "Smoke Detectors for Fire Protective Signaling Systems." Include the following features:
   1. Factory Nameplate: Serial number and type identification.
   2. Operating Voltage: 24 VDC, nominal.
   3. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore normal operation.
   4. Plug-In Arrangement: Sensor and associated electronic components are mounted in a module that connects to a fixed base with a twist-locking plug connection. Base shall provide break-off plastic tab that can be removed to engage the head/base locking mechanism. No special tools shall be required to remove head once it has been locked. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal at the control unit.

5. Each sensor base shall contain an LED that will flash each time it is scanned by the Control Unit (once every 4 seconds). In alarm condition, the sensor base LED shall be on steady.
6. Each sensor base shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
7. Each sensor shall be scanned by the Control Unit for its type identification to prevent inadvertent substitution of another sensor type. Upon detection of a "wrong device", the control unit shall operate with the installed device at the default alarm settings for that sensor; 2.5% obscuration for photoelectric sensor, 135-deg F and 15-deg F rate-of-rise for the heat sensor, but shall indicate a "Wrong Device" trouble condition.
8. The sensor's electronics shall be immune from false alarms caused by EMI and RFI.
9. Sensors include a communication transmitter and receiver in the mounting base having a unique identification and capability for status reporting to the FACP. Sensor address shall be located in base to eliminate false addressing when replacing sensors.
10. Removal of the sensor head for cleaning shall not require the setting of addresses.

B. Type: Smoke sensors shall be of the photoelectric or combination photoelectric / heat type. Where acceptable per manufacturer specifications, ionization type sensors may be used.

C. Bases: Relay output, sounder and isolator bases shall be supported alternatives to the standard base.

D. Duct Smoke Sensor: Photoelectric type, with sampling tube of design and dimensions as recommended by the manufacturer for the specific duct size and installation conditions where applied. Sensor includes relay as required for fan shutdown.
1. Environmental compensation, programmable sensitivity settings, status testing, and monitoring of sensor dirt accumulation for the duct sensor shall be provided by the FACP.
2. The Duct Housing shall provide a supervised relay driver circuit for driving up to 15 relays with a single "Form C" contact rated at 7A@ 28VDC or 10A@ 120VAC. This auxiliary relay output shall be fully programmable. Relay shall be mounted within 3 feet of HVAC control circuit.
3. Duct Housing shall provide a relay control trouble indicator Yellow LED.
4. Compact Duct Housing shall have a transparent cover to monitor for the presence of smoke. Cover shall secure to housing by means of four (4) captive fastening screws.
5. Duct Housing shall provide two (2) Test Ports for measuring airflow and for testing. These ports will allow aerosol injection in order to test the activation of the duct smoke sensor.
6. Duct Housing shall provide a magnetic test area and Red sensor status LED.
7. For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housing front cover.
8. Each duct sensor shall have a Remote Test Station with an alarm LED and test switch.
9. Where indicated provide NEMA 4X weatherproof duct housing enclosure shall provide for the circulation of conditioned air around the internally mounted addressable duct sensor housing to maintain the sensor housing at its rated temperature range. The housing shall be UL Listed to Standard 268A.

2.9 HEAT SENSORS

A. Thermal Sensor: Combination fixed-temperature and rate-of-rise unit with plug-in base and alarm indication lamp; 135-deg F fixed-temperature setting except as indicated.

B. Thermal sensor shall be of the epoxy encapsulated electronic design. It shall be thermistor-based, rate-compensated, self-restoring and shall not be affected by thermal lag.

C. Sensor fixed temperature sensing shall be independent of rate-of-rise sensing and] programmable to operate at 135-deg F or 155-deg F. Sensor rate-of-rise temperature detection shall be selectable at the FACP for either 15-deg F or 20-deg F per minute.

D. Sensor shall have the capability to be programmed as a utility monitoring device to monitor for temperature extremes in the range from 32-deg F to 155-deg F.

2.10 ADDRESSABLE CIRCUIT INTERFACE MODULES

A. Addressable Circuit Interface Modules: Arrange to monitor one or more system components that are not otherwise equipped for addressable communication. Modules shall be used for monitoring of waterflow, valve tamper, non-addressable devices, and for control of evacuation indicating appliances and AHU systems.

