PROJECT MANUAL
Volume 3

McKinley High School Major Renovations

CSRS|Tillage Program Management PROJECT NOS. 920.007

OWNER:

EAST BATON ROUGE PARISH SCHOOL SYSTEM

EAST BATON ROUGE PARISH SCHOOL BOARD

Shashonnie Steward	President
Michael Gaudet	Vice President
Lamont Cole	Superintendent of Schools

SCHOOL BOARD MEMBERS

Mark Bellue, District 1
Dadrius Lanus, District 2
Carla Powell, District 3
Shashonnie Steward, District 4
Cliff Lewis, District 5
Nathan Rust, District 6
Michael Gaudet, District 7
Emily Soulé, District 8
Patrick Martin, District 9

Addition and Renovation Package
Design Development Submittal

DATE:
August 8, 2025

PROGRAM MANAGER:

CSRS | TILLAGE
PROGRAM MANAGEMENT

ARCHITECT:

Domain Architecture, APAC / CHASM Architecture, LLC
A Joint Venture
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SECTION 26 00 00-ELECTRICAL COMMON WORK

PART 1 GENERAL

1.1 The National Electrical Code (2020) and State, Parish, City and local building codes shall be considered a part of these specifications, and pertinent articles will not be repeated herein. These codes shall establish the minimum acceptable criteria where more stringent requirements have not been defined in these specifications and/or drawings.

1.2 This project needs to comply with IECC 2021. The following items shall be provided:

A. Lighting Controls

1. Refer to 260926 – Lighting Control System

B. Submetering per load type.

1. Meters hall be placed to record energy usage data separated per load type

a. HVAC System
b. Interior Lighting
c. Exterior Lighting
d. Plug Loads
e. Process Load (Kitchen)

2. Meters shall be able to be integrated into the central data acquisition system and graphical interface system pertaining to the Building Automation system.

3. Meters shall be digital type.

1.3 Contractor shall apply for permits and pay inspection fees relevant to this scope of work.

1.4 No work shall be concealed until approved by the local inspector and local regulations shall be adhered to.

1.5 Upon completion, a certificate of approval from the appropriate regulatory agency shall be furnished to the Architect.

A. Refer to general provisions of the Contract, including Division 01 Specifications.

1.6 QUALITY ASSURANCE

A. Perform all work in accordance with the latest edition of the national electrical code (NEC), and local codes.
B. All electrical materials and distribution, and utilization equipment shall be UL Listed.
C. All equipment and materials shall be new and unused and of United States Domestic manufacturer unless approved otherwise by the Project Manager or Owner.

1.7 CARE AND MAINTENANCE

A. Instruct Owner’s Representative and operating personnel in the operation, care and maintenance of systems, system equipment and components.

1.8 COORDINATION WITH UTILITY COMPANY

A. Contact Utility provider for Project to understand and provide required installation as necessary for utility to connect to project. Any fees or payments required by Utility shall be included in base bid as a separate line item. Owner will not incur additional fees.

1.9 COORDINATION WITH OTHER TRADES

A. Coordinate the work of this division with all other divisions to ensure that all components of the electrical system will be installed at the proper time and fit the available space.

B. Along with electrical gear submittal, Contractor shall provide layout of electrical rooms to include equipment shuch as:

1. Electrical panels
2. Emergency Lighting battery cabinets
3. Fire Alarm battery cabinets
4. Lighting Control panels
5. Elevator Control panels
6. HVAC infrastructure , if any.

1.10 SUBMITTALS

A. Submit wiring diagrams and installation details of equipment indicating proposed location. Provide Submittals for the following:

1. Raceways
2. Hangers and Supports
3. Transformers
4. Panelboards
5. Lighting system including lighting control system
6. Electrical devices including receptacles and device plates
7. Fire Alarm system

B. Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

C. Quality Control: in accordance with Section 01 45 00 - Quality Control.

1. Provide NRTL certified equipment and material.
2. Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Owner’s Representative.

D. Manufacturer's Field Reports: submit to Owner's Representative within seven (7 working days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in paragraph 3.6- FIELD QUALITY CONTROL.

E. Single Line Electrical Diagrams

1. Provide single line electrical diagrams in glazed frames as follows:
   a. Electrical distribution system: locate in main switchboard.

1.11 DELIVERY, STORAGE AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.12 CUTTING AND PATCHING

A. Perform the work in such a manner to avoid cutting where possible. Holes cut shall be patched and refinished. Holes cut in exterior walls shall be patched, flashed, and waterproofed.

B. Inform all other divisions in time, concerning required openings. Where this requirement is not met, bear the cost of all cutting. Openings of 8" or smaller shall be the responsibility of Division 26. Openings larger than 200 mm shall be the responsibility of Division 1. Obtain written approval of Structural engineer before drilling any beams or floors.

C. Field cut openings in concrete shall be located to avoid the reinforcing. These areas shall be scanned (x-ray or other suitable method) to obtain locations of reinforcing and other obstructions. Locations shall be subject to approval of those responsible for CONCRETE DIVISION.

D. No structural members shall be field cut or pierced without the approval of the Architect.

E. Inserts in slabs and beams for fastening work shall be drilled type.

F. Where conduits penetrate slabs, provide non-shrinking waterproof grout around raceway penetrations to equal fire rating of floor.

1.13 PROTECTION

A. Protect exposed live equipment during construction for personnel safety.

B. Shield and mark all live parts “LIVE 120 VOLTS”, or with appropriate voltage in English.

C. Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

1.14 DRAWINGS

A. Electrical outlets locations on drawings are approximate only. Refer to architectural drawings for dimensions as necessary. Refer to architectural, structural, and mechanical drawings as well as equipment manufacturer's shop drawings, fire alarm and fir protection shop drawings, and adjust work accordingly to provide a coordinated installation. Contractor shall install fire alarm devices as near as possible to the locations indicated on the fire alarm shop drawings. Where conflicts arise, notify Architect.

B. Obtain a set of white prints. As the job progresses, mark these prints to accurately indicate installed work. Have the white prints available for inspection at the site at all times and present for scrutiny at each job meeting.

C. Show on the record drawings the installed location of all services entering and leaving the building and the property. Dimension underground services at key points of every run in relation to the structure and building.

D. Indicate exact location of all services for future work. Show and dimension all work embedded in the structure.

E. Submit record drawings within 30 days of substantial completion.

1.15 INSPECTION OF WORK

A. The Owner will make periodic visits to the site during construction to ascertain reasonable conformity to plans and specifications but will not execute quality control. The Contractor shall be responsible for the execution of his work in conformity with the construction documents and with the requirements of the inspection authority.

1.16 SCHEDULING OF WORK

A. Work shall be scheduled in phases as per other divisions of the architectural specifications.
B. Become familiar with the phasing requirements for the work and comply with these conditions.
C. No additional monies will be paid for contractor's requirement to comply with work phasing conditions.

1.17 FIRE RATING OF PENETRATIONS

A. Maintain fire ratings around conduits passing through floors, ceilings and fire rated walls.
B. Use 3M brand or equal fire barrier products at each penetration.
C. Acceptable products for fire barrier products shall be 3M #CP25 fire barrier caulk, #303 putty, #FS 195 wrap and #CS195 sheet.
D. Acceptable manufacturers: Nelson, Fire Stop Systems, 3M or approved equal. Material of same manufacturer to be used throughout project.

1.18 VISITING SITE

A. The bidder shall visit the site of proposed work so that he may understand the facilities, difficulties, and restrictions attending the execution of the contract. He will be allowed no additional compensation for failure to be so informed.

1.19 GUARANTEE

A. The Contractor shall guarantee materials and workmanship for one year, at a minimum, after final acceptance of entire project. Provide longer guarantee for specific items as indicated in the construction documents.

1.20 PRODUCTS

A. Materials

1. Equipment and materials shall be new and listed by a Nationally Recognized Testing Laboratory to UL standards.

B. Warning Signs

1. As specified and to meet requirements of Electrical Inspection Department and Owner's Representative.

C. Porcelain enamel decal signs, minimum size 7" x 10".

1.21 SUBSTITUTIONS

A. Manufacturer names and/or catalog numbers indicated in construction documents are indicated as a basis of design to indicate standard of quality. Other products deemed to be equal may be submitted to Architect for review and approval if deemed equal.

B. Lighting substiutions shall be submitted with cutsheets indicating similar light output from schedules fixtures and floor plans indicating foot candle plots.

PART 2 NOT USED

PART 3 EXECUTION

3.1 NAMEPLATES AND LABELS

A. Ensure manufacturer's nameplates, NRTL labels and identification nameplates are visible and legible after equipment is installed.

3.2 EXCAVATING AND BACKFILLING

A. Perform excavating and backfilling required for work shown on construction documents. Removal of obstructions shall be part of this work. Backfill shall be river sand. Backfilling shall be thoroughly tamped dowm. Remove any excess dirt.

B. Before excavating or trenching, locate and stake out existing underground utilities which may be adversely affected by this work. Work shall be performed in a manner to avoid damage to existing utilities. Repair or replace, at no expense to Owner, any utilities damaged by him. Call 1-800-272-3020 per Louisiana Statutes.

3.3 OWNER INSTRUCTION

A. The General Contractor shall coordinate with the Architect to provide on-site Owner training for all new equipment.

B. Use Operation and Maintenance manuals and actual equipment installed as basis for instruction.

C. At conclusion of on-site training program have Owner personnel sign written certification they have completed training and understand equipment operation. Include copy of training certificates in final Operation and Maintenance manual submission. Operation and Maintenance Manual shall include:

1. Description of major components on power systems, lighting fixtures, lighting control system, and others
2. Detailed operating instructions.
3. Routine maintenance requirements.
4. Manufactuer’s catalog number and parts list for each piece of equipment.

5. Final reviewed submittals (with A/E comments)
6. A compact disk or USB thumbdrive with digital copy of above information.

3.4 FIELD QUALITY CONTROL

A. All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the State Act respecting manpower vocational training and qualification. Employees registered in a apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks – the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

B. The work of this division to be carried out by a contractor who holds a valid Electrical Contractor License as issued by the State.

C. Furnish manufacturer's certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

D. Insulation resistance testing.

1. Megger and record circuits, feeders and equipment up to 350 V with a 500 V instrument.
2. Megger and record 350 – 600 V circuits, feeders and equipment with a 1000 V instrument.
3. Check resistance to ground before energizing and record value.

E. Submit test results for Owner's Representative's review.

3.5 CLEANING

A. Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

B. Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting

END OF SECTION 260000

SECTION 26 05 19-CONDUCTORS AND CABLES

PART 1 GENERAL

1.1. DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

A. Section Includes:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

B. Related Requirements:

1. Section 270500 "Communications Systems" for cabling used for voice and data circuits

1.3. SUBMITTALS

A. Product Data: For each type of product.
B. Qualification Data: For testing agency.
C. Field quality-control reports.

1.4. QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.
1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 PRODUCTS

2.1. CONDUCTORS AND CABLES

A. Manufacturers

1. Southwire
2. Allied Wire and Cable
3. General Cable
4. or approved equal.

B. Aluminum and Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.

C. Aluminum shall be AA-8000 Series alloy and only used for service entrance feeder.

D. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN/THWN-2, Type XHHW-2, and Type SO.

E. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for metal-clad cable, Type MC Type NM, Type SO and Type USE with ground wire.

2.2. CONNECTORS AND SPLICES

A. Manufacturer

1. 3M
2. AFC Cable Systems
3. Hubbel Power Systems
4. or approved equal.

B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3. SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 3 EXECUTION

3.1. CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper for feeders smaller than No. 1/0 AWG; copper or aluminum for feeders No. 1/0 AWG and larger. Aluminum shall only be used for Service Entrance.

B. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

C. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 10 AWG and larger.

3.2. CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type XHHW-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.

E. Exposed Branch Circuits, Including in Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway or Metal-clad cable, Type MC.

G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and UndergroundUnderground: Type THHN/THWN-2, single conductors in raceway.

H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

3.3. INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4. CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5. IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6. SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.7. FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8. FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections[with the assistance of a factory-authorized service representative:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.

2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

    a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
    b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
    c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Test and Inspection Reports: Prepare a written report to record the following:
    1. Procedures used.
    2. Results that comply with requirements.
    3. Results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Cables will be considered defective if they do not pass tests and inspections.

END OF SECTION 260519

SECTION 260526-GROUNDING AND BONDING

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3. SUBMITTALS

A. Product Data: For each type of product indicated.

1.4. QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA or an NRTL.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 PRODUCTS

2.1. MANUFACTURERS

A. Burndy
B. Dossert
C. Erico
D. Thomas and Betts

2.2. SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3. CONDUCTORS

A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4. CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless exothermic-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

PART 3 EXECUTION

3.1. APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.
4. Connections to Structural Steel: Welded connectors.

3.2. INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

3.3. FIELD QUALITY CONTROL

A. Testing Agency: Perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

1. Inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

D. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

END OF SECTION 260526

SECTION 26 05 29-HANGERS AND SUPPORTS

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.

1.3. DEFINITIONS

A. EMT: Electrical metallic tubing.
B. IMC: Intermediate metal conduit.
C. RMC: Rigid metal conduit. (Rigid Galvanized Conduit)

1.4. PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5. ACTION SUBMITTALS

A. Product Data: For the following:
   1. Steel slotted support systems.
   2. Nonmetallic slotted support systems.

PART 2 PRODUCTS

2.1. SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
   1. Manufacturers:
      a. Allied Tube & Conduit
      b. B-line
      c. Flex-Strut
      d. Thomas & Betts
   2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
   3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
   4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
   5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices**:** Steel hangers, J-hooks, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and

shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

PART 3 EXECUTION

3.1. APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists

maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
   1. Secure raceways and cables to these supports.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

E. Low Voltage cables pertaining to special systems, including, but not limited to fire alarm, communications, clock, intercom, access control, etc shall be permitted to be installed using j-hooks
   1. Fire Alarm system cables shall be installed on J-hook system dedicated to fire alarm system.

3.2. SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

   1. To Wood: Fasten with lag screws or through bolts.
   2. To New Concrete: Bolt to concrete inserts.

3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars. Provide 3/8” stainless steel rods to support raceways and tie into slab structural steel.

END OF SECTION 260529

SECTION 26 05 33-ELECTRICAL RACEWAYS AND BOXES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing and fittings.
3. Metal wireways and auxiliary gutters.
4. Surface raceways.
5. Boxes, enclosures, and cabinets.
6. Cable tray for Data Distribution

1.2 DEFINITIONS

A. RGS: Rigid Galvanized Steel Conduit
B. EMT: Electrical Metallic Tubing
C. FMC: Flexible Steel Conduit
D. LFMC: Flexible Steel Conduit with PVC jacket.

1.3 SUBMITTALS

A. Product data for raceways, wireways, fittings, boxes, and cabinets
B. Coordinated underground routing of raceway with structural and plumbing.

PART 2 PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers

1. Allied
2. Triangle-PWC
3. Republic
4. Wheatland
5. Middle-Atlantic
6. Or Approved Equal

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

D. Fittings for EMT:

1. Material: Steel.
2. Type: Compression (SETSCREW TYPE CONNECTORS ARE PROHIBITED)

E. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

F. Joint Compound for IMC,RGS, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 METAL WIREWAYS

A. Manufacturers

1. Cooper (B-line)
2. MonoSystems
3. Hoffman
4. Or approved equal

B. Description: Sheet metal, complying with UL 870 and NEMA 250 Type 1, unless otherwise noted. Raceways shall be sized according to NFPA 70 to comply with requirements such as fill ratio, bending radius.

C. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold- down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

E. Wireway Covers: Screw-cover type, unless otherwise indicated.

F. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers

1. Crouse-Hinds
2. EGS/Appleton
3. Hubbell
4. RACO
5. Or approved equal

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

E. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb. Outlet boxes designed for attachment of luminaires weighing more than 50 lb shall be listed and marked for the maximum allowable weight.

F. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

G. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum with gasketed cover.

H. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

I. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

J. Gangable boxes are prohibited.

K. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

L. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.

M. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

N. Cabinets: NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.

O. Hinged door in front cover with flush latch and concealed hinge.

P. Key latch to match panelboards.

Q. Metal barriers to separate wiring of different systems and voltage.

R. Accessory feet where required for freestanding equipment.

S. Provide shallow boxes as necessary where pace in wall does not allow standard depth boxes.

T. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

U. In-grade pull boxes shall be equivalent to Hubbell Quazite PG style polymer concrete, open bottom series. Size shall be as required raceways entering box.

2.4 CABLE TRAY

A. Manufacturers

1. Eaton
2. Legrand
3. Middle Atlantic
4. Or approved equal

B. General Requirements for Cable Tray: cable Ladder Type, fully welded Heavy Duty,

C. Ladder section shall have rungs on 9” centers max. Ladder shall be constructed of ASTM A570 structural steel finished in a durable black powder coat. Cable ladder shall have up to 187 lb. weight capacity per foot based on a 4 ft. support span. Cable ladder shall be RoHS EU Directive 2002 / 95 / EC compliant. Cable ladder shall be classified by UL in the US and Canada.

D. Cable ladder shall be GREENGUARD Indoor Air Quality Certified for Children and Schools. Cable ladder shall be RoHS EU Directive 2002/95/EC Compliant.

E. Cable ladder shall be manufactured by an ISO 9001 and ISO 14001 Registered Company.

F. Cable ladder shall be warrantied to be free from defects in material and workmanship under normal use and conditions for the lifetime of the product.

G. Minimum 18” wide for MDF and 12” wide for IDF,

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: Rigid Galvanized Steel (RGS)
2. Concealed Conduit, Aboveground: RGS.
3. Underground Conduit: Type PVC Schedule 40, direct buried; RGS shall be use as 90’s coming out of ground
4. In Slab Conduit: Type PVC , RGS shall be use as 90’s coming out of ground
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
6. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R, with cover Weather Protection Listed while in use.

B. Indoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: RGS.
    a. Concealed in Ceilings and Interior Walls and Partitions: EMT
    b. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
    c. Damp or Wet Locations: RGS.
    d. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 steel in institutional and commercial kitchens and damp or wet locations.
    e. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

D. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.

E. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.

F. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

G. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

H. Use watertight compression fitting on all equipment connections in Mechanical Rooms, Kitchens, and Serving Lines.

I. Install surface raceways only where indicated on Drawing. In Conditioned Bay, for lighting circuits, exposed conduit shall be painted to match ceiling structure.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102

for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Service raceways entering building shall be concrete encased (within 2” of concrete as a minimum) if exposed prior to entering main service panelboard.

C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

D. Complete raceway installation before starting conductor installation.

E. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

F. Arrange stub-ups so curved portions of bends are not visible above finished slab.

G. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

H. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.

I. Support conduit within 12 inches of enclosures to which attached.

J. Raceways Embedded in Slabs:

1. Run conduit larger than 1-inch trade size under slab. , parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot intervals.
2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
3. Arrange raceways to keep a minimum of 2 inches of concrete cover in all directions.
4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
5. Change from PVC to RGS before rising above floor.

K. Stub-ups to Above Recessed Ceilings:

L. Use EMT, IMC, or RMC for raceways.

M. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.

N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

Q. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

R. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

S. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

T. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

U. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

V. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

W. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Where otherwise required by NFPA 70.

X. Comply with manufacturer's written instructions for solvent welding PVC and fittings.

Y. Expansion-Joint Fittings:

1. Install in each run of aboveground PVC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RGS and EMT that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.

a. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
b. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

4. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches of flexible conduit for [recessed and semirecessed luminaires,]equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
5. Use LFMC in damp or wet locations subject to severe physical damage.
6. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.

Z. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

AA. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box.

BB. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

CC. Locate boxes so that cover or plate will not span different building finishes.

DD. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

EE. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

FF. Set metal floor boxes level and flush with finished floor surface.

GG. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

HH. Provide shallow boxes recessed in walls where wall depth or wall-furrings do not allow for standard depth boxes.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

6. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits but a minimum of 6 inches below grade. Align planks along centerline of conduit.
7. Underground conduits outside building:
    a. Install minimum 24” below finished grade
    b. Provide warning tape at a maximum of 18” below finished grade.
8. Underslab conduits
    a. Install directly below vapor barrier.
9. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems.

3.4 INSTALLATION OF CABLE TRAY

A. Tray shall be installed prior to installation and termination of cat6A cable,
B. Contractor shall lay out MDF and IDF cabinets in plan and consult with EBR DTS layout of cable tray prior to installation.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling.

3.6 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping.

3.7 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.
B. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

1. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260544 -SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.
5. Silicone sealants.

B. Related Requirements:

1. Section 078413 "Penetration Firestopping" for penetration firestopping installed in fire-resistance-rated walls, horizontal assemblies, and smoke barriers, with and without penetrating items.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.

2. Laboratory Test Reports for Credit EQ 4: For sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

D. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

E. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

F. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches , thickness shall be 0.138 inch .

2.2 SLEEVE-SEAL SYSTEMS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.

1. Manufacturers:
   a. Advance Products and Systems
   b. BWM
   c. Calpico
   d. Approved Equivalent

2. Sealing Elements: [EPDM] [Nitrile (Buna N)] rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: [Carbon steel] [Plastic] [Stainless steel].
4. Connecting Bolts and Nuts: [Carbon steel, with corrosion-resistant coating,] [Stainless steel] of length required to secure pressure plates to sealing elements.

2.3 SLEEVE-SEAL FITTINGS

A. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.

1. HoldRite
2. Approved Equivalent

2.4 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi , 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

2.5 SILICONE SEALANTS

A. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. Sealant shall have VOC content of <Insert value> g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

PART 3 EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Comply with NEMA VE 2 for cable tray and cable penetrations.

C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."

b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide [1/4-inch] <Insert dimension> annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed[or unless seismic criteria require different clearance].
4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
5. Install sleeves for floor penetrations. Extend sleeves installed in floors [2 inches (50 mm)] above finished floor level. Install sleeves during erection of floors.

D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using [steel] [cast-iron] pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing sleeve-seal system.

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.

B. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve.

Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.3 SLEEVE-SEAL-FITTING INSTALLATION

A. Install sleeve-seal fittings in new walls and slabs as they are constructed.

B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.

C. Secure nailing flanges to concrete forms.

D. Using grout, seal the space around outside of sleeve-seal fittings.

END OF SECTION 260544

SECTION 26 05 53-IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification for conductors.
3. Warning labels and signs.
4. Instruction signs.
5. Equipment identification labels.
6. Miscellaneous identification products.

1.3. SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4. QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5. COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.1. POWER AND CONTROL RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage.

C. Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Retain one of two subparagraphs below.
2. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
3. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2. METAL-CLAD CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each cable size.

B. Colors for Cables Carrying Circuits at 600 V and Less:

1. Black letters on an orange field.
2. Legend: Indicate voltage

C. Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound clear adhesive tape for securing ends of legend label.

D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

E. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around cable it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

2.3. CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive, Self-Laminating Polyester Labels: Write-on, thick flexible label with acrylic pressure-sensitive adhesive that provides a clear, weather- and chemical-resistant, self-laminating, protective shield over the legend. Labels sized to fit the conductor diameter such that the clear shield overlaps the entire printed legend.

C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of conductor it identifies and to stay in place by gripping action.

D. Heat-Shrink Preprinted Tubes: Flame-retardant polyolefin tube with machine-printed identification label. Sized to suit diameter of and shrinks to fit firmly around conductor it identifies. Full shrink recovery at a maximum of 200 deg F. Comply with UL 224.

E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

F. Write-On Tags: Polyester tag, 0.015 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Labels for Tags: Self-adhesive label, machine-printed with permanent, waterproof, black ink recommended by printer manufacturer, sized for attachment to tag.

2.4. WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES ."

2.5. INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

2.6. EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

B. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

C. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

D. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch.

2.7. CABLE TIES

A. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch .
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black except where used for color-coding.

B. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 7000 psi.
3. UL 94 Flame Rating: 94V-0.
4. Temperature Range: Minus 50 to plus 284 deg F.
5. Color: Black.

2.8. MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.1. INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. Attach plastic raceway and cable labels that are not self-adhesive type with clear vinyl tape with adhesive appropriate to the location and substrate.

G. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. Outdoors: UV-stabilized nylon.
2. In Spaces Handling Environmental Air: Plenum rated.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

J. Painted Identification: Comply with requirements in painting Sections for surface preparation and paint application.

3.2. IDENTIFICATION SCHEDULE

A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30A, and 120V to ground: Identify with self-adhesive vinyl label. Install labels at 20-foot maximum intervals.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded feeder and [branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit].

b. Colors for 208/120-V Circuits:

1) Phase A: Black.
2) Phase B: Red.
3) Phase C: Blue.
4) Neutral : White
5) Ground : Green

c. Colors for 480/277V Circuits

1) Phase A: Brown
2) Phase B: Orange
3) Phase C: Yellow
4) Neutral : Gray
5) Ground : Green

d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of

tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

E. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.

F. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

G. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

H. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Baked-enamel warning signs.
1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.

4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:

    a. Power transfer switches.
    b. Controls with external control power connections.

I. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

J. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.

1. Labeling Instructions:

    a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch high label; where two lines of text are required, use labels 2 inches high.
    b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
    c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards:
        1) 3/8” Tall Engraved Letter and Numbers. Helvetica Medium Style, melamine label.

2) Black Finish with White Copy for 120/208V Panelboards
3) Red Finish with White Copy for 277/480V Panelboards.
4) Typewritten directory of circuits shall be provided as follows

    i. Typewritten
    ii. All circuits properly identified
    iii. All Spares Noted
    iv. All devices identified by room number and type.

b. Enclosures and electrical cabinets.
c. Lighting Control Panel
d. Access doors and panels for concealed electrical items.
e. Enclosed controllers.
f. Contactors.

END OF SECTION 260553

SECTION 26 09 13 – ELECTRICAL POWER MONITORING

PART 1 GENERAL

1.1 DOCUMENTS

A. Please note that this section of the Specifications forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts listed by the appropriate parties below.

1.2 SYSTEM DESCRIPTION

A. The products specified herein are intended to provide a complete sub-metering solution. This solution shall be utilized to measure and monitor electricity usage for the following systems separately:

1. Lighting.
2. HVAC.
3. Power Receptacles.
4. Kitchen.
5. Other systems to be determined by Owner.

B. System will also allow for compliance with national and local energy codes and provide equipment needed to meet specific criteria for IECC 2021.

1.3 SECTION INCLUDES

A. Electrical sub-metering equipment, data collection systems, and data management software systems including:

1. Standard single point kWh electrical sub-meters.
2. Advanced single point kWh electrical sub-meters.
3. Multi-point electrical sub-meters.
4. Data collection hubs.
5. High density pulse modules.
6. Open protocol data communication network.
7. Wireless communication devices.
8. Energy monitoring and tenant billing software.

1.4 STANDARDS

A. Provide equipment of this Section in full compliance with the following applicable portions of the latest revisions of the following standards:

1. ANSI C12.1 & C12.20 at 0.5 Accuracy Class
2. UL Certified to IEC/EN/UL/CSA 61010-1 2nd Edition.
3. UL916:
    a. These requirements cover energy management equipment and associated sensing devices rated 600 volts or less and intended for installation in accordance with the National Electrical Code, NFPA 70.
4. NEMA -ESM-1

1.5 SHOP DRAWINGS

1. Installation and Shop Drawings to include the following:

    a. Manufacturer’s literature and specification.
    b. Component connection wiring diagrams.
    c. Communications system specification.

1.6 INSTALLATION, OPERATION, AND MAINTENANCE MANUALS

A. Submit installation, operation, and maintenance manuals for the electrical sub-metering system data collection system, and data management software.

1.7 TECHNICAL PERFORMANCE

A. Minimum measured technical performance of each piece of installed equipment shall meet the specifications published by the manufacturer.

B. Optimize technical performance of all systems to produce the highest achievable technical performance to the satisfaction of consultant and/or client.

C. Any deficiencies in the system, particularly information communication errors or operational deficiencies, shall be cause for rejection. Rectify any such deficiencies prior to calling for substantial completion review.

1.8 WARRANTY

A. Manufacturer shall provide a comprehensive warranty for all products.

B. All electrical sub-meters included in this specification to be free from defects in materials and workmanship from the date of substantial completion for a period of 5 Years.

C. All data collection system components included in this specification to be free from defects in materials and workmanship from the date of substantial completion for a period of 5 Years.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Leviton Manufacturing

B. Electro-Industries

C. Basis of Design: Leviton VerifEye Metering System.

D. Substitutions Permitted

1. Show all substitutions as an add or deduct from base bid pricing.
2. Provide Manufacturer's reference list.
3. Clearly delineate all propose substitutions as such and submit in writing for approval by the engineer a minimum of 10 working days prior to the bid date.
4. Prior to rough-in, provide complete engineered shop drawings, including power wiring, with deviations for the original design highlighted in an alternate color, to the engineer for review and approval. e. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

2.2 METERS AND CURRENT TRANSFORMERS

A. Standard single point metering devices: Leviton Mini-Meters, Series 1000, and Series 2000

B. Advanced single point metering devices: Leviton Series 3500, Series 4000 & Series 4100

C. Multipoint metering devices: Leviton Series 7000, 7100 or 8000

D. Leviton solid or split core current transformers with full scale output of 0.1A or 0.333v

E. Leviton Rogowski coil current transformers.

F. Solid Core current transformers available for 100-400A and split core current transformers available from 50A - 5,000A.

G. Current transformer secondary conductor wires can be extended:

1. 500’ for 0.1A CT’s.
2. 300’ for 0.333V CT’s.
3. 20’ for Rogowski Coil CT’s.

2.3 SYSTEM DESCRIPTION – SINGLE POINT METERING DEVICES

A. Provide single point metering devices capable of metering 1PH/2W, 2PH/3W, 3PH/3W, and/or 3PH/4W loads.

B. Meters must be capable of directly metering North American 120/208/240v,277/480V and 347/600V.

C. Metering units must be capable of metering loads between 50A and 5000A. Provide meters specific to each project as indicated on construction drawings.

D. Metering Units may have the capability of paralleling up to 3 (three) sets of CTs per phase. Not applicable to Rogowski coil meters.

E. Must meet all ISO 9001 standards for quality control where all meters test to a minimum of +/- 0.2% or 0.5% accuracy, dependent on stated accuracy class.

F. The system shall be as described below:

1. To consist of electronic meters with embedded communications capability, and solid core, split core or Rogowski coil current transformer technology. The current transformers shall have a full scale output of 0.1A or .333v and secondary voltage clamps for safety purposes.
2. Meters to be used for Energy Monitoring and Tenant Billing applications.
3. The meters will be capable of remote communication from each metering device.
4. Standard meters shall have isolated pulse output with output ranges from 10Wh to 1kWh.

5. Advanced meters shall transmit data via one of the following communication protocols:
   a. Isolated Pulse Output
   b. Modbus TCP/IP
   c. BACNet IP
   d. Modbus RTU
   e. BACNet MS/TP
6. Backup power provided by on-board battery maintains the real time clock through power loss (Advanced Meters Only). Energy data is stored in non-volatile memory to maintain value through power loss. Device is capable of holding 65 days of historical data in default settings (Advanced Meters Only).
7. Failure of the building electrical normal power system shall not result in loss of data and will not require manual restarting of the metering system.
8. The electronic energy monitoring system shall be fully automated microprocessor-based electrical energy measurement system for Measurement and Verification and Tenant Billing purposes. The system shall incorporate complete metering, communications, reporting functions; energy monitoring and threshold limit capabilities.

2.4 SYSTEM MEASUREMENTS – SINGLE POINT METERING DEVICES

A. Meters to be complete with a Liquid Crystal Display (LCD) to access all energy measurements and phase diagnostics when needed.

B. Standard Meter Energy Parameters:

1. kWh real consumption.
2. kW peak resettable kW peak.

C. Advanced Meter Energy Parameters:

1. Bi-directional Energy Measurements
2. kWh real consumption
3. kW peak resettable kW peak
4. kW instantaneous consumption
5. kVAh apparent energy consumption

6. kVA total apparent power
7. kVARh reactive consumption
8. kVAR total reactive power
9. PF power Factor Total
10. Maximum kW peak demand with time and date stamp
11. Line Frequency Hz

D. Advanced Meter Phase Diagnostics: Parameters to be displayed for each individual phase of each metered load:

1. Voltage Phase to neutral or phase to phase
2. Amps Instantaneous amperage for each phase
3. kW Instantaneous real energy
4. PF Power factor
5. kVA Instantaneous apparent energy
6. KVAR Instantaneous reactive energy

2.5 SYSTEM DESCRIPTION – MULITPOINT METERING DEVICES

A. The system shall be as described below:

1. To consist of electronic multiple point meters with embedded communications capability, and solid core, split-core or Rogowski coil current transformer technology. The current transformers shall have a full-scale output of 0.1A or .333v A/C outputs and secondary voltage clamps for safety purposes.
2. Meters to be used for Energy Monitoring and Tenant Billing applications.
3. Meters shall be capable of external mounting in a NEMA 1 enclosure or internal mounting in electrical panels or switchgear.
4. The meters will be capable of remote communication from each metering device. Each device shall have IP sockets and RS-485 terminals to accommodate data transmission via Modbus RTU, Modbus TCP/IP, BACNet MS/TP, BACNet IP and standard Ethernet. Data shall be transmitted by one or a combination of the following:

a. Standard Ethernet interface.

b. Ethernet connection to PC or laptop via crossover cable.

c. RS-485 Network-Modbus RTU & BACNet MS/TP.

5. Systems to have backup storage power to key components so no data is lost during power outages. The system shall continue to function after resumption of power.

6. Failure of the building electrical normal power system shall not result in loss of data and will not require manual restarting of the metering system.

B. The electronic energy monitoring system shall be fully automated microprocessor-based electrical energy measurement system for Measurement and and Verification purposes. The system shall incorporate the following:

1. Complete metering
2. Communications
3. Reporting functions
4. Energy monitoring
5. Threshold limits capabilities.

C. Meters must be capable of directly metering on board, North American 120/208/240V, 277/480V and 347/600V.

D. Meters may require Potential Transformers in 480v Delta and 347/600v applications.

E. Meters may be capable of two distinct and independent reference voltage inputs to allow for monitoring two separate electrical systems. Meter must allow any CT input to be referenced against either input voltage channel.

F. Metering Units may have the capability of a Wiring Harness, single incoming cable containing 25 pairs of 22 AWG wire with associated current transformers (CT's) or optional Terminal Strips, screw terminal connections for CTs. Metering Units may also be configured with individual input channels for CT's secondary wires.

G. Must meet all ISO 9001 standards for quality control where all meters test to a minimum of +/- 0.2% or 0.5% accuracy, dependent on accuracy class.

H. Metering unit(s) must be configurable to meter 24 single-pole circuits, 12 two-pole circuits, or 8 three-pole circuits

I. Metering unit (s) must be configurable to meter 48 single pole circuits, 16 two pole circuits or 16 three-pole circuits.

J. Metering unit (s) must be configurable to meter 12 single pole circuits, 4 two-pole circuits or 4 three-pole circuits.

2.6 SYSTEM MEASUREMENTS – MULITPOINT METERING DEVICES 1.

A. Meters to be complete with a Liquid Crystal Display (LCD) to access energy measurements and phase diagnostics when needed.

B. Energy Parameters:

1.	kWh	real energy consumption
2.	kW	instantaneous power
3.	kVAh	apparent consumption
4.	kVA	apparent power
5.	kVARh	reactive consumption
6.	kVAR	reactive power

C. Phase Diagnostics: Parameters to be displayed for each individual phase of each metered load:

1.	Voltage	Phase to neutral or phase to phase
2.	Amps	Instantaneous amperage for each phase
3.	kW	Instantaneous power
4.	PF	Power factor
5.	PA	Phase angle
6.	kVA	Instantaneous apparent energy
7.	KVAR	Instantaneous reactive energy
8.	THD	Total Harmonic Distortion-Theta

2.7 METER DATA COLLECTION AND COMMUNICATION

1. Data acquisition sever: Leviton Energy Monitoring HUB
2. Pulse data collection: Leviton High Density Pulse Module
3. Wireless data transmission: Leviton ModHopper

2.8 SYSTEM DESCRIPTION - METER COMMUNICATIONS AND DATA COLLECTION

1. The system shall be as described below:

a. To consist of energy management hubs, pulse modules, wireless communication devices, and software used to transmit, collect, and display data provided by sub-metering equipment used to capture measurements from utilities that include, but are not limited to, electrical, gas, water, and steam.

b. System to allow all data collected to be connected to IP based applications including Third Party Billing Companies/Software, Enterprise Energy Management Software, Demand Response, and Smart Grid Collection for use in power measurement and tenant billing.

c. Data collection system shall be all non-proprietary and compatible with industry standard M&V software applications. Open protocols such as Modbus, pulse outputs, analog, resistive inputs, etc. shall be utilized. No proprietary or manufacturer specific protocols between meter and data collectors shall be accepted.