B. Addressable Circuit Interface Modules will be capable of mounting in a standard electric outlet box. Modules will include cover plates to allow surface or flush mounting. Modules will receive their operating power from the signaling line or a separate two wire pair running from an appropriate power supply as required.

C. There shall be the following types of modules:
   1. Type 1: Monitor Circuit Interface Module:
      a. For conventional 2-wire smoke detector and/or contact device monitoring with Class B or Class A wiring supervision. The supervision of the zone wiring will be Class B. This module will communicate status (normal, alarm, trouble) to the FACP.
      b. For conventional 4-wire smoke detector with Class B wiring supervision. The module will provide detector reset capability and over-current power protection for the 4-wire detector. This module will communicate status (normal, alarm, trouble) to the FACP.
   2. Type 2: Line Powered Monitor Circuit Interface Module:
      a. This type of module is an individually addressable module that has both its power and its communications supplied by the two wire multiplexing signaling line circuit. It provides location specific addressability to an initiating device by monitoring normally open dry contacts. This module shall have the capability of communicating four zone status conditions (normal, alarm, current limited, trouble) to the FACP.
      b. This module shall provide location specific addressability for up to five initiating devices by monitoring normally closed or normally open dry contact security devices. The module shall communicate four zone status conditions (open, normal, abnormal, and short). The two-wire signaling line circuit shall supply power and communications to the module.
   3. Type 3: Single Address Multi-Point Interface Modules:
      a. This multipoint module shall provide location specific addressability for four initiating circuits and control two output relays from a single address. Inputs shall provide supervised monitoring of normally open, dry contacts and be capable of communicating four zone status conditions (normal, open, current limited, and short). The input circuits and output relay operation shall be controlled independently and disabled separately.
      b. This dual point module shall provide a supervised multi-state input and a relay output, using a single address. The input shall provide supervised monitoring of two normally open, dry contacts with a single point and be capable of communicating four zone status conditions (normal, open, current limited, and short). The two-wire signaling line circuit shall supply power and communications to the module.

c. This dual point module shall monitor an unsupervised normally open, dry contact with one point and control an output relay with the other point, using a single address. The two-wire signaling line circuit shall supply power and communications to the module.

4. Type 4: Line Powered Control Circuit Interface Module:
   a. This module shall provide control and status tracking of a Form "C" contact. The two-wire signaling line circuit shall supply power and communications to the module.
5. Type 5: 4-20 mA Analog Monitor Circuit Interface Module:
   a. This module shall communicate the status of a compatible 4-20 mA sensor to the FACP. The FACP shall annunciate up to three threshold levels, each with custom action message; display and archive actual sensor analog levels; and permit sensor calibration date recording.

D. All Circuit Interface Modules shall be supervised and uniquely identified by the control unit. Module identification shall be transmitted to the control unit for processing according to the program instructions. Modules shall have an on-board LED to provide an indication that the module is powered and communicating with the FACP. The LEDs shall provide a troubleshooting aid since the LED blinks on poll whenever the peripheral is powered and communicating.

2.11 MAGNETIC DOOR HOLDERS

A. Description: Units shall be listed to UL 228. Units are equipped for wall or floor mounting as indicated and are complete with matching door plate. Unit shall operate from a 120VAC, a 24VAC or a 24VDC source, and develops a minimum of 25 lbs. holding force.

B. Material and Finish: Match door hardware.

2.12 STANDARD ALARM NOTIFICATION APPLIANCES

A. Horn: Piezoelectric type horn shall be listed to UL 464. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The horn shall mount directly to a standard single gang, double gang or 4" square electrical box, without the use of special adapter or trim rings.

B. Visible/Only: Strobe shall be listed to UL 1971. The V/O shall consist of a xenon flash tube and associated lens/reflector system. The V/O enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings. V/O appliances shall be provided with different minimum flash intensities of 15cd, 75cd and 110cd. Provide a label inside the strobe lens to indicate the listed candela rating of the specific Visible/Only appliance.

C. Audible/Visible: Combination Audible/Visible (A/V) Notification Appliances shall be listed to UL 1971 and UL 464. The strobe light shall consist of a xenon flash tube and associated lens/reflector system. Provide a label inside the strobe lens to indicate the listed candela rating of the specific strobe. The horn shall have a minimum sound pressure level of 85 dBA @ 24VDC. The audible/visible enclosure shall mount directly to standard single gang, double gang or 4" square electrical box, without the use of special adapters or trim rings.

D. Speaker/Visible: Combination Speaker/Visible (S/V) units combine the speaker and visible functions into a common housing. The S/V shall be listed to UL 1971 and UL 1480.

1. Twisted/shielded wire is required for speaker connections on a standard 25VRMS or 70.7VRMS NAC using and UTP conductors, having a minimum of 3 twists per foot is required for addressable strobe connections.
2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.
4. The S/V installs directly to a 4" square, 1 ½ in. deep electrical box with 1 ½" extension

E. Speaker: Speaker notification appliances shall be listed to UL 1480.
1. The speaker shall operate on a standard 25VRMS or 70.7VRMS NAC using twisted / shielded wire.
2. The following taps are available: 0.25W, 0.50W, 1.0W and 2.0W. At the 1.0W tap, the speaker has minimum UL rated sound pressure level of 84dBA at 10 feet.
3. The S/V shall have a frequency response of 400 to 4000 Hz for Fire Alarm and 125 to 12kHz for General Signaling.
4. The S/V installs directly to a 4" square, 1 ½ in. deep electrical box with 1 ½" extension

F. Notification Appliance Circuit provides synchronization of strobes at a rate of 1Hz and operates horns with a Temporal Code Pattern operation. The circuit shall provide the capability to silence the audible signals, while the strobes continue to flash, over a single pair of wires. The capability to synchronize multiple notification appliance circuits shall be provided.

G. Accessories: The contractor shall furnish the necessary accessories.

2.13NAC Power Extender

A. The IDNet NAC Power Extender panel shall be a stand-alone panel capable of powering a minimum of 4 notification appliance circuits. Notification appliance circuits shall be Class B Style Y rated at 2 amps each. Panel shall provide capability to be expanded to 8 notification appliance circuits.

B. The internal power supply & battery charger shall be capable of charging up 12.7 Ah batteries internally mounted or 18Ah batteries mounted in an external cabinet.

C. The NAC extender panel may be mounted close to the host control panel or can be remotely located. The IDNET Addressable NAC Extender Panel when connected to an addressable panel shall connect to the host panel via an IDNet communications channel. Via the IDNET channel each output NAC can be individually controlled for general alarm or selective area notification.

D. For IDNet connected NAC extender panels up to five panels can be connected on a single IDNet channel.

E. When connected to a conventional (non-addressable panel) one or two standard notification appliance circuits from the main control panel may be used to activate all the circuits on the NAC power extender panel.

F. Alarms from the host fire panel shall signal the NAC power extender panel to activate. The panel shall monitor itself and each of its NACs for trouble conditions and shall report trouble conditions to the host panel.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install system components and all associated devices in accordance with applicable NFPA Standards and manufacturer's recommendations.

B. Installation personnel shall be supervised by persons who are qualified and experienced in the installation, inspection, and testing of fire alarm systems. Examples of qualified personnel shall include, but not be limited to, the following:
   1. Factory trained and certified personnel.
   2. National Institute of Certification in Engineering Technologies (NICET) fire alarm level II certified personnel.
   3. Personnel licensed or certified by state or local authority.

3.2 EQUIPMENT INSTALLATION

A. Furnish and install a complete Fire Alarm System as described herein and as shown on the plans. Include sufficient control unit(s), annunciator(s), manual stations, automatic fire detectors, smoke detectors, audible and visible notification appliances, wiring, terminations, electrical boxes, and all other necessary material for a complete operating system.

B. Existing Fire Alarm Equipment shall be maintained fully operational until the new equipment has been tested and accepted.

C. Equipment Removal: After acceptance of the new fire alarm system, disconnect and remove the existing fire alarm equipment and restore damaged surfaces. Package operational fire alarm and detection equipment that has been removed and deliver to the Owner. Remove from the site and legally dispose of the remainder of the existing material.

D. Water-Flow and Valve Supervisory Switches: Connect for each sprinkler valve required to be supervised.

E. Device Location-Indicating Lights: Locate in the public space immediately adjacent to the device they monitor.

3.3 WIRING INSTALLATION

A. System Wiring: Wire and cable shall be a type listed for its intended use by an approval agency acceptable to the Authority Having Jurisdiction (AH and shall be installed in accordance with the appropriate articles from the current approved edition of NFPA 70: National Electric Code (NEC).