2.9 PRODUCT REQUIREMENTS - DATA ACQUISITION SERVER

A. Provide data acquisition servers that measure and verify data from electrical meters, water and gas meters and other compatible environmental sensors.

B. Server shall comply with the following codes and standards:

1. FCC CFR 47 Part 15, Class A
2. EN 610000
3. EN 61326
4. CE

C. Server shall be equipped with an ARM7 embedded CPU, an ARM7 I/O co-processor, 32MB of onboard RAM, 16MB of NOR flash memory, and a USB expansion port.

D. Server shall operate under the following conditions:

1. 32°F to 122°F (0°C to 50°C), 0-90% RH, non-condensing
2. 41°F to 104°F (5°C to 40°C), 0-90% RH, non-condensing

E. Server shall have the capability to collect and log information at intervals from one (1) to sixty (60) minutes.

F. Server shall timestamp all acquired data and store it in a non-volatile memory.

G. Server shall use modem and/or Ethernet connections for internet access allowing either static IP (internet protocol) or DHCP (Dynamic Host Control Protocol) addressing.

H. Server shall communicate with metering data points via wired or wireless connections over the following protocols:

1. Wired communications:
    a. Pulse
    b. Ethernet-Modbus TCP/IP / Modbus RTU
        i. Modbus devices to be connected via Belden 1120A or equivalent 18g twisted shielded pair.
    c. Wireless Communications:
        i. Wireless Modbus

I. Server shall communicate with external devices via -wired or wireless connections over the following protocols:

1. Wired communications:
    a. Ethernet LAN (Local Area Network) or WAN (Wide Area Network)
    b. TCP/IP
    c. PPP
    d. HTTP/HTML
    e. FTP
    f. NTP
    g. XML
    h. SNMP
    i. BACnet-Optional Downloaded Module
2. Wireless Communications:
    a. GSM (Global System for Mobile Communications)
    b. GPRS (General Packet Radio Service)

c. PSTN (Public Switched Telephone Network)

3. Server shall upload data at user selectable scheduled intervals via HTTP or FTP and download data in XML or custom formats.
4. Server shall generate alarms for data points including SNMP (Simple Network Management Protocol) traps.
5. Server shall have the following input and output connections:

   a. Input:
      i. RS485 Modbus serial input capable of supporting 32 external devices. Input to be expandable at owner's option.
      ii. Eight (8) Flex I/O inputs configurable for the following modes:
      iii. 0-10VDC iv. 4-20mA v. Resistive
      iv. Standard KYZ pulse modes for A or C dry contact relay outputs
      v. Status

   b. Output:
      i. Two (2) opto-FET dry contact relays rated at 30VDC and 150mA maximum.

2.10 PRODUCT REQUIREMENTS – HIGH DENSITY PULSE MODULES

A. Provide high density pulse module for collection and distribution of pulse output data generated by electricity.
B. Module shall have on-board, adjustable Modbus addressing via dip switches with addresses from 1-128
C. Module shall comply with the following codes and standards: a. FCC CFR 47 Part 15, Class A emissions standard.
D. Module shall be equipped with an ARM7 I/O processor with field-upgradable firmware.
E. Module shall communicate over a Modbus / RTU RS-485, two wire network with the following network speeds

1. 19200 Baud
2. 9600 Baud

F. Module shall operate under the following conditions

1. 22°F to 158°F (-30°C to 70°C), 0-90% RH, non-condensing

G. Module shall have a 32-bit pulse counter which rolls over at 4.295 billion pulses per channel and store pulse data in a non-volatile memory. Pulse rate shall be user selectable.

H. Module shall have the following input and output connections.

1. Input
    a. Non isolated pulse and power inputs
    b. Modbus RS485 connection
    c. Twenty-three (23) independent pulse count inputs designed for use with dry contact outputs. The pulse rate shall be user selectable between the following:

        i. 10Hz: Minimum pulse width to be 50ms
        ii. 50Hz: Minimum pulse width to be 10ms
        iii. 100Hz: Minimum pulse width to be 5ms

2.11 PRODUCT REQUIREMENTS – WIRELESS TRANSCEIVER

A. Provide OPTIONAL wireless transceiver for collection and distribution of pulse outputs generated by electrical meters, other energy meters and sensors.

B. Transceiver shall comply with the following codes and standards:

1. FCC CFR 47 Part 15, Class A emissions standard.
2. FCC ID to be OUR-9XTREAM
3. Industry Canada ID to be 4214A-9XTREAM

C. Transceiver shall be equipped with a 60 MHz ARM7 embedded CPU.

D. Transceiver firmware to be field upgradable.

E. Transceiver shall communicate over a self-healing, self-optimizing wireless mesh network. Network shall utilize frequency hopping, spread-spectrum radio transmission and reception over 900MHz band.

F. Transceiver shall have a range of 3000 feet indoors and 14 miles outdoor line of sight.

G. Transceiver broadcast power shall be 1 watt.

H. Transceiver shall operate under the following conditions

1. 32°F to 122°F (0°C to 50°C), 0-90% RH, non-condensing
2. 1.24 miles (2000m) maximum altitude, degree 2 pollution

I. Transceiver shall have a pulse counter with pulse data stored in a non-volatile memory.

J. Transceiver shall have the following input and output connections. Modbus addresses to be adjustable via DIP switches with addresses between 1 and 247.

1. Input:
   a. Two (2) Pulse inputs with user selectable pulse rates of 10, 50, 100, or 250 Hz.
   b. Modbus RS485 input.
   c. Connect a maximum of 32 Modbus devices to transceiver input.
2. Outputs to be user selectable between 100 Ohms and 2.5 kOhms.
   a. Two (2) opto-FET dry contact relays rated at 30VDC, 150mA max.

2.12 CLOUD BASED ENERGY INFORMATION SOFTWARE

A. Software package shall consist of one or more of the following WEB based system modules:

1. Basic Building Management Software: BMO Base Module.
2. Enterprise Energy Management Software: BMO Advanced Reporting Module.

2.13 PRODUCT REQUIREMENTS-BASIC SOFTWARE-BMO BASE MODULE

A. Software shall be able to be integrated into Building Energy Management System used for HVAC systems.

B. Provide a web hosted software platform which is fully functional without software other than standard web browsers including, but not limited to, Microsoft Internet Explorer, Google Chrome and Firefox Mozilla

1. Software shall support unlimited number of meter data points based on subscription level.
2. Software shall be used for the collection, analysis, and reporting of energy data from sub-metering equipment used to capture energy usage measurements that include, but are not limited to:

a. Lighting
b. HVAC
c. Receptacle
d. Kitchen
e. Other loads .

PART 3 EXECUTION

3.1 WIRING AND CONNECTIONS

A. All wiring must meet and or exceed local electrical code.

B. Metering points show on submitted drawings only to be connected or installed

C. Install all wiring in conduit.

D. Provide a non-dedicated or Ethernet drop for remote meter reading and diagnostics of the system

E. Perform all necessary system calibration, testing, commissioning, and demonstrations as required

F. Prepare and submit record drawings and installation, operation and maintenance manuals for the energy management system as required.

3.2 INTEGRATION TO BUILDING MANAGEMENT SYSTEM

A. THE COMPUTER MONITORING THE BMS SHALL HAVE THE CAPACITY TO PULL UP THE REAL-TIME AND HISTORICAL MEASUREMENT DATA.

1. DATA SHALL BE PRESENTED IN SUCH A MANNER THAT EACH SYSTEM'S (LIGHTING, HVAC, RECEPTACLES, KITCHEN) POWER SHALL BE IDENTIFIED WITH KWH, DEMAND, THD

2. SYSTEM SHALL PREPARE REPORTS OF WEEKLY USAGE AND EMAIL A DESIGNATED PERSON WITH THE SCHOOL

3.3 TESTING AND COMMISSIONING

A. Perform final testing, adjustment, and commissioning of the systems, report results to the Consultant, and include the results in the installation, operation, and maintenance manuals. Provide qualified technicians for testing and commissioning.

B. Perform sufficient technical and operational tests to ensure the technical performance of the system meets the intent of the Contract Documents. Typical testing to include but not be limited to:

1. Verification of meter readings and proper installation of meter equipment.
2. Communication system connectivity.
3. Meter communication with all software platforms.

C. Provide optional functional testing including end to end verification that all meters are operating properly.

D. Demonstrate the operation of the system to the Owner at a time suitable to them. Such demonstration to include product training on how to program the monitoring system.

3.4 FIELD VERIFICATION, ACCEPTANCE, AND TRAINING

A. Provide all "AS BUILT" DRAWINGS and data showing each meter, serial number, address, cross reference, load and CT ratio prior to field verification.

B. Manufacturer's representative shall verify, adjust and test the system. Verification of the energy monitoring system is to be carried out with the assistance of an electrical contractor at all times. Upon completion, the manufacturer shall issue a "Commissioning Report" to the owner, electrical consultant, contractor and client.

C. Manufacturer's representative shall demonstrate operation of the system as follows:

1. Local and remote meter readings.
2. Phase diagnostics.
3. Provide manual of the installed system.
4. Ensure system is connected to the cloud as required to communicate with software servers.

D. Software training is typically completed remotely via on-line instruction by Manufacturer technical support.

3.5 FIELD QUALITY CONTROL

A. Submit a detailed testing and commissioning procedure to the Consultant and Client for review and approval prior to undertaking this Work. The procedure shall indicate all test equipment required and acceptance criteria.

B. Upon completion of all testing and commissioning, submit a copy of the test results and certify the system as acceptable for revenue metering purposes.

C. Undertake the testing and commissioning Work with the manufacturer's factory representative(s).

3.6 INSTRUCTION TO STAFF

A. Upon completion of the installation, a competent instructor representing the system manufacturer shall provide a lecture to the operating and maintenance staff concerning the intent, use, and operation and maintenance of the system. This may be accomplished remotely.

END OF SECTION 260913

SECTION 26 09 26-LIGHTING CONTROL SYSTEM

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

A. Refer to Section SECTION 262726 - WIRING DEVICES for individual standalone controls

B. Lighting Controls shall comply with IECC 2021.

C. Section Includes: Lighting controls using:

1. Lighting Control Panels using Electrically operated, mechanically latched relays and dimmable controls.
2. Room controls capable of controlling fixture output per response to natural daylight and occupancy.

1.3. DEFINITIONS

A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4. SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for control modules, power distribution components, manual switches and plates, and conductors and cables.

2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each lighting control panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
2. Include diagrams for power, signal, and control wiring.
3. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.

C. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.

1. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
2. For networked controls, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the network protocol.

D. Sample Warranty: For manufacturer's special warranty.

1.5. CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lighting controls to include in emergency, operation, and maintenance manuals.

1.6. MAINTENANCE MATERIALS 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. Wall Station
2. Electrically operated, Mechanically Latched Relay

1.7. WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace transient voltage suppression devices 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. Wattstopper
B. Hubbell
C. Douglas Lighting Controls
D. Source Limitations: Obtain lighting controls and power distribution components from single manufacturer.

2.2. DIMMABLE LIGHTING CONTROL PANEL FOR EXTERIOR LIGHTING AND MULTI-PURPOSE DINING ROOM.

A. EQUIVALENT TO DOUGLAS LIGHTING LITEPAK2 SYSTEM OR WATTSTOPPER DLM SYSTEM
B. SYSTEM DESCRIPTION
    1. Input signal from field-mounted or on-board signal source shall open or close one or more electrically operated, mechanically latched relays in the lighting control panelboards.
    2. Switchlegs shall be dimmable and compatible with fixture source.

3. Input devices shall be wall stations, occupancy sensors and daylight measurement devices.
4. Any combination of inputs shall be programmable to any combination outputs.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. PERFORMANCE REQUIREMENTS

1. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
2. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified.
3. Expansion Requirements: Capacity for future expansion of number of control functions by 25 percent of current capacity; to include equipment ratings, housing capacities, spare spaces for circuit breakers, terminals, number of conductors in control cables, and control software.

D. PANELBOARD

1. The lighting panelboards may contain remotely operated circuit breakers and standard branch circuit breakers specified in Section 262416 "Panelboards."
2. Assemblies: Comply with UL 67 and NEMA PB 1.
3. Surge Protective Device: Field mounted, complying with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
4. Surge Protective Device: Integrally mounted, complying with UL 1449 Type 1.
5. Comply with IEEE C62.41, Category C, 200-kA short-circuit current rating.
6. Non-modular type with the following features and accessories:
    a. Digital-display indicator lights for power and protection status.
7. Enclosures: Comply with UL 50 and NEMA 250.

8. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
9. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, listed and labeled for series-connected, short-circuit rating by an NRTL.
10. Panelboard Short-Circuit Current Rating: Fully rated to interrupt 14 kAsymmetrical short-circuit current available at terminals.
11. RELAYS / DIMMING MODULES as indicated on drawings.

E. MAIN CONTROLLERS

1. Description: Controllers shall contain the power supply and electronic control for operating and monitoring remotely operated branch circuit breakers.
    a. Comply with UL 916; with a microprocessor-based, solid-state, 365-day timing and control unit.
    b. Power Supply: Powered from the panelboard, sized to provide control power for the operation of the remotely operated circuit breakers, controller, bus system, low-voltage inputs, field-installed occupancy sensors, and low-voltage photo sensors.
    c. Integral keypad and digital-display front panel for local setup, including the following.
    d. Blink notice, time adjustable from software.
    e. Capability for accepting downloadable firmware so that the latest production features may be added in the future without replacing the module.

2. Nonvolatile memory shall retain all setup configurations. After a power failure, the controller shall automatically reboot and return to normal system operation.
3. Timing Unit:

a. 365-day calendar, astronomical clock, and automatic adjustments for daylight savings and leap year.
b. Clock configurable for 12-hour (A.M./P.M.) or 24-hour format.
c. Schedule periods settable to the minute.
d. Day-of-week, day-of-month, day-of-year with one-time or repeating capability.

4. With eight inputs, each configurable to the following parameters:

a. Normally open, normally closed, two-wire maintained toggle, two-wire momentary toggle, two-wire momentary on, two-wire momentary off, or three-wire momentary operation.
b. On and off-delay timers for local override operation, adjustable from five minutes to 12 hours. Local override shall be by field-installed, two-wire momentary toggle switch.

F. MANUAL SWITCHES AND PLATES

1. Keypads: Designed to control lighting applications and functions associated with the equipment of this Section. The units shall be able to control any system output device, including remotely operated circuit breakers, relays, dimmers, and analog outputs. Shall be as recommended by panelboard manufactrer.
2. Wall Plates: Single and multigang plates as specified in Section 262726 "Wiring Devices."

G. CONDUCTORS AND CABLES

1. Provide conductors as recommended by lighting control manufacturer.
2. Cables intended to be routed in plenum spaces shall be plenum rated.

2.3. ROOM CONTROLLER BASED SYSTEM (WHERE DAYLIGHT RESPONSIVE CONTROLLS ARE CALLED FOR)

A. Equivalent to Watt Stopper DLM Room Controller Series Or Douglas Lighting Dialog 4000 Series.
B. Room Controller shall receive inputs from wall stations, occupancy sensors, and daylight sensors as indicated on drawings
C. Upon activation of daylight sensor, room controller shall be able to dim fixtures in the daylight control zone as required to maintain desired light level in area.

PART 3 EXECUTION

3.1. GENERAL

A. Room Controllers to be installed in areas where daylight responsive controller are required and in Corridors
B. Lighting Control Panel to be installed in as indicated on drawings for control of exterior lighting and multipurpose/dining room.
C. Individual lighting controls per Section 262726 Wiring Devices shall be used in stand alone room with single switches/dimmers and occupancy sensors.

3.2. EXAMINATION

A. Receive, inspect, handle, and store panelboards according to NECA 407.
B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3. WIRING INSTALLATION

A. Comply with NECA 1.
B. Wiring Method: low voltage cabling may be routed on j-hooks.
    1. Install plenum cable in environmental air spaces, including plenum ceilings.

2. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.4. PANELBOARD INSTALLATION

A. Comply with NECA 1.

B. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Mounting Height: 72 inches to top of trim above finished floor unless otherwise indicated.

D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

E. Install filler plates in unused spaces.

3.5. IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."

C. Create a directory to indicate loads served by each circuit; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are unacceptable.

D. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6. FIELD QUALITY CONTROL

A. Testing Agency: Perform tests and inspections that system works throughly. Provide a certificate certifying that tests have been made.

B. Perform the following tests and inspections:

1. Wall Station operational
2. Lathing of relays
3. Photocell operation
4. Room Controller Operation
5. Individual Occ Sensor Operation.
6. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.7. SOFTWARE

A. Technical Support: Ensure that system has latest firmware available at time of substantial completion.

3.8. DEMONSTRATION

A. Provide literature to train Owner's maintenance personnel to adjust, operate, and maintain control modules.

END OF SECTION 260926

SECTION 26 24 16-DISTRIBUTION EQUIPMENT & ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.
2. Dry-type distribution transformers

1.3 DEFINITIONS

A. ATS: Acceptance testing specification.
B. GFCI: Ground-fault circuit interrupter.
C. MCCB: Molded-case circuit breaker.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

1. Include materials, switching and overcurrent protective devices, accessories, and components indicated.
2. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Product Data: For each type of transformer

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
2. Provide Financial analysis for return of investment of HMT Transformers vs Traditional transformers.

C. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details with clearances required
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of NRTL listing for series rating of installed devices.
7. Include evidence of NRTL listing for SPD as installed in panelboard.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include wiring diagrams for power, signal, and control wiring.
10. Key interlock scheme drawing and sequence of operations.
11. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device. Include an Internet link for electronic access to downloadable PDF of the coordination curves.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Panelboard Schedules: For installation in panelboards.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.7 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. Keys: Two spares for each type of panelboard cabinet lock.
2. Circuit Breakers Including GFCI and GFEP Types: Two spares for each panelboard.
3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: ISO 9001 or 9002 certified.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.

B. Handle and prepare panelboards for installation according to NECA 407.

1.10 FIELD CONDITIONS

A. Environmental Limitations:

1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding minus 22 deg F.

B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Architect and Owner no fewer than five days in advance of proposed interruption of electric service.
2. Do not proceed with interruption of electric service without written permission.
3. Comply with NFPA 70E.

1.11 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 PRODUCTS

2.1 PANELBOARDS AND COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NEMA PB 1.

E. Comply with NFPA 70.

F. Enclosures: Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

    a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
    b. Outdoor Locations: NEMA 250, Type 3R.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
7. Finishes:

    a. Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    b. Back Boxes: Same finish as panels and trim.
    c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.

G. Incoming Mains:

1. Location: Top or Bottom.
2. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

H. Phase, Neutral, and Ground Buses:

1. Material: Tin-plated aluminum or Hard-drawn copper, 98 percent conductivity.
    a. Plating shall run entire length of bus.
    b. Bus shall be fully rated the entire length.

2. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.

4. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

I. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum or Hard-drawn copper, 98 percent conductivity.
2. Terminations shall allow use of 75 deg C rated conductors without derating.
3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
4. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
5. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

J. NRTL Label: Panelboards or load centers shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.

K. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

1. Percentage of Future Space Capacity: Ten percent.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

1. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on Drawings, but not less than 10,000 A rms symmetrical.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

2.3 POWER PANELBOARDS

A. Manufacturers

1. Square D
2. General Electric
3. Eaton
4. Siemens

B. Panelboards: NEMA PB 1, distribution type.
C. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
D. Mains: As indicated on drawings.
E. Branch Overcurrent Protective Devices: Bolt-on circuit breakers.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturer: same as Power Panelboards
B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
C. Mains: as per drawings.
D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.5 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturer: same as Power Panelboards

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
3. GFEP Circuit Breakers: Class B ground-fault protection (30-mA trip).
4. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
5. Subfeed Circuit Breakers: Vertically mounted.

2.6 SURGE PROTECTION DEVICES (SPD)

A. Manufacturer

1. Basis of Design is T&B/Current Technology Current Guard Series CGP-200-XXXV-3GY
2. Emerson/APT
3. Cooper Bussman
4. GE
5. Or approved equal

B. Listed to UL 1449 4th Edition for Tyoe 1 and Type 2 Applications

C. Modes of Protection

1. L-N
2. L-G
3. N-G
4. L-L

D. Max. Surge Rating: 200 kA per mode / 400kA per phase as tested by 3rd party for entire assembly

E. Additional Features:

1. LED Status Indicators (per phase)
2. Service Required LED and Audible Alarm
3. Surge Event Counter.

2.7 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

D. Circuit Directory: Computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.

1. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.

2.8 PANELBOARD ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

2.9 DRY TYPE TRANSFORMERS

A. The design of the electrical distribution system, including the specification of harmonic mitigating transformers (HMTs) as identified in the accompanying construction drawings, provides for the control of the harmonic currents that are generated by nonlinear electronic loads. These design objectives and the various standards that apply are detailed herein as follows:

1. To reduce the ‘penalty losses’ that are produced by harmonic currents, which would otherwise result in an increase in the cost-of-power, apparatus heating and the cost of air conditioning, within economic limits.
2. To limit harmonic current injection into the Point of Common Coupling (PCC), as recommended in (ANSI) IEEE Std. 519-1992, Section 10.4, Table 10.3.
3. To limit positive, negative and zero sequence harmonic currents in the distribution system so that the Individual Harmonic Distortion of Voltage (IHDv) levels do not exceed 3% at the loads and the Total Harmonic Distortion of Voltage (THDv) levels do not exceed 5% at the loads.

B. DESIGN EXECUTION

1. In order to achieve the ‘Design Objectives’, a harmonic mitigation plan which will meet all of the requirements elaborated in Section 1.2. This engineered solution includes the application of various harmonic filtering transformers, all of which have been included in this specification and detailed in the accompanying construction drawings.

C. Harmonic Mitigating, Isolation Transformers for Medium K-Factor Loads:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Power Quality International LLC, Type DV (ZS).

a. Configuration:

1) Primary winding configurations shall be “Delta” in order to ensure the required zero-sequence reactance and impedance. (“Wye” connected primary windings shall NOT be used.)

2) Secondary winding configurations shall be “Zig-Zag” (two windings per secondary core leg) for 0 degree phase shift HMTs and “Modified Zig-Zag” (three windings per secondary core leg) for all other phase shift HMTs in order to ensure that zero-sequence flux is completely cancelled under balanced zero-sequence loading.

3) Primary to Secondary Phase Shift: Manufacturer shall establish a phase shift pattern for the combination of transformers.

i. Positive- and Negative-sequence impedance at 60 Hz shall be 3 to 6 percent.

ii. Zero-sequence reactance at 60 Hz shall be less than 0.2 percent.

iii. Zero-sequence impedance at 60 Hz shall be less than 0.9 percent.

iv. Neutral connection shall be rated at two times the ampacity of the secondary phase current.

v. Harmonic cancellation shall be by electromagnetic means only. No capacitors or electronics shall be used.

vi. Specifically designed to provide an ultra-low zero-sequence impedance (less than 0.9 percent) path for all zero-sequence currents (i.e. I3, I9, I15, I21,) in their three-phase, four-wire secondary windings regardless of phase shift.

b. Enclosure: Ventilated, NEMA 250, Type 1, Indoor (Standard) unless otherwise indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
B. Receive, inspect, handle, and store panelboards according to NECA 407.
C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
B. Comply with NECA 1.
C. Install panelboards and accessories according to NECA 407.
D. Equipment Mounting:

1. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations per Division 03

2. Attach panelboard to the vertical finished or structural surface behind the panelboard.

E. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.

F. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

G. Mount top of trim 90 inches above finished floor unless otherwise indicated.

H. Mount panelboard cabinet plumb and rigid without distortion of box.

I. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

J. Mounting panelboards with space behind is recommended for damp, wet, or dirty locations. The steel slotted supports in the following paragraph provide an even mounting surface and the recommended space behind to prevent moisture or dirt collection.

K. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.

L. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.
2. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written instructions.

M. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

N. Install filler plates in unused spaces.

O. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future.

P. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

Q. Mount spare fuse cabinet in accessible location.

3.3 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

D. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS, Paragraph 7.6 Circuit Breakers. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:

    a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
    b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
    c. Instruments and Equipment:

        1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.
F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.

1. Measure loads during period of normal facility operations.
2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by the Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
4. Tolerance: Maximum difference between phase loads, within a panelboard, shall not exceed 20 percent.

3.6 PROTECTION

A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature according to manufacturer's written instructions.

END OF SECTION 262416

SECTION 26 27 26-WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Receptacles, receptacles with integral GFCI, receptacles with USB ports and associated device plates.
2. Weather-resistant receptacles.
3. Snap switches and wall-box dimmers.
4. Wall-switch.
5. Indoor occupancy sensors.

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.
B. GFCI: Ground-fault circuit interrupter.
C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.

C. Lighting Control Shop Drawings. Prepared by manufacturer indicating:

1. Cutsheets of occupancy sensors and indication of fixtures controlled
2. Areas of coverage of devices.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

1.8 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers

1. Hubbel

2. Leviton
3. Pass and Seymour
4. Legrand
5. Douglas Lighting Controls

B. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

2.2 GENERAL WIRING-DEVICE REQUIREMENTS

A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
B. Comply with NFPA 70.
C. Material: Bakelite phenolic
D. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:

1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
2. Devices shall comply with the requirements in this Section.

2.3 STRAIGHT-BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Equal to Hubbell # HBL5362.

2.4 GFCI RECEPTACLES

A. General Description:

1. Straight blade, feed -through type.
2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Equal to Hubbell # GFR5362-ITR

2.5 STRAIGHT-BLADE RECEPTACLES WITH USB PORTS

A. Convenience Receptacles, 125 V, 20 A with Two (2) Type A Port Configurations: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

1. Equal to Hubbell # USB20A5

2.6 TOGGLE SWITCHES

A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
B. Switches, 120/277 V, 20 A:

1. Single Pole: Equal to #HBL1221
2. Two Pole: Equal to #HBL1222
3. Three Way: Equal to #HBL1223
4. Four Way: Equal to #HBL1224

2.7 WALL PLATES

A. Single and combination types shall match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.

2. Material for Finished Spaces: 0.035-inch-thick, satin-finished, Type 302 stainless steel
3. Material for Unfinished Spaces: Galvanized steel
4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

2.8 INDOOR OCCUPANCY SENSORS

A. General Requirements for Sensors: Wall- or ceiling-mounted, solid-state indoor occupancy sensors with a separate power pack.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Operation: Unless otherwise indicated, turn lights on when coverage area is occupied, and turn them off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
3. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor is powered from the power pack.
4. Power Pack: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Sensor has 24-V dc, 150-mA, Class 2 power source, as defined by NFPA 70.
5. Mounting:
    a. Sensor: Suitable for mounting in any position on a standard outlet box.
    b. Relay: Externally mounted through a 1/2-inch knockout in a standard electrical enclosure.
    c. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
6. Indicator: Digital display, to show when motion is detected during testing and normal operation of sensor.

7. Bypass Switch: Override the "on" function in case of sensor failure.

B. PIR Type: Ceiling mounted; detect occupants in coverage area by their heat and movement.

1. Detector Sensitivity: Detect occurrences of 6-inch-minimum movement of any portion of a human body that presents a target of not less than 36 sq. in.
2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.
3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.

C. Ultrasonic Type: Ceiling mounted; detect occupants in coverage area through pattern changes of reflected ultrasonic energy.

1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch- high ceiling.
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch- high ceiling.
5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot- high ceiling in a corridor not wider than 14 feet.

D. Dual-Technology Type: Ceiling mounted; detect occupants in coverage area using PIR and ultrasonic detection methods. The particular technology or combination of technologies that control on-off functions is selectable in the field by operating controls on unit.

1. Sensitivity Adjustment: Separate for each sensing technology.
2. Detector Sensitivity: Detect occurrences of 6-inch- (150-mm-) minimum movement of any portion of a human body that presents a target of not less than 36 sq. in. (232 sq. cm), and detect a person of average size and weight moving not less than 12 inches (305 mm) in either a horizontal or a vertical manner at an approximate speed of 12 inches/s (305 mm/s).
3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch-high ceiling.

2.9 SWITCHBOX-MOUNTED OCCUPANCY SENSORS

A. General Requirements for Sensors: Automatic-wall-switch occupancy sensor, suitable for mounting in a single gang switchbox.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application, and shall comply with IEC 2021.
2. Operating Ambient Conditions: Dry interior conditions, 32 to 120 deg F .
3. Switch Rating: Not less than 1200-VA LED at 277 V.

B. Wall-Switch Sensor:

1. Standard Range: 180-degree field of view, field adjustable from 180 to 40 degrees; with a minimum coverage area of 900 sq. ft.
2. Sensing Technology: Dual technology - PIR and ultrasonic
3. Switch Type: SP, manual "on," automatic "off." with poles as indicated on drawings.

a. Voltage: Match the circuit voltage.

b. Ambient-Light Override: Concealed, field-adjustable, light-level sensor from 10 to 150 fc. The switch prevents the lights from turning on when the light level is higher than the set point of the sensor.

1) Concealed, field-adjustable, "off" time-delay selector at up to 30 minutes.

2) Concealed "off" time-delay selector at 30 seconds, and 5, 10, and 20 minutes.

3) Adaptive Technology: Self-adjusting circuitry detects and memorizes usage patterns of the space and helps eliminate false "off" switching.

2.10 HIGH-BAY OCCUPANCY SENSORS

A. General Description: Solid-state unit. The unit is designed to operate with the lamp and ballasts indicated.

B. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Operation: Turn lights on when coverage area is occupied, and to half-power when unoccupied; with a time delay for turning lights to half-power that is adjustable over a minimum range of 1 to 16 minutes.

D. Continuous Lamp Monitoring: When lamps are dimmed continuously for 24 hours, automatically turn lamps on to full power for 15 minutes for every 24 hours of continuous dimming.

E. Operating Ambient Conditions: 32 to 149 deg F

F. Mounting: Threaded pipe.

1. Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.

G. Detector Technology: PIR.

1. Power and dimming control from the lighting fixture

2. Detector Coverage: User selectable by interchangeable PIR lenses, suitable for mounting heights from 12 to 50 feet.

H. Accessories: Obtain manufacturer's installation and maintenance kit with laser alignment tool for sensor positioning and power port connectors.

2.11 SAFETY SWITCHES

A. Safety Switches shall be of he quick-make, quick-break visibl blade-knife switch type. They shall be of the fused or non-fused type as required. Fused switches shall have positive pressure fuse clips. Heavy Duty switches shall be able to be opened without disrupting the circuit.

B. Switches shall have provisions for padlocking.

C. Switches shall have class R rejection feature.

2.12 FUSES

A. Provide one complete set of fuses, together with 33% spares, for each fuse-holder.

B. Fuses shall be dual element, current limiting and time delay, unless otherwise noted.

2.13 FINISHES

A. Device Color:

1. Wiring Devices Connected to Normal Power System: As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

B. Wall Plate Color: For plastic covers, match device color.

PART 3 EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.

B. Coordination with Other Trades:

1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
4. Existing Conductors:
    a. Cut back and pigtail, or replace all damaged conductors.
    b. Straighten conductors that remain and remove corrosion and foreign matter.
    c. Pigtailing existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:
   1. Vertical. Install ground pin of vertically mounted receptacles down.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 GFCI RECEPTACLES

A. Install non-feed-through-type GFCI receptacles where protection of downstream receptacles is not required.

3.3 MOUNTING HEIGHTS

A. Receptacles: 18” above floor
B. Switches: 48: above floor

3.4 SENSOR INSTALLATION

A. Coordinate layout and installation of ceiling-mounted devices with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, smoke detectors, fire-suppression systems, and partition assemblies.
B. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.
C. Drawings indicate ceiling mounted devices in schematic manner. Contractor shall provide quantity of sensors as required in locations as required for complete coverage of area.
D. Generally, ceiling mounted sensors shall be PIR type, except for in Latrines, where they shall be ultrasonic type and in NCO Logistics office, where they shall be dual type.

3.5 WIRING INSTALLATION

A. Wiring Method: Comply with Section 260519 "Conductors and Cables." Minimum conduit size is 3/4 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.6 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric and occupancy sensors at each.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.

6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

C. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).

D. Wiring device will be considered defective if it does not pass tests and inspections.

E. Perform the following tests and inspections:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

F. Prepare test and inspection reports.

3.8 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

1. For occupancy and motion sensors, verify operation at outer limits of detector range. Set time delay to suit Owner's operations.

3.9 DEMONSTRATION

A. Coordinate demonstration of products specified in this Section with demonstration for the Architect during final walk through.

B. Train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 262726

SECTION 265119-LIGHTING

PART 1 GENERAL

1.1. RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

A. Section Includes:

1. Interior solid-state luminaires that use LED technology.
2. Lighting fixture supports.
3. Emergency Lighting

B. Related Requirements:

1. Section 260926 "Lighting Control System" for automatic control of lighting, including time switches, photoelectric relays, occupancy sensors, and multipole lighting relays and contactors.

1.3. DEFINITIONS

A. CCT: Correlated color temperature.
B. CRI: Color Rendering Index.
C. Fixture: See "Luminaire."
D. IP: International Protection or Ingress Protection Rating.
E. LED: Light-emitting diode.
F. Lumen: Measured output of lamp and luminaire, or both.
G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.4. SUBMITTALS

A. Product Data: For each type of product.

1. Arrange in order of luminaire designation.
2. Include data on features, accessories, and finishes.
3. Include physical description and dimensions of luminaires.
4. Include emergency lighting units, including batteries and chargers.
5. Include life, output (lumens, CCT, and CRI), and energy efficiency data.
6. Photometric data and adjustment factors based on laboratory tests IES LM-79 and IES LM-80.

    a. Manufacturers' Certified Data: Photometric data certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
    b. Testing Agency Certified Data: For indicated luminaires, photometric data certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

B. Shop Drawings: For luminaires mounted from structure.

1. Include plans, elevations, sections, and mounting and attachment details.
2. Include details of luminaire assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Product Schedule: For luminaires, use same designations indicated on Drawings.

1.5. CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and lighting systems to include in operation and maintenance manuals.

1.6. 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. Drivers: One for each type.

1.7. QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Luminaire manufacturer's laboratory that is accredited under the NVLAP for Energy Efficient Lighting Products.
B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7, accredited under the NVLAP for Energy Efficient Lighting Products, and complying with the applicable IES testing standards.
C. Provide luminaires from a single manufacturer for each luminaire type.
D. Each luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.

1.8. DELIVERY, STORAGE, AND HANDLING

A. Protect finishes of exposed surfaces by applying a strippable, temporary protective covering before shipping.

1.9. WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

B. Warranty Period: Five year(s) from date of Substantial Completion.

PART 2 PRODUCTS

2.1. PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7

B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified."

2.2. LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. Recessed Fixtures: Comply with NEMA LE 4.

E. CRI of minimum as specified on drawings. CCT of (as specified on drawings).

F. Rated lamp life of 50,000 hours.

G. Internal driver.

H. Nominal Operating Voltage: as indicated on drawings.

I. Refer to Luminaire Schedule for additional requirements.

2.3. MATERIALS – as indicated on Luminaire Schedule

A. Metal Parts:

1. Free of burrs and sharp corners and edges.
2. Sheet metal components shall be steel unless otherwise indicated.
3. Form and support to prevent warping and sagging.

B. Diffusers and Globes:

1. As indicated on drawings

C. Housings:

1. Exterior Lighting shall have aluminum housing used as a heat sink.

D. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps. Locate labels where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.

1. Label shall include the following lamp characteristics:

a. CCT and CRI for all luminaires.