B. Contractor shall obtain from the Fire Alarm System Manufacturer written instruction regarding the appropriate wire/cable to be used for this installation. No deviation from the written instruction shall be made by the Contractor without the prior written approval of the Fire Alarm System Manufacturer.

C. Color Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color code for alarm initiating device circuits wiring and a different color code for supervisory circuits. Color-code notification appliance circuits differently from alarm-initiating circuits. Paint fire alarm system junction boxes and covers red.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the pretesting, testing, and adjustment of the system.

B. Service personnel shall be qualified and experienced in the inspection, testing, and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include, but shall not be limited to, individuals with the following qualifications:
   1. Factory trained and certified.
   2. National Institute for Certification in Engineering Technologies (NICET) fire alarm certified.
   3. International Municipal Signal Association (IMSA) fire alarm certified.
   4. Certified by a state or local authority.
   5. Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

C. Pretesting: Determine, through pretesting, the conformance of the system to the requirements of the Drawings and Specifications. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new and retest until satisfactory performance and conditions are achieved.

D. Final Test Notice: Provide a 10-day minimum notice in writing when the system is ready for final acceptance testing.

E. Minimum System Tests: Test the system according to the procedures outlined in NFPA 72.

F. Retesting: Correct deficiencies indicated by tests and completely retest work affected by such deficiencies. Verify by the system test that the total system meets the Specifications and complies with applicable standards.

G. Report of Tests and Inspections: Provide a written record of inspections, tests, and detailed test results in the form of a test log.

H. Final Test, Certificate of Completion, and Certificate of Occupancy:
   1. Test the system as required by the Authority Having Jurisdiction in order to obtain a certificate of occupancy.

3.5 CLEANING AND ADJUSTING

A. Cleaning: Remove paint splatters and other spots, dirt, and debris. Clean unit internally using methods and materials recommended by manufacturer.

B. Occupancy Adjustments: When requested within one year of date of Substantial Completion, provide on-site assistance in adjusting sound levels and adjusting controls and sensitivities to suit actual occupied conditions. Provide up to three visits to the site for this purpose.

3.6 TRAINING

A. Provide the services of a factory-authorized service representative to demonstrate the system and train Owner's maintenance personnel as specified below.

1. **Train Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventive maintaining of the system. Provide a minimum of 8 hours' training.**
2. **Schedule training with the Owner at least seven days in advance.**

END OF SECTION

SECTION 07540

THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: PVC membrane parapet cap fully-adhered to top and back of existing parapets.

B. Related Sections:
   1. Section 07920 - Joint Sealants.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Samples: For each product included in membrane roofing system.

C. Research/evaluation reports.

D. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Source Limitations: Obtain components for membrane roofing system from or approved by roofing membrane manufacturer.

C. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.

D. Preinstallation Conference: Conduct conference at Project site.

E. Manufacturer's Representative: Coordinate membrane manufacturer's representative's site visit during initial stage of installation. Incorporate representative's recommendations into the Work at no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 PVC ROOFING MEMBRANE

A. PVC Sheet: ASTM D 4434, Type III, fabric reinforced, fleece backed.
   1. Approved Manufacturers:
      a. Flex Membrane International, Inc. (45 mils)
      b. Seaman Corporation (FiberTite) (45 mils)
      c. Sarnafil Inc. (60 mils)
   2. Exposed Face Color: Brown.

2.2 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.

C. Bonding Adhesive: Manufacturer's standard solvent or water-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

D. Metal Termination Bars: Manufacturer's standard predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick with anchors.

E. Low Rise Spray Foam Adhesive: Membrane manufacturer's recommended urethane adhesive for membrane installation.

F. Urethane Adhesive: Membrane manufacturer's recommended urethane adhesive for membrane installation.

PART 3 - EXECUTION

3.1 ADHERED ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over existing parapets as indicated according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
1. Install sheet according to ASTM D 5036.

B. Bonding Adhesive (Solvent Based): Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

C. Bonding Adhesive (Water Based): Apply water-based bonding adhesive to substrate at rate required by manufacturer and immediately install roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.