2.4. METAL FINISHES

A. Variations in finishes are unacceptable in the same piece. Variations in finishes of adjoining components are acceptable if they are within the range of approved Samples and if they can be and are assembled or installed to minimize contrast.

2.5. EMERGENCY LIGHTING

A. Emergency lighting system shall consist of the following:

1. Normally-off, low voltage, led emergency lights distributed throughout the area to achieve light levels required by State Fire Marshall
2. Exit Lights connected to normally on circuits.
3. Central Low Voltage battery cabinets/controllers distributed among the electrical rooms.
4. Low Voltage wiring connecting batteries to luminaires.

B. System shall be capable of self testing and shall log test reports for use by the Owner.

C. Basis of Design is Signtex CBL System

2.6. LUMINAIRE FIXTURE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.
B. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as luminaire, or as recommended by manufacturer.
C. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.

PART 3 EXECUTION

3.1. EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before fixture installation. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2. TEMPORARY LIGHTING

A. If approved by the Architect, use selected permanent luminaires for temporary lighting. When construction is sufficiently complete, clean luminaires used for temporary lighting and install new lamps.

3.3. INSTALLATION

A. Comply with NECA 1.

B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.

C. Install lamps in each luminaire.

D. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Provide support for luminaire without causing deflection of ceiling or wall.
4. Luminaire mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and vertical force of 400 percent of luminaire weight.

E. Flush-Mounted Luminaire Support:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

F. Wall-Mounted Luminaire Support:

1. Attached to a minimum 20 gauge backing plate attached to wall structural members.
2. Do not attach luminaires directly to gypsum board.

G. Ceiling-Grid-Mounted Luminaires:

1. Secure to any required outlet box.
2. Secure luminaire to the luminaire opening using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
3. Use approved devices and support components to connect luminaire to ceiling grid and building structure in a minimum of four locations, spaced near corners of luminaire.

H. Comply with requirements in Section 260519 "Conductors and Cables" for wiring connections.

3.4. IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5. FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.

B. Luminaire will be considered defective if it does not pass operation tests and inspections.

C. Prepare test and inspection reports.

3.6. STARTUP SERVICE

A. Comply with requirements for startup specified in Section 260943.16 "Addressable-Fixture Lighting Controls."

B. Comply with requirements for startup specified in Section 260943.23 "Relay-Based Lighting Controls."

3.7. ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting the direction of aim of luminaires to suit occupied conditions. Make up to two visits to Project during

other-than-normal hours for this purpose. Some of this work may be required during hours of darkness.

1. During adjustment visits, inspect all luminaires. Replace lamps or luminaires that are defective.
2. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
3. Adjust the aim of luminaires in the presence of the Architect.

END OF SECTION 265119

SECTION 270500-COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.1 SCOPE

A. Work described in this Section includes providing all labor, materials, and equipment indicated, specified, and necessary for complete and operating systems in accordance with SECTION 26 00 00 - ELECTRICAL GENERAL PROVISIONS.

B. Installation shall comply with EBR Department of Technology Services Cabling Solutions Minimum Requirements as od March 5, 2021. Contractor shall obtain a copy of document prior to bid.

C. Certified Vendor shall install a structured cabling system forming a complete channel solution.

1.2 APPLICABLE PARAGRAPHS

A. Applicable paragraphs of SECTION 26 00 00 – Electrical Common Work, shall apply to this Section as though repeated herein.
B. Applicable paragraphs of SECTION 26 05 26 – Grounding and Bonding, shall apply to this Section as though repeated herein.
C. Applicable paragraphs of SECTION 26 05 29 – Hangars and Supports, shall apply to this Section as though repeated herein.
D. Applicable paragraphs of SECTION 26 05 33 – Raceways and Boxes, shall apply to this Section as though repeated herein.

1.3 SYSTEMS INVOLVED

A. Systems involved include the following:

1. Voice/Data/Special System Outlets

2. Voice/Data/Special System Cabling & Fiber
3. Raceways and for Voice/Data/Special System Outlets
4. Data Racks Patch Panels

PART 2 PRODUCTS

2.1 VOICE/DATA/SPECIAL SYSTEM OUTLETS

A. Telephone and Data outlets shall consist of outlet box (4" square x 1½"deep, or larger), Dual gang raised device cover, and dual gang plate with jacks (8-position, category 6 module, quantity as required). Finish and type of plate shall match that specified for wiring devices plates. Plate shall contain ID windows at top and bottom with appropriate label designations. .

B. Provide 8-pin modular (RJ45 type, Cat 6A) outlet/connectors (quantity as indicated on drawings) with a double gang outlet faceplate.

2.2 VOICE/DATA/WAP CABLING & Fiber

A. CAT6A+ (400MHz), 4-Pair, Unshielded-twisted Pair, Plenum-Rated, Premise Horizontal Cable, 23 AWG Solid Bare Copper Conductors, Dual, X-Spline Center Member, Rip Cord, plenum rated PVC jacket.

B. Provide 1 CAT6A, 4-pair UTP cable for each standard 8-pin modular connector provisioned at the outlet and connect.

C. Only cable that has passed the Underwriters Laboratory (UL) LAN certification program and is labeled with an NRTL acceptable marking shall be used.

D. The designer shall not use 150 ohm shielded twisted pair.

E. A minimum of 3 m (10 feet) of cable slack shall be provided above the ceiling at the location of the future Telecom Closet. Cable shall be properly organized and supported from structure.

F. Cable shall be rated for Category 6 standards - TIA 568.C.2

G. Cables for Voice shall be White and cables designated for Data shall be light blue.

H. Provide two 6-strand Multi Mode OM3 or OM4 (or Single Mode, if required for

distance to sustain 10GB speed) armored fiber cables from each remote wiring closet back to main wiring closet with LC connectors. Fiber type shall be determined by distance of run and guaranteed to operate at a speed of 10 gigabits.

2.3 RACK/ PATCH Panels

A. Cabinet shall be 42 U x 84”H standard depth (minimum) with (2) 20-amp horizontal power strips (PDUs) with 10 outlets each.

B. The wiring cabinets will be connected, without interior walls, and in each cabinet, there will be (1) 30-amp circuit and (1) 20-amp circuit.

C. All cabinets must be grounded.

D. Include wire management switches and patch panels.

E. After all equipment is installed in cabinet(s), a 25% growth ability must remain in cabinet.

F. Cabinet Size • 42U 84”H with (2) Horizontal Power Strips (20-amp, 10 outlets)

G. Approved models:

1. Tripp Lite SR42UB
2. Great Lakes GL840ES-2942
3. Dell 4220
4. APC AR3100

H. UPS Requirements

1. One rack mount UPS to be provided for each cabinet. UPS must be 30-amp 3000V with 30-amp circuit. UPS to be installed in bottom of rack by contractor.
2. Required circuits should be on emergency power if generator planned and should be within 2 feet of rear of rack.
3. Approved model:
   a. Eaton 5PX3000RT2U (30 AMP, 220V, twist lock)
   b. Receptacles on rear of UPS must accommodate power strip (PDU) power cord type (NEMA 5-15 vs NEMA 5-20), supplied by contractor.

I. PDU Requirements

1. Acceptable Models – Horizontal

a. EMAT08-10
b. EMAT09-10
c. EMAU05-10
d. EMAU07-10

2. Acceptable Models – Vertical
   a. EMA112-10
   b. EMA114-10
   c. EMA108-10
   d. EMA106-10
   e. EMA107-10
3. Following installation, PDU must be plugged into rear of UPS. PDU must be compatible with input on rear of UPS, supplied by contractor. Contractor to notify customer of proposed models and validate the connection compatibility prior to hardware procurement

2.4 RACEWAYS FOR VOICE/DATA OUTLETS

A. Refer to Specification SECTION 26 05 33 – Raceways and Boxes

PART 3 EXECUTION

3.1 Building telecommunications infrastructure and cabling shall be installed in accordance with NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling. Workmanship shall conform to the practices described in the BICSI Information Transport Systems Installation Methods Manual (ITSIMM).

3.2 Provide Twenty (20) year written warranty on material and workmanship on all data cabling, including fiber.

A. The system warranty shall be facilitated by the contractor and be established between the East Baton Rouge Parish School System and the cabling system manufacturer.

3.3 VOICE/DATA OUTLETS

A. Outlet labeling shall be IAW TIA/EIA-606. Each outlet location shall be labeled with a unique designator and level of classification, in sequence starting with “A” or “1” and proceeding clockwise around the room. The left or top 8-pin (RJ-45 type) CAT6 or other compliant connector shall be designated for voice and shall be labeled “VOICE.” The right or bottom 8-pin (RJ-45 type) CAT6 or other compliant connector shall be designated for data and be labeled “DATA.” All LAN components in the system shall also be labeled with similar designations IAW TIA/EIA 606. For FO connections, the left or top FO connection shall be labeled “A,” and the right or bottom FO connection shall be labeled "B."

B. All outlets shall be labeled as to their function and with a unique identifier code.

C. All devices, outlet locations, and designations shall also appear on the system as-built drawings.

3.4 VOICE/DATA/WAP/CAMERA CABLING

A. All wiring and connections shall be tested per ANSI/TIA/EIA standards. Test reports shall be provided.

B. The designer shall specify that all telecommunications cable installed as part of a project be tested to the commercial standards for that cable system.

C. Maximum horizontal cable length to be 90m/295 ft, including loop/slack of 15 feet (coiled above data closet ceiling).

D. Cables suspended above an open ceiling shall not rest on ceiling tiles.

1. Cables must maintain 18 in. distance from light fixtures and any other electrical structure or wiring.
2. Cables runs shall not include power wiring or wiring for other low voltage systems (fire alarm, intercom, security, etc.)
3. Data, WAPs, IP Speakers, IP Clocks and IP Camera cables must be free of splices.
4. Cables will be run in J hooks supported every 4 to 6 feet. No other wires are to be in DTS data J hooks.
5. Cables must be bundled with Velcro finger tight. (No tie-wraps or electrical tape)

6. All data wiring paths between buildings will have 25% growth ability.
7. Wiring paths will be discussed and determined by Electrical Engineer, electrical contractor, wiring sub, wiring solution representative and DTS representative prior to start of construction.

E. Outdoor data runs and/or in/under slab data runs may require special wiring and must be run in conduit with proper protection from surge. These runs must be discussed with DTS prior to finalizing wiring plan.

F. Cable Color Scheme:
1. Data/Voice: Blue Cat6A cable, inserts and patch cables.
2. WAPs: Green Cat6A cable, inserts, and patch cables.
3. Cameras: Yellow Cat6A cable, inserts, and patch cables.
4. IP Speakers: Purple Cat 6A cable, inserts, and patch cables.
5. IP Clocks: Orange Cat6A cable, inserts, and patch cables.

G. UTP Tests

1. All metallic cable pairs shall be tested for proper identification (ID) and continuity. All opens, shorts, crosses, grounds, and reversals shall be corrected. Correct color-coding and termination of each pair shall be verified in the TR and at the outlet. Horizontal wiring shall be tested from, and including, the termination device in the TR to, and including, the modular jack in each room. Backbone wiring shall be tested end-to-end, including termination devices, from terminal block to terminal block, in the respective TRs. These tests shall be completed and all errors corrected before any other tests are begun.

H. CAT6A Circuits

1. All CAT6A circuits shall be tested using a test set that meets the accuracy requirements of the most recent revision of the ANSI/TIA/EIA-568 standards for cabling.

I. After the contractor has completed the installation and testing of the system, the

contractor shall submit a test report for all copper cabling and fiber to EBR DTS electronically at turnover of building to EBRPSS.

J. Contractor shall place a label at the cable ends and in junction boxes, The label shall be the same as the outlet it is connected to.

K. A laminated wiring map/as-built (on 11x17 or larger paper) will be posted in each data closet wiring cabinet documenting data, voice, wireless access points (WAPs), IP speakers, IP clocks and IP cameras. Additionally, a complete set of all as-builts must be provided to DTS and Principal electronically.

L. Each cable run to exterior of structure (example: exterior WAP) requires surge protection via lightning arrestors. Lightning arrestors should be installed in the same wiring closet where WAP drop is terminated. Jacks and patch cables to/from lightening arrestors should be appropriate color based on device type. Wiring sub is responsible for providing and installing adequate lightening arrestors for all external devices.

M. Data drops and electrical outlets will be located on the same wall within 6 inches of each other.

N. Cable warranty: A 20-Year written warranty on material and workmanship is required. The system warranty shall be facilitated by the Contractor and be established between the East Baton Rouge Parish School System and the cabling system manufacturer.

3.5 FIBER

A. Placement of fiber conduit in main (core) wiring closet from ISP will be coordinated by Architect/Electrical Engineer and DTS representative.
B. All exterior fiber runs will be in metal conduit.
C. Conduit running between buildings will have an unused inner duct with pull string.
D. Fiber from each remote closet must be home run to main data closet and contain no splices.

E. Provide two 6-strand Multi Mode OM3 or OM4 (or Single Mode, if required for distance to sustain 10GB speed) armored fiber cables from each remote wiring closet back to main wiring closet with LC connectors. Fiber type shall be determined by distance of run and guaranteed to operate at a speed of 10 gigabits.

F. Service loop at both ends will be a minimum of 15 feet.

G. Outdoor fiber runs and/or in/under slab fiber runs may require special wiring and must be run in conduit underground with proper protection from surge. These runs must be discussed with DTS prior to installation.

H. Fiber jumpers to be provided by contractor for each fiber pair. Fiber jumpers are to be 3 meters in length with LC connectors. OM3 or OM4 (Aqua in color) multimode or Single Mode (yellow in color), whichever type has been terminated in closet.

I. Any remaining unused fiber jumpers, following complete install of all network hardware, will be turned over to DTS and must be signed for by DTS. This is to be done at the same time patch cables are received by DTS.

3.6 LABELING

A. All patch panel and faceplate labels will be printed. No handwritten labels will be accepted.

B. Labels on all cables/cables will be easily read after installing in cabinet and in bundles.

C. Data, WAPs, IP speakers, IP clocks and IP camera drops will be numbered and labeled at patch panel and on faceplate. For all ceiling tile mounted devices, ceiling grid will be labeled at drop location in lieu of on faceplate.

D. Labeling on faceplate in room/classroom should contain:

1. Room number of the wiring closet that the drop is terminated.
2. The drop number. This number should be consecutive numbers by room by wiring closet.
    a. Example: Room 203 with data drops 73 thru 75 and WAP 2 and 3 all terminated in wiring closet room 17. The labels in room 203 would look like this:
    Data: R17-D73, R17-D74, R17-D75 (on faceplate)
    WAPs: R17-W2, R17-W3 (on ceiling grid)

E. Labeling in wiring closet should contain:

1. The room number where drop is located.
2. The drop number. This number should be consecutive numbers by room by wiring closet.
3. Example: Room 203 with data drops 73 thru 75 and WAP 2 and 3 all terminated in wiring closet room 17.
   a. The patch panel would be labeled like this:
      Data: R203-D73, R203-D74, R203-D75
      WAPs: R203-W2, R203-W3

F. Drop numbering should start 1 thru 999 by wiring closet, consecutive by room.

G. Labeling on camera should be the same number on architectural drawings.

H. Labeling on WAP shall be discussed with DTS and approved DTS contractor responsible for installation of WAPs.

I. Labeling is mandatory for cables running to Energy Management equipment.

3.7 RACKS / PATCH PANELS:

1. Drops for data, WAPs, IP speakers, IP clocks and IP cameras will be punched down using modular patch panels using correct color matched inserts and patch cables.
2. Device types may be combined in patch panels to allow for minimal cable management and easier maintenance IF growth space is accounted for on patch panels. To allow for growth and additional cabling, patch panel ports should be left open between device types (20% of each type).
3. Patch panels should be placed strategically in rack to allow for customer provided network switches to be installed between patch panels, with all patch panels connected to switches with 1 ft. patch cables. A minimum of 1U space must be left between patch panels to accommodate network switch installation. This will be specified in finalized rack design.
4. Upon receipt of documentation from electrical engineer providing full list of all rack mounted hardware (including contractor supplied hardware) with specs, owner will provide rack design to include hardware and patch panel layouts. Rack design will be provided to electrical engineer for review, feedback, and dispersal to all relevant contractors. Example

design with cable counts is shown below for reference; final design to be provided by customer upon receipt of documentation from electrical engineer, confirmation of final cable counts and prior to cable termination.

5. Work shall be inspected and approved at least two times by the wiring manufacturer's representative - (rough in and final) and DTS shall be present at all inspection.

6. Network switches will be supplied, installed, and patched in by DTS contractor. An installation meeting must be called with DTS and DTS contractor responsible for installing network switches to discuss/plan the layout of wiring cabinet, patch panel layout and switch configuration prior to termination of Cat6A cabling and/or fiber.
7. Patch cables not installed, including excess (required + 5%) will be turned over to and must be signed for by DTS two weeks prior to substantial completion. Patch cables will be turned over to DTS and/or approved DTS contractor and must be signed for by DTS and/or approved DTS contractor at least two weeks before IT installation in wiring closets begins, before substantial completion and/or before allowing school personnel on construction site, whichever occurs first.

3.8 RACEWAY INSTALLATION FOR VOICE/DATA OUTLETS

A. Provide 1 - 1" EMT Raceway from each Telephone and Data outlet to the area above the accessible ceiling and provide bushing at end of conduit.
B. Raceways shall contain not more than two 90 degree bends without a junction box.
C. Pull boxes shall be placed in conduit runs where a continuous conduit length exceeds 100 feet or where there are more than two 90-degree bends. Pull boxes shall be placed in straight runs of conduit and shall not be used in lieu of a bend.
D. Refer to "260533 Raceways and Boxes" for specification and installation of Cable Tray

END OF SECTION 270500

SECTION 274100-INTERCOM, CLOCK, AND PAGING

PART 1 GENERAL

1.1 SCOPE

A. Work described in this Section includes providing all labor, materials, and equipment indicated, specified, and necessary for complete and operating systems in accordance with SECTION 26 00 00 - ELECTRICAL GENERAL PROVISIONS.

B. Contractor shall furnish and install speakers, trumpets, volume controls, clocks, administrative intercom/phones, call-in buttons, annunciators, racks with head-in equipment, power supplies, wiring, raceways, and all other equipment, whether specifically indicated or not, to provide a complete and properly operating system.