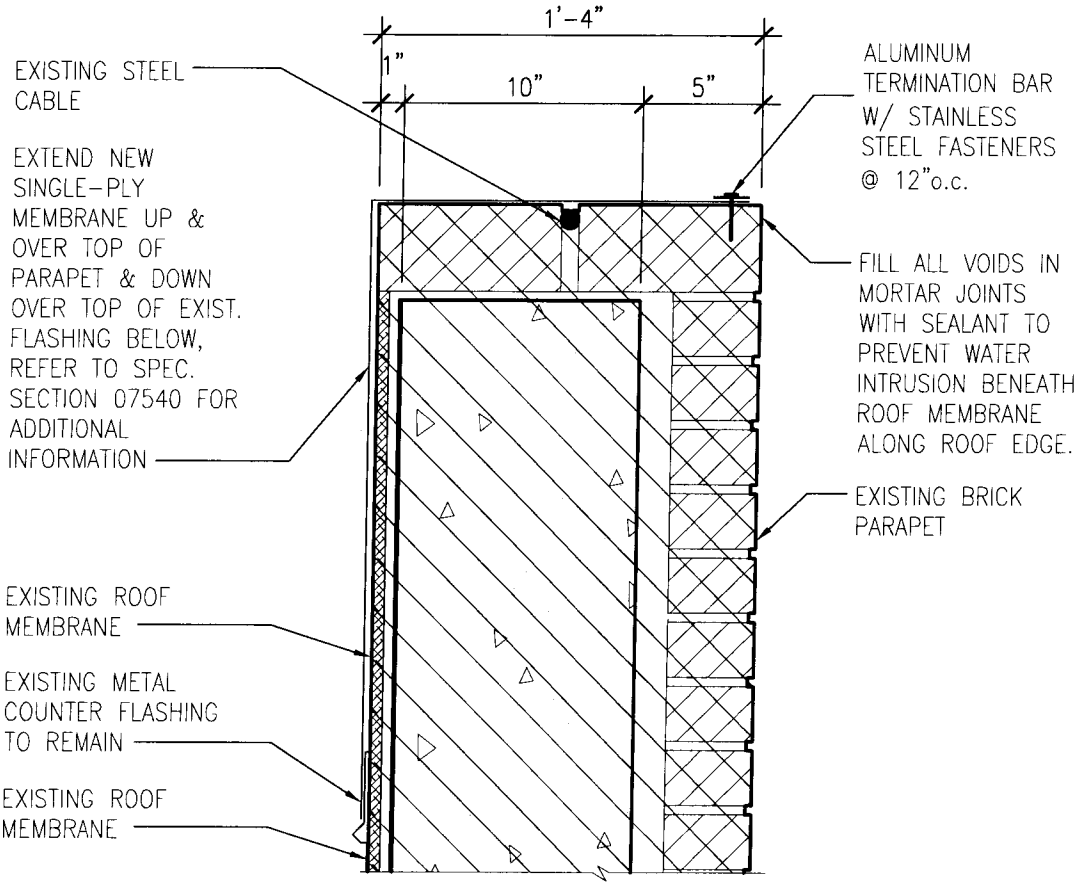
D. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
1. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.2 FIELD QUALITY CONTROL

A. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.

END OF SECTION



A6/A-1.21 | PARAPET FLASHING FOR EXISTING BLDG. | Scale: 1 1/2"= 1'-0"

K|P|S GROUP

K P S Group, Inc.
2101 First Ave. North
Birmingham, AL 35203
Tel: (205) 251-0125
Fax: (205) 458-1513

11/02/01
SHOP DRAWING & RFI #7
FIRE EXTINGUISHER LOCATIONS

RELEASES / DATES
1 ADDENDA #5

NOT FOR CONSTRUCTION ☐
RELEASED FOR CONSTRUCTION ■

PROJECT TITLE
The University of Alabama School of Law
OWNER
University of Alabama Construction Administration
Box 870382
Tuscaloosa, Al 35487-0382

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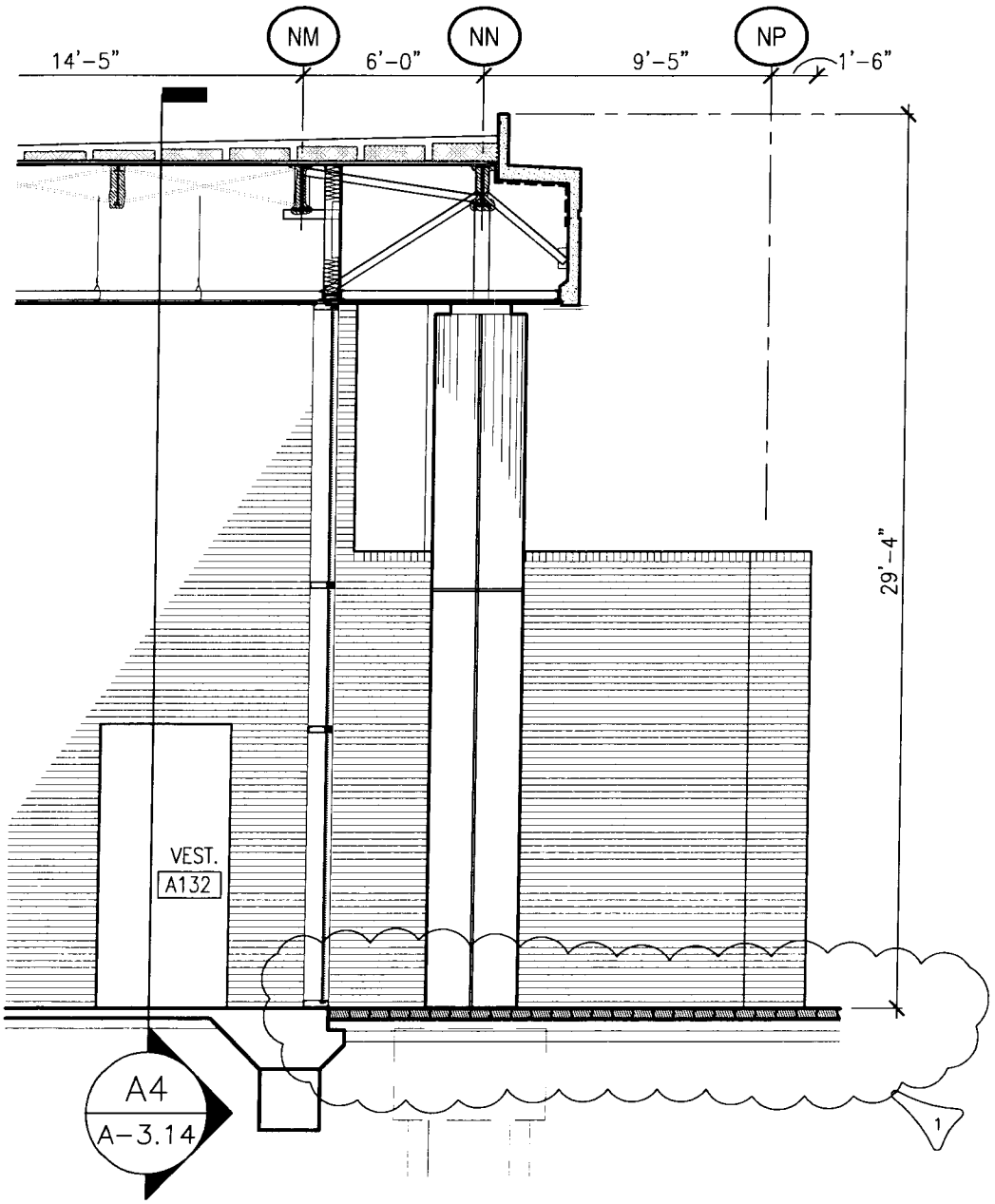
REVIEWED	—

SHEET TITLE
ADDENDA #5
REVISED PARAPET DETAIL

PROJECT NUMBER 03612-00
DRAWING NUMBER A-1.21a
SHEET x OF x

KPS NCS 8511 001207



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D1/A-3.01 | PARTIAL BUILDING CROSS SECTION | Scale: 3/16"= 1'-0"