C. The Basis of Design system shall be Rauland-Borg Telecenter System TCU-IP Technology System, Intercom and paging system to include the following:

1. IP Administrative Consoles
2. Staff Phones
3. Ceiling/Wall Mounted Speaker Assemblies
4. Flush annunciator
5. Normal/Emergency Call-In Switch/buttons
6. Bell/Class Change Signaling System
7. Public Address/Intercom System
8. Controls, Amplifiers, and Terminal Equipment
9. Power Supplies
10. Wiring
11. Wall-mounted Paging Horns
12. Volume Attenuators
13. Atomic Clock Synchronization module
14. Wireless Master Clock
15. Program Sources - Tuner, MP3,CD
16. Emergency Call Check in
17. 48 Preset Buttons on Consoles
18. POE Switches

19. Software with Server

1.2 APPLICABLE PARAGRAPHS

A. Applicable paragraphs of SECTION 26 00 00 – Electrical Common Work, shall apply to this Section as though repeated herein.

B. Applicable paragraphs of SECTION 26 05 26 – Grounding and Bonding, shall apply to this Section as though repeated herein.

C. Applicable paragraphs of SECTION 26 05 29 – Hangars and Supports, shall apply to this Section as though repeated herein.

D. Applicable paragraphs of SECTION 26 05 33 – Raceways and Boxes, shall apply to this Section as though repeated herein.

1.3 SYSTEMS INVOLVED

A. Systems involved include the following:

1. Intercom
2. Clock
3. Sound System for Multipurpose Area

B. SUBMITTALS

1. Prior to ordering the equipment, Contractor shall provide a submittal for review to include the following:

a. Submit equipment prints, full electronic wiring diagrams and specification sheets for each item specified herein. Specification Sheets shall be submitted on all items including cable types.

b. Shop drawings, detailing the system including, but not limited to, the following:

1) Built in station arrangement.
2) Equipment cabinet arrangement.
3) Wiring diagrams that detail wiring for power, signal, and control, differentiating clearly between manufacturer -installed wiring and field installed wiring. Identify terminals to facilitate installation, operation and

maintenance.

4) Provide a riser diagram for the system showing in technically accurate detail all connections, interconnections, and all provisions available and made for adaptability of all specified future functions. In addition, riser diagram must include all calculations, charts, and test data necessary to demonstrate that all systems and system components deliver the specified signals, grades, and levels at all required points and locations.

2. At completion, Contractor shall submit a certificate of completion of installation and service training.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.

2.2 INTERCOMMUNICATION SYSTEM OPERATION

A. IP central switching exchange shall be capable of supporting at least three simultaneous loudspeaking intercom conversations without blocking of any kind. Systems that are restricted to a single conversation within any group of stations shall not be acceptable.

B. The system shall be wired for 10 Channels.

C. The system shall be equipped with bi directional intercom amplifiers that shall be capable of delivering at least twelve (12) watts RMS.

D. The system shall provide facilities for calling a classroom station by dialing the assigned classroom number.

E. The system shall provide facilities for up to twelve (12) independent digital readout displays upon which, incoming intercom calls are identified by their designated numbers. The display shall show visually, in the order received, three (3)

calls at a time. Emergency calls shall override normal calls and shall annunciate with the letters "EMER" and the calling station number.

F. A flush wall-mounted intercom call switch shall be provided at 44" above finished floor. The call switch shall be equipped with dedicated Call and Emergency buttons. Normal calls, shall be placed by pressing the "Call" button.

G. The system shall allow the classroom call-in buttons to place intercom call-ins. It shall be possible to place a normal call or an emergency call.

H. Provide facilities for answering calls registered in the display by pressing a single "response" button. This capability shall not prevent other calls from being placed or answered by dialing their numbers.

2.3 PUBLIC ADDRESS / EMERGENCY TONE SIGNALING OPERATION

A. The system shall provide for the distribution of paging announcements from any authorized administrative phone. It shall be possible to distribute announcements to the entire facility or to selected zones.

B. If the administrative phone originating a paging announcement is associated with a loudspeaker, the system shall automatically mute the speaker to avoid feedback.

C. The system shall provide the capability of assigning speaker locations to any one or more of the eight (8) software programmable zones for zone paging. The paging zones shall be separate from time signal zones.

D. Through programming, it shall be possible to exclude selected speakers from the reception of paging announcements. Speakers may be permanently excluded or they may be temporarily excluded so that testing or other functions may take place without interruption. Speakers that have been temporarily excluded shall be automatically reinstated by the system at midnight each night.

E. Provide a Priority Paging Microphone for use by administrative personnel. The microphone shall be a desk type with a locking Push to Talk bar. When the Push-to-Talk bar is pressed, the system shall automatically initiate an all page from the microphone. Microphone shall be equivalent to a Rauland 1295 with a TCC2077 Microphone Aux Module

F. The system shall provide for the distribution of emergency tone signals to all locations with speakers to alert school personnel to emergency situations. It shall

be possible to initiate tone signals from any authorized handset or phone. When tones are initiated from a system handset or phone, it shall also be possible to make a voice announcement in conjunction with the tone. The system shall automatically mix the tone and voice signals.

G. The system shall also provide the capability of initiating tones manually from a dedicated tone initiation panel. Switches on this panel shall be clearly labeled to indicate the tones, which may be activated.

H. The system shall provide for Personal Identification Numbers (PIN) for selected administrators. By dialing their PIN at any system handset or phone, the administrator shall have access to the same capabilities assigned to their office phone including paging and tone distribution, regardless of the restrictions on the phone he is currently using.

I. Paging zones for the Main Building shall be as follows (to be verified with Owner prior to programming):

1. Media Center
2. Kitchen
3. Dining Room
4. Multipurpose/Stage
5. Other interior spaces by Wing
6. All interior spaces
7. Exterior
8. All-call

2.4 MASTER CLOCK SYSTEM FUNCTIONS / OPERATION

A. The system shall provide a master clock system, which shall provide class change signaling and shall serve as a controller to ensure that a consistent time base in maintained throughout the school. The master clock system shall provide the following minimum capabilities:

1. The system shall provide the capacity for storing 255 events.
2. The system shall provide four (20) schedules to allow flexibility due to seasonal changes or special events. Five of the schedules may be active at any given time.

3. Classroom speakers may be assigned to any one or more of up to eight (8) time zones. The Master Clock System shall provide the ability to distribute class change signals to any or all of the zones. Time Zones shall be separate from paging zones. The system shall provide separate bell duration for each zone circuit.
4. The system shall provide programmable holidays with fully automatic holiday program execution. Bells can be silenced or special schedules can be implemented. Normal bells will resume after the holiday period.
5. The system shall provide User-programmable Automatic Daylight Savings Time Change. Two (2) daylight savings time changes may be programmed into the system.
6. The system shall provide the ability to review, edit, and delete events. Editing may take place via a separate computer.
7. It shall be possible, using the system's display phones, to review and change the active schedule of the master clock. It shall also be possible to review programmed time events.
8. The system shall provide latched operation of zones to control lighting or other devices.
9. The system shall provide the ability to test all output zone circuits.
10. Interface with all types of secondary clocks whether synchronous wired, electronic, or minute impulse types. This shall be accomplished without the use of external synchronous adapters.
11. Accumulation of down time during power outage to reset slave clocks, both minute impulse and synchronous types after the power has been restored.
12. The system shall provide eight (8) output relays for each of the eight (8) zone circuits. Each relay shall be rated at 5 amperes.
13. The system shall provide a crystal-controlled time base for assured accuracy.
14. The system's time base shall include a Lithium battery, which shall provide not less than 5 years battery back up of the time keeping function.
15. The system shall monitor eight zone inputs for interface and synchronization with external master clocks.

B. Call-in switches: Call-in switches (indicated on the drawings as part of the intercom stations) shall be Series TCDCS2 or 603302 and shall provide the following functions and features:

1. One (1) "Normal" call switch that shall activate a distinctive "NORM" level call from a single button activation. The button shall be clearly marked "NORM" and will route the call-in to any one or more Administrative Phones and/or Displays for quick and easy response from an Administrative Phone. In accordance with the Americans with Disabilities Act (ADA), the "Normal" call will provide a steady call assurance LED confirming that the call has been placed in the system.

C. Addressable Analog Gateway

1. IP Addressable Gateway provides integration with existing analog wiring infrastructure – consisting of shielded two-pair classroom field wiring. The Gateway provides the ability to reuse speaker wiring, speakers, and punch blocks to integrate analog infrastructure with IP platform.
2. Each Gateway will have 5 watts of power per port and 25 watts total per device.
3. Supports 24 classrooms that utilize 25 Volt speakers and all current Telecenter call switches for front office notification.
4. Supports minimum of 5 call switch priorities per classroom, capable of lockdown check-in functionality, while reusing existing shielded two-pair classroom field wiring.
5. Classroom intercom volume adjustable from Software interface.
6. Classroom paging volume adjustable from Software interface.
7. Configured to the school network and can be used in conjunction with IP Addressable Modules. Provide (3) Rauland TCC2024

D. IP Addressable Administrative Console

1. A full color screen with 64 soft keys, 3 line select, volume control, push to talk, speakerphone mode and left/right and up/down scrolling.
2. Audio paging access from any Console to any single intercom speaker, zone (group) of intercom/paging speakers, or all speakers/paging horns

throughout the entire school.

3. Programmable soft key access from any console on the system to initiate alarm signals within the school to all or select locations equipped with speakers. A minimum of 25 separate distinct alarm signals shall be provided. Alarm signals originating from any assigned administrative console shall have priority over all regular system functions.
4. Programmable soft key access from any console to automatically broadcast page emergency instructions throughout an entire school when an alarm (e.g. lockdown, lockout, security, fire) is tripped or manually activated. The emergency instructions are preprogrammed and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
5. Ability to perform intercom to any single IP Addressable Speaker Module.
6. Ability to display 3 call-ins at a time on the screen while other call-ins are annunciating and the ability to scroll to view all call-ins.
7. Ability to upgrade a call-in via soft key.
8. Programmable soft key access from any console for activating relays, campus wide.
9. Ability to maintain, along with controller and other IP Modules system functions, including intercom, bells and paging for the local campus in the event of district-wide connection loss.
10. Classrooms that have not ‘checked-in’ during an emergency are listed on the Administrative Console’s screen.
11. The time duration of an emergency is shown on the screen of the administrative console. The check-in timer is shown on the screen of the administrative console.

2.5 AUDIO PAGING

A. Desk-mounted administrative phone shall be Rauland TCC2045. Provide THREE of these at locations as directed. Also intercom company shall connect to the schools designated phone system for paging as needed. Patton Model NS-4141

B. Audio paging/program amplifiers:

1. Power amplifier(s) shall be provided to provide a minimum of 2 watt of power to all intercom speakers, 2 watts of power to all paging speakers, and 15 watts of power to all paging trumpets.
2. The maximum load on the paging/program amplifiers shall be 80% of the rated maximum output of the amplifiers.

C. Outdoor trumpets shall be Series 3601 durable weatherproof reentrant paging horns with:

1. Frequency Response: 375 to 14,000 Hz.
2. Power Handling: 30 Watts, 60 Watts Peak.
3. Variable screw taps, 25 V transformer.
4. Sound Pressure Level: 110 dB at 1 meter with 1 watt input.
5. Mounting: Adjustable, horizontal, and vertical.
6. Color: Beige.

D. Ceiling-Mounted Paging Speakers and Ceiling-Mounted Intercom Speakers shall be flush-mounted and shall consist of a Rauland Series ACC 1000 baffle, Series USO188-8" speaker, Rauland Series ACC1101 round speaker backbox, Rauland Series ACC1104 Speaker support bridge: Rauland Ceiling BAFKIT1X2S as an approved equal

1. 8" Cone.
2. Frequency Response: 65 to 17,000 Hz.
3. Power Rated: 8 Watts.
4. Magnet: 5 Ounce.
5. Axial Sensitivity: 93 dB at 4 feet with 1 watt input.
6. 25 watt variable tap transformer.

E. Wall Mounted Intercom stations shall be flush-mounted and shall consist of Rauland ACC1003 square speaker baffle, Rauland US0188-8" speaker, Rauland ACC1105 flush mount square backbox and call-in switch. Rauland Ceiling BAFKIT1X2S as an approved equal

F. Equipment Racks and Backboards

1. Equipment racks shall be located in a climate controlled area/room as shown on drawings (in MDF).
2. Self contained, specifically engineered racks with provisions for all present and future components as described and recommended by the manufacturer within this specification.
3. Racks shall be accessible from front and rear.
4. All program, zone, and time circuitry, data, linkage, power, telecommunications components, and circuitry to be located in racks configured as approved by the Engineer.
5. Cisco POE Switch SG300-28PP
6. The main rack shall include an MP3 player and a Series MCX 325 AM/FM/CD player which shall be used to provide sound to selected rooms, zones, or all zones simultaneously. Provide antenna as necessary.
7. Secondary clock system shall be as follows:
    a. The NTP Synchronized Wireless System shall consist of a master transmitter located on the inside of the building and wireless analog clocks that are synchronized to the NTP time.

G. System shall synchronize all clocks to each other. System shall utilize GPS technology to provide atomic time to components.

H. System shall not require hard wiring for its components except for AC Power. Analog Clocks shall be battery operated for full portability.

I. Analog Clocks shall synchronize to +/- 1 second of the transmitter displayed time.

J. Clocks shall automatically adjust for Daylight Saving per settings on the transmitter

K. The system shall have an internal clock that is continually updated by the NTP receiver. If a NTP failure were to occur, the clocks would continue to be synchronized to the internal clock and would not deviate from each other. Once NTP time is restored, all clocks would once again be synchronized to the NTP time.

L. The system must have a fail safe design so that if a power interruption were to occur, the clocks will continue to operate. If a synch signal is not received by the analog clocks for 48 hours, the second hand shall double pulse to indicate this

condition. Upon restoration of power, the transmitter shall once again communicate with the clocks and normal operation will resume.

M. Battery Powered Analog Clocks shall require 2 "D" cell batteries.

N. System shall be 100% programmable from the front operational panel with lights that indicate power status and GPS reception. Panel programming shall also include Time Zone, Frequency, 12 or 24 hour operation and DST on/off.

O. The wireless backbone must support expansion of the system to include wireless alphanumeric displays for emergency crisis communications.

P. The system shall be able to be modified to use NTP (Network Time Protocol) instead of GPS as the time source without the need to replace the transmitter.

Q. The system shall lend itself to expansion by simple addition of wireless secondary clocks and their required power source.

R. Wireless transmitter shall be Rauland Model # WCXATRAN as follows:

1. FCC Part 90 Approved, 467.2125-467.4375 MHz frequency range
2. Radio Technology (Narrowband FM, 12.5 KHz bandwidth)
3. 10 selectively available channels
4. 5 watt transmitter
5. Daylight Savings Time pre-programmed
6. Time Zone Pre-set
7. Non-Volatile Memory
8. LCD Display for time, date, year, power, time zone and signal reception
9. Operating Range (32 degrees F to 158 degrees F)
10. Rack Mount
11. Power Supply Input: 120-volt AC, Output: 12-volt DC, 3 Amps
12. 7" Rear Mounted Antenna
13. Dimensions: 12"L x 6"W x 1.75"H Weight: 2 lbs
14. NTP Receiver Model# WCXRVPNTP100, Dimensions (2.5"W x .75"H) Operating Range (-32 Degrees - 158 Degrees)
15. Optional External Antenna for use in large campus applications. Up to 2 miles radius

S. Secondary 13" analog clocks shall be Rauland Model # WCA1312B as follows:

1. 13" Analog Clock (Battery Powered using 2"D" Cell batteries).

2. Maintenance Free.
3. Five year manufacturer's warranty.
4. Microprocessor based with built-in wireless receiver
5. Heavy Duty Construction
6. Durable ABS Casing
7. Clock numbering graphics shall be Standard Arabic Format (12HR-60 Minute)
8. Face of clock is white
9. Hour and Minute hands shall be black, second hand is red
10. The clock lens shall use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
11. Wire Guard Model WANA13WG shall be provided in gym.
12. The clock shall have a low-profile, semi-flush design

T. Secondary dual face 13" analog clocks shall be as follows:

1. Requires two Rauland #WCA1312B Clocks mounted back to back with either one Rauland Model # WCAMC (Ceiling Mount Kit) or #WCAMW (Wall Mount Kit)
2. Wall or Ceiling Mount shall be determined by drawings or owner
3. Maintenance Free.
4. Five year manufacturer's warranty.
5. Microprocessor based with built-in wireless receiver
6. Heavy Duty Construction
7. Durable ABS Casing
8. Clock numbering graphics shall be Standard Arabic Format (12HR-60 Minute)
9. Face of clock is white
10. Hour and Minute hands shall be black, second hand is red
11. The clock lens shall use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.

U. Secondary 16" analog clocks shall be Rauland Model # WCA1612B as follows:

1. 16" Analog Clock (Battery Powered using 2"D" Cell batteries).
2. Maintenance Free.
3. Five year manufacturer's warranty.
4. Microprocessor based with built-in wireless receiver
5. Heavy Duty Construction
6. Durable ABS Casing
7. Clock numbering graphics shall be Standard Arabic Format (12HR-60 Minute)
8. Face of clock is white
9. Hour and Minute hands shall be black, second hand is red
10. he clock lens shall use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
11. Provide a Wire Guard Model #WANA16WG for each clock in the gymnasium.\
12. The clock shall have a low-profile, semi-flush design

2.6 SOUND SYSTEM

A. Contractor shall furnish and install speakers, microphones, headend equipment, raceways, outlets, cabinet, cables raceways and all other equipment whether specifically indicated or not, for complete and properly operating sound systems.