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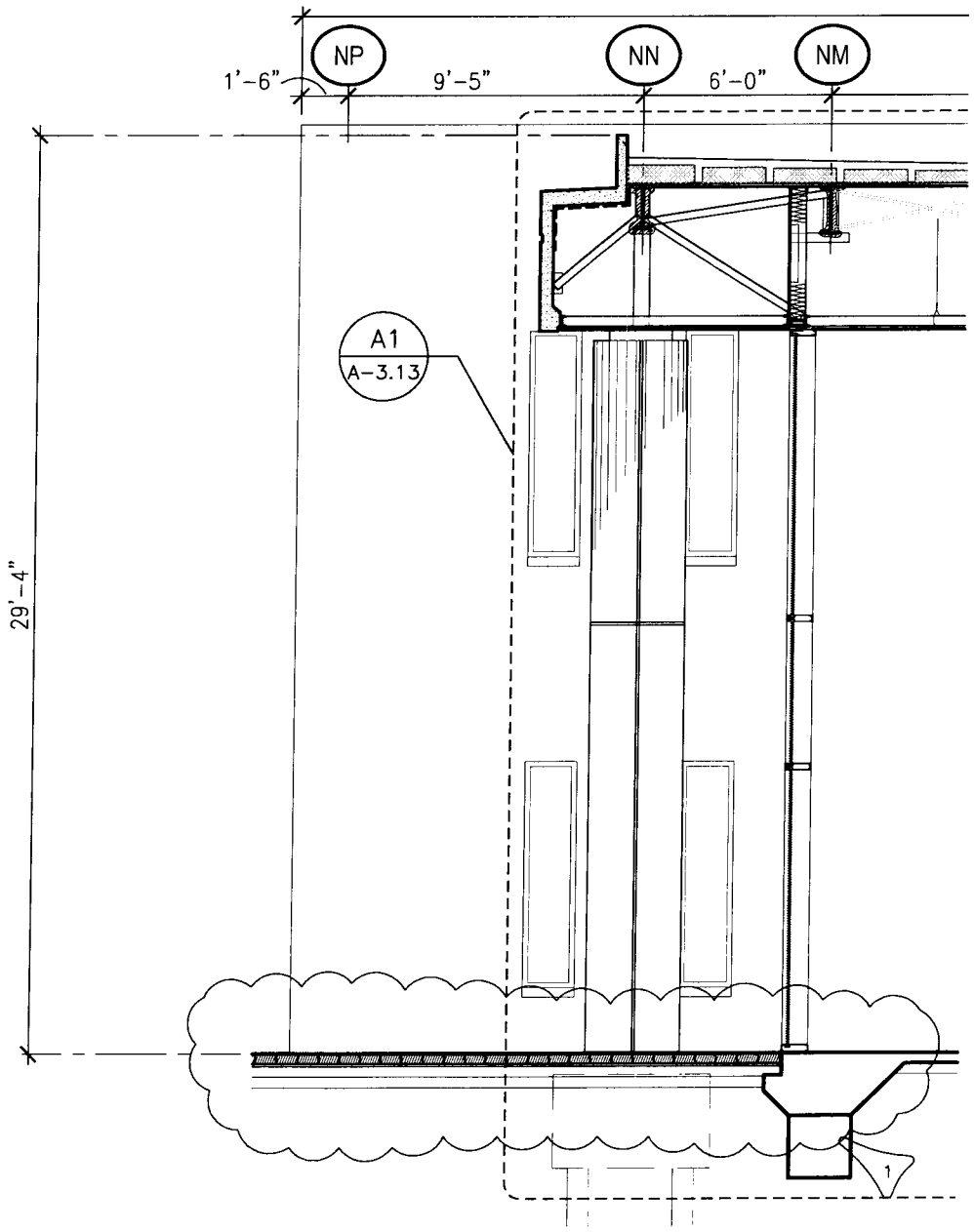
SHEET TITLE
ADDENDA #5
SIDEWALK COORDINATION

PROJECT NUMBER 03612-00
DRAWING NUMBER A-3.01a

S NCS 8511 001207



REF: B1/A-2.02 D1/A-2.02

C1/A-3.01 | PARTIAL BUILDING CROSS SECTION | Scale: 3/16"= 1'-0"