B. Stage/Multipurpose Room Sound System shall include the following:

1. Rauland MCX-325 AM/FM digital cassette player (mounted in rack).
2. Shure Model #SM58LC microphone with M-50 cord (quantity of 2).
3. DBX Venue360 Equalizer/feedback eliminator (mounted in rack).
4. Interface to the intercom system (biamp EPI) for paging over-ride. Rauland #TCC2033 (switchable on or off).
5. Shure handheld BLX wireless microphone, dual diversity. (quantity of 2)
6. Speakers shall be a JBL Control Series 26C, 6 2" speaker, 150 watt, 16 ohms (woofer and coaxially mounted 0.75" tweeter) with grill, and backbox for recess installation.
7. Amplifier - The powered amplifier shall be a Crown XTI-1002 amplifier. The amplifier shall be solid state dual channel model employed multi

mode grounded bridge output circuitry. The amplifier shall contain protection circuitry, which will limit the drive level placed on the output devices before their known safe operation area is exceeded. It shall be rated 120V and shall draw 60 watts or less. It shall have steel chassis with flow-through ventilation, (mounted in rack). The power amplifier shall meet or exceed the following performance criteria:

a. Input sensitivity for rated output shall be 0.775V unbalanced.
b. Rated FTC output in dual mode with less than 0.1% THD.
c. 660 watts per channel into 4 OHMS, 400 watts per channel into 8 OHMS.

8. Mixer/Preamplifier/Equalizer (mounted in rack):

a. Mixer shall accommodate eight line/mic and one mixing bus. Mixer shall be a Crown 28M. Contractor shall provide the proper microphone level modules as required for up to 4 microphones.

9. Feedback Eliminator/Equalizer with a DBX Venue360 feedback eliminator.
10. Rack shall be an Atlas/Soundolier Series 340-21B wall rack with door and key lock.
11. Model MCX325 AM/FM tuner/compact disc player shall be installed in rack.
12. Microphone outlets shall be a Soundilier S601-13C or equal, three microphone three-pin female connectors mounted on single gang stainless plate.

C. System shall be interlocked with the intercom/paging system so that the sound system speakers are silent when an intercom/paging call is made to this room.
D. System shall interface with fire alarm system for shut down during alarm condition.

PART 3 EXECUTION

3.1 THE SYSTEM SHALL BE SUBMITTED AS A DELEGATED DESIGN WITH A BASIS OF DESIGN AS RAUL/BORG.

3.2 INSTALLER QUALIFICATIONS

A. Shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least 10 years. The contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's warranty privileges.

B. Shall show satisfactory evidence, upon request, that the supplier maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The supplier shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

3.3 GENERAL CONDITIONS

A. Installation and start up of all systems shall be under the direct supervision of a local agency regularly engaged in installation, repair, and maintenance of such systems. The supplier shall be accredited by the proposed equipment manufacturers and be prepared to offer a service contract for system maintenance on completion of the guarantee period and provide the names, locations, and size of six (6) recent successful installations in the area.

B. The agency providing equipment shall be responsible for providing all specified equipment and mentioned services for all equipment as specified herein. The agency must be a local authorized distributor of all specified equipment for single source of responsibility and shall provide documents proving such. The agency must provide written proof that the agency is adequately staffed with factory trained technicians for all of the specified equipment. The agency must have established business for and currently be providing all services for the equipment to be provided for a minimum of 10 years.

C. The contractor shall be an established communications and electronics contractor that has had and currently maintains a locally run and operated business for at least 10 years. The contractor shall utilize a duly authorized distributor of the equipment supplied for this project location with full manufacturer's warranty privileges.

D. The contractor shall show satisfactory evidence, upon request, that the supplier maintains a fully equipped service organization capable of furnishing adequate

inspection and service to the system. The supplier shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

E. Electrical Component Standard: Provide work complying with applicable requirements of NFPA 70 "National Electrical Code" including, but not limited to:

1. Article 250, Grounding.
2. Article 300, Part A. Wiring Method.
3. Article 310, Conductors for General Wiring.
4. Article 725, Remote Control, Signaling Circuits.
5. Article 800, Communication Systems.
6. EIA Compliance: Comply with the following Electronics Industries Association Standards:
    a. Sound Systems, EIA 160.
    b. Loudspeakers, Dynamic Magnetic Structures, and Impedance, EIA 299 A.
    c. Racks, Panels, and Associated Equipment, EIA 310 A.
    d. Amplifiers for Sound Equipment, SE 101 A.
    e. Speakers for Sound Equipment, SE 103.

3.4 WARRANTY

A. The Contractor shall guarantee availability of local service by factory trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On the premise maintenance shall be provided at no cost to the buyer for a period of one (1) year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect, or accident. Additionally, all manufacturer supplied products must be covered by a five (5) year (parts only) limited warranty from the date of acceptance. The warranty period shall begin on the date of acceptance by the Owner.

B. The contractor shall guarantee availability of local service by factory trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On the premise maintenance shall be provided at

no cost to the buyer for a period of one (1) year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect, or accident. Additionally, all manufacturer supplied products must be covered by a five (5) year (parts only) limited warranty from the date of acceptance. The warranty period shall begin on the date of acceptance by the Owner.

C. Warranty provisions shall be as follows:

a. Provide five-year warranty of the System against defects in material and workmanship. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one year warranty shall be provided for labor.

b. Contractor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the contractor shall provide "loaner" equipment to the facility at no charge.

c. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

D. OWNER TRAINING

1. At project completion, the contractor shall provide a minimum of eight hours of in service training with this system. These sessions shall be broken into segments that will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

END OF SECTION 274100

Section 281300-ACCESS CONTROL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. GENERAL

1. Basis of Design System is RS2 Systems

B. Section Includes:

1. Security access central-control station.
2. Security access operating system and application software.
3. Security access controllers connected to high-speed electronic-data transmission network.

1.3 DEFINITIONS

A. CPU: Central processing unit.

B. Credential: Data assigned to an entity and used to identify that entity.

C. dpi: Dots per inch.

D. DTS: Digital Termination Service. A microwave-based, line-of-sight communication provided directly to the end user.

E. GFI: Ground fault interrupter.

F. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.

G. I/O: Input/Output.

H. LAN: Local area network.

I. Location: A Location on the network having a PC-to-controller communications link, with additional controllers at the Location connected to the PC-to-controller link

with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.

J. PCI Bus: Peripheral Component Interconnect. A peripheral bus providing a high-speed data path between the CPU and the peripheral devices such as a monitor, disk drive, or network.

K. PDF: Portable Document Format. The file format used by the Acrobat document-exchange-system software from Adobe.

L. RAS: Remote access services.

M. RF: Radio frequency.

N. ROM: Read-only memory. ROM data are maintained through losses of power.

O. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.

P. TWAIN: Technology without an Interesting Name. A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device.

Q. UPS: Uninterruptible power supply.

R. USB: Universal serial bus.

S. WAN: Wide area network.

T. WAV: The digital audio format used in Microsoft Windows.

U. WMP: Windows media player.

V. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

W. Windows: Operating system by Microsoft Corporation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Diagrams for cable management system.

2. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 2 and 3.
3. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:

    a. Workstation outlets, jacks, and jack assemblies.
    b. Patch cords.
    c. Patch panels.

4. Cable Administration Drawings: As specified in "Identification" Article.
5. Battery and charger calculations for central station, workstations, and controllers.

C. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.

D. Other Action Submittals:

1. Project planning documents as specified in Part 3.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

1. Microsoft Windows software documentation.
2. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files.
3. System installation and setup guides with data forms to plan and record options and setup decisions.

1.7 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. Credential FOB blanks, ready for printing. Include enough credential FOBs for all personnel to be enrolled at the site plus an extra 50 percent for future use.
2. Fuses of all kinds, power and electronic, equal to 10 percent of amount installed for each size used, but no fewer than three units.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1. Cable installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.

B. Source Limitations: Obtain central station, workstations, controllers, Identifier readers, and all software through one source from single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70, "National Electrical Code."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Central Station, Workstations, and Controllers:

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F , and not more than 80 percent relative humidity, noncondensing.
2. Open each container; verify contents against packing list; and file copy of packing list, complete with container identification, for inclusion in operation and maintenance data.
3. Mark packing list with the same designations assigned to materials and equipment for recording in the system labeling schedules that are generated by software specified in "Cable and Asset Management Software" Article.
4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.10 PROJECT CONDITIONS

A. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except the central-station control unit, installed in air-conditioned indoor environments shall be rated for continuous operation in ambient conditions of 36 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing.

2. Outdoor Environment: NEMA 250, NEMA 250, Type 3R enclosures. System components installed in locations exposed to weather shall be

rated for continuous operation in ambient conditions of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to 85 mph.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. RS2 Systems

2.2 DESCRIPTION

A. Security Access System: One or more networked PC-based workstations,] and field-installed controllers, connected by a high-speed electronic-data transmission network.

B. System Software: Based on 32]-bit, Windows central-station, workstation operating system, server operating system, and application software. Software shall have the following capabilities:

1. Multiuser and multitasking to allow for independent activities and monitoring to occur simultaneously at different workstations.
2. Graphical user interface to show pull-down menus and a menu-tree format that complies with interface guidelines of Microsoft Windows.
3. System license for the entire system including capability for future additions that are within the indicated system size limits specified in this Section.
4. Open-architecture system that allows importing and exporting of data and interfacing with other systems that are compatible with Microsoft Windows.
5. Password-protected operator login and access.
6. Open-database-connectivity compliant.

C. Network connecting the central station and workstations shall be a LAN using Microsoft Windows-based TCP/IP with a capacity of connecting up to 99 workstations. System shall be portable across multiple communication platforms without changing system software.

D. Network(s) connecting PCs and controllers shall consist of one or more of the following:

1. Local area, IEEE 802.3 Fast Ethernet Gigabit-Ethernet, star topology network based on TCP/IP.
2. Direct-connected, RS-232 cable from the COM port of the central station to the first controller, then RS-485 cable to interconnect the remaining controllers at that Location.
3. Dial-up and cable modem connection using a standard cable or dial-up telephone line.

2.3 OPERATION

A. Security access system shall use a single database for access-control and credential-creation functions.

B. Distributed Processing: A fully distributed processing system.

1. Access-control information, including time, date, valid codes, access levels, and similar data, shall be downloaded to controllers so each controller can make access-control decisions.
2. Intermediate controllers for access control are prohibited.
3. In the event that communications with the central controller are lost, controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the central station.

C. Number of Locations:

1. Support at least 32,000 separate Locations using a single PC with combinations of direct-connect, dial-up, or TCP/IP LAN connections to each Location.
2. Each Location shall have its own database and history in the central station.
3. Locations may be combined to share a common database.

D. Data Capacity:

1. 130 different card-reader formats.
2. 48 graphic file types for importing maps.

E. Location Capacity:

1. 128 reader-controlled doors.
2. 50,000 total-access credentials.
3. 2048 supervised alarm inputs.
4. 2048 programmable outputs.
5. 32,000 custom action messages per Location to instruct operator on action required when alarm is received.

F. System Network Requirements:

1. System components shall be interconnected and shall provide automatic communication of status changes, commands, field-initiated interrupts, and other communications required for proper system operation.
2. Communication shall not require operator initiation or response and shall return to normal after partial- or total-network interruption such as power loss or transient upset.
3. System shall automatically annunciate communication failures to the operator and shall identify the communications link that has experienced a partial or total failure.
4. Communications controller may be used as an interface between the central-station display systems and the field device network.

Communications controller shall provide functions required to attain the specified network communications performance.

G. Central station shall provide operator interface, interaction, display, control, and dynamic and real-time monitoring. Central station shall control system networks to interconnect all system components, including workstations and field-installed controllers.

H. Field equipment shall include controllers, sensors, and controls.

1. Controllers shall serve as an interface between the central station and sensors and controls.
2. Data exchange between the central station and the controllers shall include down-line transmission of commands, software, and databases to controllers.
3. The up-line data exchange from the controller to the central station shall include status data such as intrusion alarms, status reports, and entry-control records.
4. Controllers are classified as alarm-annunciation or entry-control type.

I. System Response to Alarms:

1. Field device network shall provide a system end-to-end response time of one second(s) or less for every device connected to the system.
2. Alarms shall be annunciated at the central station within one second of the alarm occurring at a controller or at a device controlled by a local controller, and within 100 ms if the alarm occurs at the central station.
3. Alarm and status changes shall be displayed within 100 ms after receipt of data by the central station.
4. All graphics shall be displayed, including graphics-generated map displays, on the console monitor within five seconds of alarm receipt at the security console.
5. This response time shall be maintained during system heavy load.

J. False-Alarm Reduction: The design of the central station and controllers shall contain features to reduce false alarms. Equipment and software shall comply with SIA CP-01.

K. Error Detection:

1. Use a cyclic code method to detect single- and double-bit errors, burst errors of eight bits or fewer, and at least 99 percent of all other multibit and burst errors between controllers and the central station.
2. Interactive or product error-detection codes alone will not be acceptable.
3. A message shall be in error if one bit is received incorrectly.
4. Retransmit messages with detected errors.
5. Allow for an operator-assigned two-digit decimal number to each communications link representing the number of retransmission attempts.
6. Central station shall print a communication failure alarm message when the number of consecutive retransmission attempts equals the assigned quantity.
7. Monitor the frequency of data transmission failure for display and logging.

L. Data Line Supervision: System shall initiate an alarm in response to opening, closing, shorting, or grounding of data transmission lines.

M. Door Hardware Interface:

1. Comply with requirements in Section 087100 "Door Hardware" and Section 087111 "Door Hardware (Descriptive Specification)" for door hardware required to be monitored or controlled by the security access system.
2. Electrical characteristics of controllers shall match the signal and power requirements of door hardware.

2.4 APPLICATION SOFTWARE

A. System Software: Based on 32-bit, Microsoft Windows central-station and workstation operating system and application software.

1. Multiuser multitasking shall allow independent activities and monitoring to occur simultaneously at different workstations.
2. Graphical user interface shall show pull-down menus and a menu-tree format.
3. Capability for future additions within the indicated system size limits.
4. Open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
5. Password-protected operator login and access.

B. Peer Computer Control Software: Detect a failure of a central computer and cause the other central computer to assume control of all system functions without interruption of operation. Both central computers shall have drivers to support this mode of operation.

C. Workstation Software:

1. Password levels shall be individually customized at each workstation to allow or disallow operator access to program functions for each Location.
2. Workstation event filtering shall allow user to define events and alarms that will be displayed at each workstation. If an alarm is unacknowledged (not handled by another workstation) for a preset amount of time, the alarm will automatically appear on the filtered workstation.

D. Controller Software:

1. Controllers shall operate as autonomous, intelligent processing units.

a. Controllers shall make decisions about access control, alarm monitoring, linking functions, and door-locking schedules for their operation, independent of other system components.
b. Controllers shall be part of a fully distributed processing-control network.
c. The portion of the database associated with a controller, and consisting of parameters, constraints, and the latest value or status

of points connected to that controller, shall be maintained in the controller.

2. The following functions shall be fully implemented and operational within each controller:

    a. Monitoring inputs.
    b. Controlling outputs.
    c. Automatically reporting alarms to the central station.
    d. Reporting of sensor and output status to the central station on request.
    e. Maintaining real time, automatically updated by the central station at least once a day.
    f. Communicating with the central station.
    g. Executing controller resident programs.
    h. Diagnosing.
    i. Downloading and uploading data to and from the central station.

3. Controller Operations at a Location:

    a. Up to 64 controllers connected to TIA 485-A communications loop. Globally operating I/O linking and anti-passback functions between controllers within the same Location without central-station or workstation intervention. Linking and anti-passback shall remain fully functional within the same Location even when the central station or workstations are off-line.
    b. In the event of communication failure between the central station and a Location, there shall be no degradation in operations at the controllers at that Location. Controllers at each Location shall be connected to a memory buffer with a capacity to store up to 10,000 events; there shall be no loss of transactions in system history files until the buffer overflows.
    c. Buffered events shall be handled in a first-in-first-out mode of operation.

4. Individual Controller Operation:

    a. Controllers shall transmit alarms, status changes, and other data to the central station when communications circuits are operable. If communications are not available, controllers shall function in a stand-alone mode; operational data, including the status and alarm data normally transmitted to the central station, shall be stored for later transmission to the central station. Storage capacity for the latest 1024 events shall be provided at each controller.
    b. Card-reader ports of a controller shall be custom configurable for at least 120 different card-reader or keypad formats. Multiple reader or keypad formats may be used simultaneously at different controllers or within the same controller.
    c. Controllers shall provide a response to card readers or keypad entries in less than 0.25 seconds, regardless of system size.
    d. Controllers that are reset, or powered up from a nonpowered state, shall automatically request a parameter download and reboot to

their proper working state. This shall happen without any operator intervention.

e. Initial Startup: When controllers are brought on-line, database parameters shall be automatically downloaded to them. After initial download is completed, only database changes shall be downloaded to each controller.

f. On failure for any reason, controllers shall perform an orderly shutdown and force controller outputs to a predetermined failure-mode state, consistent with the failure modes shown and the associated control device.

g. After power is restored, following a power failure, startup software shall initiate self-test diagnostic routines, after which controllers shall resume normal operation.

h. After controller failure, if the database and application software are no longer resident, controllers shall not restart but shall remain in the failure mode until repaired. If database and application programs are resident, controllers shall immediately resume operation. If not, software shall be restored automatically from the central station.

5. Communications Monitoring:

a. System shall monitor and report status of TIA 485-A communications loop of each Location.

b. Communication status window shall display which controllers are currently communicating, a total count of missed polls since midnight, and which controller last missed a poll.

c. Communication status window shall show the type of CPU, the type of I/O board, and the amount of RAM for each controller.

6. Operating systems shall include a real-time clock function that maintains seconds, minutes, hours, day, date, and month. The real-time clock shall be automatically synchronized with the central station at least once a day to plus or minus 10 seconds. The time synchronization shall be automatic, without operator action and without requiring system shutdown.

E. PC-to-Controller Communications:

1. Central-station or workstation communications shall use the following:

a. Direct connection using serial ports of the PC.

b. TCP/IP LAN interface cards.

c. Dial-up or cable modems for connections to Locations.

2. Each serial port used for communications shall be individually configurable for "direct communications," "modem communications incoming and outgoing," or "modem communications incoming only," or as an ASCII output port. Serial ports shall have adjustable data transmission rates and shall be selectable under program control.

3. Use multiport communications board if more than two serial ports are needed.

a. Use a 4-, 8-, or 16-serial port configuration that is expandable to 32- or 64-serial ports.
b. Connect the first board to an internal PCI bus adapter card.