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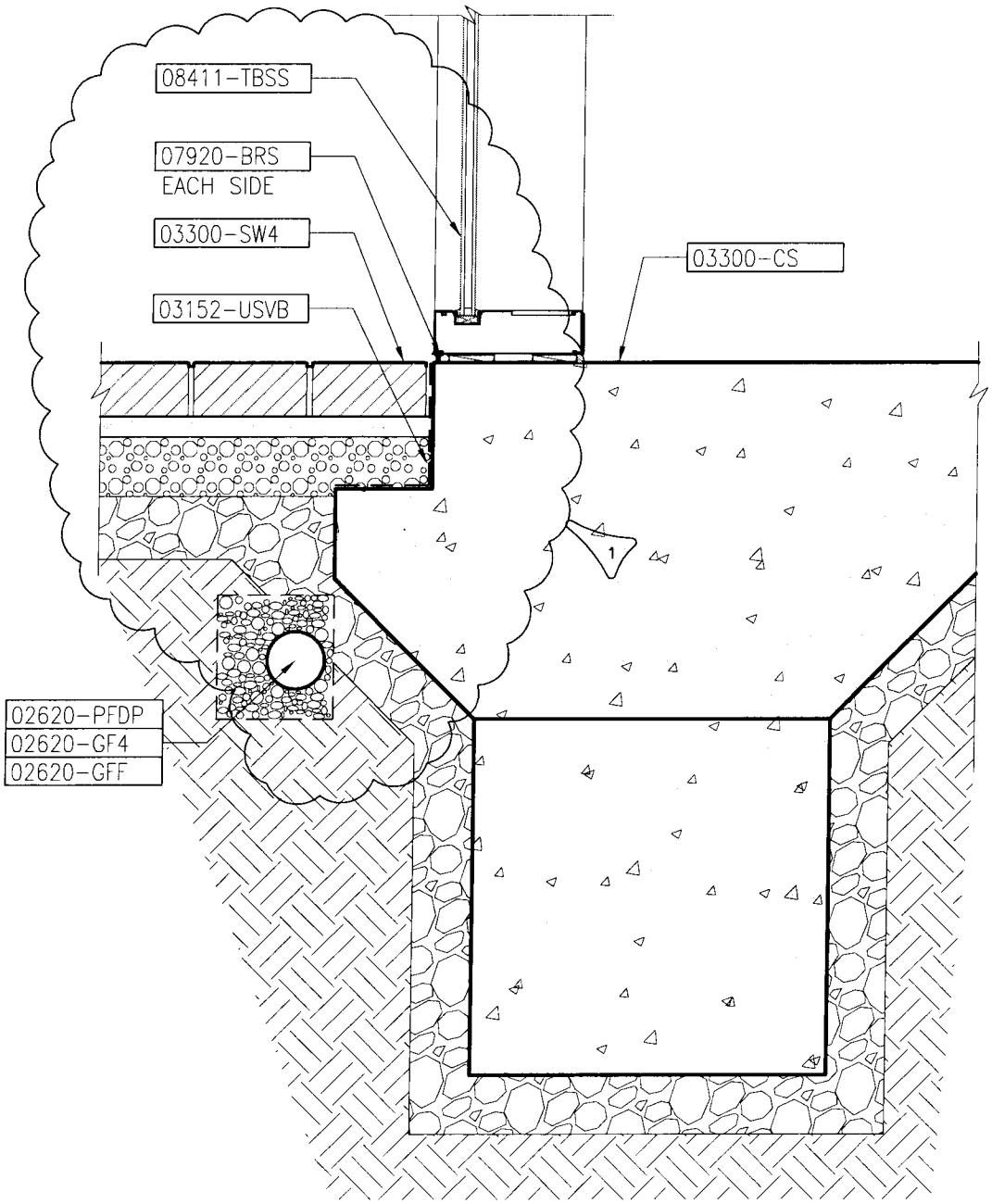
SHEET TITLE
ADDENDA #5
SIDEWALK COORDINATION

PROJECT NUMBER	DRAWING NUMBER
03612-00	A-3.01b

S NCS 8511 001207



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D2/A-3.13 | SLAB EDGE DETAIL | Scale: 1"= 1'-0"

KPS NCS 8511 001207

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11/02/01
SHOP DRAWING & RFI #7
FIRE EXTINGUISHER LOCATIONS

RELEASES / DATES
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SHEET TITLE
ADDENDA #5
SIDEWALK COORDINATION

PROJECT NUMBER 03612-00
DRAWING NUMBER A-3.13a
SHEET x OF x