4. Direct serial, TCP/IP, and dial-up, cable, or satellite communications shall be alike in the monitoring or control of the system except for the connection that must first be made to a dial-up or voice-over IP Location.
5. TCP/IP network interface card (NIV) shall have an option to set the poll-frequency and message-response time-out settings.
6. PC-to-controller and controller-to-controller communications (direct, dial-up, or TCP/IP) shall use a polled-communication protocol that checks sum and acknowledges each message. All communications in this subparagraph shall be verified and buffered, and retransmitted if not acknowledged.

F. Direct Serial or TCP/IP PC-to-Controller Communications:

1. Communication software on the PC shall supervise the PC-to-controller communications link.
2. Loss of communications to any controller shall result in an alarm at all PCs running the communication software.
3. When communications are restored, all buffered events shall automatically upload to the PC, and any database changes shall be automatically sent to the controller.

G. Dial-up Modem or Cable Modem PC-to-Controller Communications:

1. Communication software on the PC shall supervise the PC-to-controller communications link during dial-up modem connect times.
2. Communication software shall be programmable to routinely poll each of the remote dial-up or cable modem Locations, collecting event logs and verifying phone lines at operator-selectable time intervals for each Location.
3. System shall be programmable for dialing and connecting to all dial-up or cable modem Locations and for retrieving the accrued history transactions on an automatic basis as often as once every 10 minutes and up to once every 1 minutes.
4. Failure to communicate to a dial-up Location three times in a row shall result in an alarm at the PC.
5. Time offset capabilities shall be present so that Locations in a different geographical time zone than the host PC will be set to, and maintained at, the proper local time. This feature shall allow for geographical time zones that are ahead of or behind the host PC.
6. The controller connected to a dial-up or cable modem shall automatically buffer all normal transactions until its buffer reaches 80 percent of capacity. When the transaction buffer reaches 80 percent, the controller shall automatically initiate a call to the central station and upload all transactions.
7. Alarms shall be reported immediately.
8. Dial-up or cable modems shall be provided by manufacturer of the system. Modems used at the controller shall be powered by the controller. Power to the modem shall include battery backup if the controller is so equipped.

H. Controller-to-Controller Communications:

1. TIA 485-A, four-wire, point-to-point, regenerative (repeater) communications network methodology.
2. TIA 485-A communications signal shall be regenerated at each controller.

I. Database Downloads:

1. All data transmissions from PCs to a Location, and between controllers at a Location, shall include a complete database checksum to check the integrity of the transmission. If the data checksum does not match, a full data download shall be automatically retransmitted.
2. If a controller is reset for any reason, it shall automatically request and receive a database download from the PC. The download shall restore data stored at the controller to their normal working state and shall take place with no operator intervention.
3. Software shall provide for setting downloads via dial-up connection to once per 24-hour period, with time selected by the operator.
4. Software shall provide for setting delays of database downloads for dial-up connections. Delays change the download from immediately to a delay ranging from one to 999 minutes.

J. Operator Interface:

1. Inputs in system shall have two icon representations, one for the normal state and one for the abnormal state.
2. When viewing and controlling inputs, displayed icons shall automatically change to the proper icon to display the current system state in real time. Icons shall also display the input's state, whether armed or bypassed, and if the input is in the armed or bypassed state due to a time zone or a manual command.
3. Outputs in system shall have two icon representations, one for the secure (locked) state and one for the open (unlocked) state.
4. Icons displaying status of the I/O points shall be constantly updated to show their current real-time condition without prompting by the operator.
5. The operator shall be able to scroll the list of I/Os and press the appropriate toolbar button, or right click, to command the system to perform the desired function.
6. Graphic maps or drawings containing inputs, outputs, and override groups shall include the following:

    a. Database to import and store full-color maps or drawings and allow for input, output, and override group icons to be placed on maps.
    b. Maps to provide real-time display animation and allow for control of points assigned to them.
    c. System to allow inputs, outputs, and override groups to be placed on different maps.
    d. Software to allow changing the order or priority in which maps will be displayed.

7. Override Groups Containing I/Os:

a. System shall incorporate override groups that provide the operator with the status and control over user-defined "sets" of I/Os with a single icon.
b. Icon shall change automatically to show the live summary status of points in that group.
c. Override group icon shall provide a method to manually control or set to time-zone points in the group.
d. Override group icon shall allow the expanding of the group to show icons representing the live status for each point in the group, individual control over each point, and the ability to compress the individual icons back into one summary icon.

8. Schedule Overrides of I/Os and Override Groups:

a. To accommodate temporary schedule changes that do not fall within the holiday parameters, the operator shall have the ability to override schedules individually for each input, output, or override group.
b. Each schedule shall be composed of a minimum of two dates with separate times for each date.
c. The first time and date shall be assigned the override state that the point shall advance to when the time and date become current.
d. The second time and date shall be assigned the state that the point shall return to when the time and date become current.

9. Copy command in database shall allow for like data to be copied and then edited for specific requirements, to reduce redundant data entry.

K. Operator Access Control:

1. Control operator access to system controls through three password-protected operator levels. System operators and managers with appropriate password clearances shall be able to change operator levels for operators.
2. Three successive attempts by an operator to execute functions beyond their defined level during a 24-hour period shall initiate a software tamper alarm.
3. A minimum of 32 passwords shall be available with the system software. System shall display the operator's name or initials in the console's first field. System shall print the operator's name or initials, action, date, and time on the system printer at login and logoff.
4. The password shall not be displayed or printed.
5. Each password shall be definable and assignable for the following:

a. Selected commands to be usable.
b. Access to system software.
c. Access to application software.
d. Individual zones that are to be accessed.
e. Access to database.

L. Operator Commands:

1. Command Input: Plain-language words and acronyms shall allow operators to use the system without extensive training or data-processing backgrounds. System prompts shall be a word, a phrase, or an acronym.
2. Command inputs shall be acknowledged and processing shall start in not less than one second(s).
3. Tasks that are executed by operator's commands shall include the following:

    a. Acknowledge Alarms: Used to acknowledge that the operator has observed the alarm message.
    b. Place Zone in Access: Used to remotely disable intrusion-alarm circuits emanating from a specific zone. System shall be structured so that console operator cannot disable tamper circuits.
    c. Place Zone in Secure: Used to remotely activate intrusion-alarm circuits emanating from a specific zone.
    d. System Test: Allows the operator to initiate a system-wide operational test.
    e. Zone Test: Allows the operator to initiate an operational test for a specific zone.
    f. Print reports.
    g. Change Operator: Used for changing operators.
    h. Security Lighting Controls: Allows the operator to remotely turn on or turn off security lights.
    i. Display Graphics: Used to show any graphic displays implemented in the system. Graphic displays shall be completed within 20 seconds from time of operator command.
    j. Run system tests.
    k. Generate and format reports.
    l. Request help with the system operation.

        1) Include in main menus.
        2) Provide unique, descriptive, context-sensitive help for selections and functions with the press of one function key.
        3) Provide navigation to specific topic from within the first help window.
        4) Help shall be accessible outside the application program.

    m. Entry-Control Commands:

        1) Lock (secure) or unlock (open) each controlled entry and exit up to four times a day through time-zone programming.
        2) Arm or disarm each monitored input up to four times a day through time-zone programming.
        3) Enable or disable readers or keypads up to two times a day through time-zone programming.
        4) Enable or disable cards or codes up to four times a day per entry point through access-level programming.

4. Command Input Errors: Show operator input assistance when a command cannot be executed because of operator input errors. Assistance screen shall use plain-language words and phrases to explain why the command cannot be executed. Error responses that require an operator to look up a

code in a manual or other document are not acceptable. Conditions causing operator assistance messages include the following:

a. Command entered is incorrect or incomplete.
b. Operator is restricted from using that command.
c. Command addresses a point that is disabled or out of service.
d. Command addresses a point that does not exist.
e. Command is outside the system's capacity.

M. Alarms:

1. System Setup:

a. Assign manual and automatic responses to incoming-point status change or alarms.
b. Automatically respond to input with a link to other inputs, outputs, or operator-response plans; unique sound with use of WAV files; and maps or images that graphically represent the point location.
c. Sixty-character message field for each alarm.
d. Operator-response-action messages shall allow message length of at least 65,000 characters, with database storage capacity of up to 32,000 messages. Setup shall assign messages to zone.
e. Secondary messages shall be assignable by the operator for printing to provide further information and shall be editable by the operator.
f. Allow 25 secondary messages with a field of four lines of 60 characters each.
g. Store the most recent 1000 alarms for recall by the operator using the report generator.

2. Software Tamper:

a. Annunciate a tamper alarm when unauthorized changes to system database files are attempted. Three consecutive unsuccessful attempts to log onto system shall generate a software tamper alarm.
b. Annunciate a software tamper alarm when an operator or other individual makes three consecutive unsuccessful attempts to invoke functions beyond the authorization level.
c. Maintain a transcript file of the last 5000 commands entered at each central station to serve as an audit trail. System shall not allow write access to system transcript files by any person, regardless of their authorization level.
d. Allow only acknowledgment of software tamper alarms.

3. Read access to system transcript files shall be reserved for operators with the highest password authorization level available in system.
4. Animated Response Graphics: Highlight alarms with flashing icons on graphic maps; display and constantly update the current status of alarm inputs and outputs in real time through animated icons.
5. Multimedia Alarm Annunciation: WAV files to be associated with alarm events for audio annunciation or instructions.

6. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, with options of requiring the operator to enter a comment about disposition of alarm. Allow operator to silence alarm sound when alarm is acknowledged.
7. Alarm Automation Interface: High-level interface to central-station alarm automation software systems. Allows input alarms to be passed to and handled by automation systems in the same manner as burglar alarms, using a TIA 232-F ASCII interface.
8. CCTV Alarm Interface: Allow commands to be sent to CCTV systems during alarms (or input change of state) through serial ports.
9. Camera Control: Provides operator ability to select and control cameras from graphic maps.

N. Alarm Monitoring: Monitor sensors, controllers, and DTS circuits and notify operators of an alarm condition. Display higher-priority alarms first and, within alarm priorities, display the oldest unacknowledged alarm first. Operator acknowledgment of one alarm shall not be considered acknowledgment of other alarms nor shall it inhibit reporting of subsequent alarms.

1. Displayed alarm data shall include type of alarm, location of alarm, and secondary alarm messages.
2. Printed alarm data shall include type of alarm, location of alarm, date and time (to nearest second) of occurrence, and operator responses.
3. Maps shall automatically display the alarm condition for each input assigned to that map if that option is selected for that input location.
4. Alarms initiate a status of "pending" and require the following two handling steps by operators:

    a. First Operator Step: "Acknowledged." This action shall silence sounds associated with the alarm. The alarm remains in the system "Acknowledged" but "Un-Resolved."
    b. Second Operator Step: Operators enter the resolution or operator comment, giving the disposition of the alarm event. The alarm shall then clear.

5. Each workstation shall display the total pending alarms and total unresolved alarms.
6. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.
7. Alarms shall transmit to the central station in real time except for allowing connection time for dial-up locations.
8. Alarms shall be displayed and managed from a minimum of four different windows.

    a. Input Status Window: Overlay status icon with a large red blinking icon. Selecting the icon will acknowledge the alarm.
    b. History Log Transaction Window: Display name, time, and date in red text. Selecting red text will acknowledge the alarm.
    c. Alarm Log Transaction Window: Display name, time, and date in red. Selecting red text will acknowledge the alarm.

d. Graphic Map Display: Display a steady colored icon representing each alarm input location. Change icon to flashing red when the alarm occurs. Change icon from flashing red to steady red when the alarm is acknowledged.

9. Once an alarm is acknowledged, the operator shall be prompted to enter comments about the nature of the alarm and actions taken. Operator's comments may be manually entered or selected from a programmed predefined list, or a combination of both.
10. For locations where there are regular alarm occurrences, provide programmed comments. Selecting that comment shall clear the alarm.
11. The time and name of the operator who acknowledged and resolved the alarm shall be recorded in the database.
12. Identical alarms from the same alarm point shall be acknowledged at the same time the operator acknowledges the first alarm. Identical alarms shall be resolved when the first alarm is resolved.
13. Alarm functions shall have priority over downloading, retrieving, and updating database from workstations and controllers.
14. When a reader-controlled output (relay) is opened, the corresponding alarm point shall be automatically bypassed.

O. Monitor Display: Display text and graphic maps that include zone status integrated into the display. Colors are used for the various components and current data. Colors shall be uniform throughout the system.

1. Color Code:

a. FLASHING RED: Alerts operator that a zone has gone into an alarm or that primary power has failed.
b. STEADY RED: Alerts operator that a zone is in alarm and alarm has been acknowledged.
c. YELLOW: Advises operator that a zone is in access.
d. GREEN: Indicates that a zone is secure and that power is on.

2. Graphics:

a. Support 32,000 graphic display maps and allow import of maps from a minimum of 16 standard formats from another drawing or graphics program.
b. Allow I/O to be placed on graphic maps by the drag-and-drop method.
c. Operators shall be able to view the inputs, outputs, and the point's name by moving the mouse cursor over the point on the graphic map.
d. Inputs or outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view graphic maps associated with I/Os.
e. Each graphic map shall have a display-order sequence number associated with it to provide a predetermined order when toggled to different views.
g. Camera icons shall have the ability to be placed on graphic maps that, when selected by an operator, will open a video window,

display the camera associated with that icon, and provide pan-tilt-zoom control.

h. Input, output, or camera placed on a map shall allow the ability to arm or bypass an input, open or secure an output, or control the pan-tilt-zoom function of the selected camera.

P. System test software enables operators to initiate a test of the entire system or of a particular portion of the system.

1. Test Report: The results of each test shall be stored for future display or printout. The report shall document the operational status of system components.

Q. Report-Generator Software: Include commands to generate reports for displaying, printing, and storing on disk and tape. Reports shall be stored by type, date, and time. Report printing shall be the lowest-priority activity. Report-generation mode shall be operator selectable but set up initially as periodic, automatic, or on request. Include time and date printed and the name of operator generating the report. Report formats may be configured by operators.

1. Automatic Printing: Setup shall specify, modify, or inhibit the report to be generated; the time the initial report is to be generated; the time interval between reports; the end of the period; and the default printer.
2. Printing on Request: An operator may request a printout of any report.
3. Alarm Reports: Reporting shall be automatic as initially set up. Include alarms recorded by system over the selected time and information about the type of alarm such as door alarm, intrusion alarm, tamper alarm, etc., the type of sensor, the location, the time, and the action taken.
4. Access and Secure Reports: Document zones placed in access, the time placed in access, and the time placed in secure mode.
5. Custom Reports: Reports tailored to exact requirements of who, what, when, and where. As an option, custom report formats may be stored for future printing.
6. Automatic History Reports: Named, saved, and scheduled for automatic generation.
7. Cardholder Reports: Include data, or selected parts of the data, as well as the ability to be sorted by name, card number, imprinted number, or by any of the user-defined fields.
8. Cardholder by Reader Reports: Based on who has access to a specific reader or group of readers by selecting the readers from a list.
9. Cardholder by Access-Level Reports: Display everyone that has been assigned to the specified access level.
10. Who Is "In" (Muster) Report:

    a. Emergency Muster Report: One-click operation on toolbar launches report.
    b. Cardholder Report. Contain a count of persons who are "In" at a selected Location and a detailed listing of name, date, and time of last use, sorted by the last reader used or by the group assignment.

11. Panel Labels Reports: Printout of control-panel field documentation including the actual location of equipment, programming parameters, and

wiring identification. Maintain system installation data within system database so that data are available on-site at all times.

12. Activity and Alarm On-Line Printing: Activity printers for use at workstations; prints all events, or alarms only.
13. History Reports: Custom reports that allow the operator to select any date, time, event type, device, output, input, operator, Location, name, or cardholder to be included or excluded from the report.

    a. Initially store history on the hard disk of the host PC.
    b. Permit viewing of the history on workstations or print history to any system printer.
    c. The report shall be definable by a range of dates and times with the ability to have a daily start and stop time over a given date range.
    d. Each report shall depict the date, time, event type, event description, and device; or I/O name, cardholder group assignment, and cardholder name or code number.
    e. Each line of a printed report shall be numbered to ensure that the integrity of the report has not been compromised.
    f. Total number of lines of the report shall be given at the end of the report. If the report is run for a single event such as "Alarms," the total shall reflect how many alarms occurred during that period.

14. Reports shall have the following four options:

    a. View on screen.
    b. Print to system printer. Include automatic print spooling and "Print To" options if more than one printer is connected to the system.
    c. "Save to File" with full path statement.
    d. System shall have the ability to produce a report indicating status of system inputs and outputs or of inputs and outputs that are abnormal, out of time zone, manually overridden, not reporting, or in alarm.

15. Custom Code List Subroutine: Allow the access codes of system to be sorted and printed according to the following criteria:

    a. Active, inactive, or future activate or deactivate.
    b. Code number, name, or imprinted card number.
    c. Group, Location access levels.
    d. Start and stop code range.
    e. Codes that have not been used since a selectable number of days.
    f. In, out, or either status.
    g. Codes with trace designation.

16. The reports of system database shall allow options so that every data field may be printed.
17. The reports of system database shall be constructed so that the actual position of the printed data shall closely match the position of the data on the data-entry windows.

    a. Anti-Passback:

R. System shall have global and local anti-passback features, selectable by Location. System shall support hard and soft anti-passback.

1. Hard Anti-Passback: Once a credential holder is granted access through a reader with one type of designation (IN or OUT), the credential holder may not pass through that type of reader designation until the credential holder passes through a reader of opposite designation.
2. Soft Anti-Passback: Should a violation of the proper IN or OUT sequence occur, access shall be granted, but a unique alarm shall be transmitted to the control station, reporting the credential holder and the door involved in the violation. A separate report may be run on this event.
3. Timed Anti-Passback: A controller capability that prevents an access code from being used twice at the same device (door) within a user-defined amount of time.
4. Provide four separate zones per Location that can operate without requiring interaction with the host PC (done at controller). Each reader shall be assignable to one or all four anti-passback zones. In addition, each anti-passback reader can be further designated as "Hard," "Soft," or "Timed" in each of the four anti-passback zones. The four anti-passback zones shall operate independently.
5. The anti-passback schemes shall be definable for each individual door.
6. The Master Access Level shall override anti-passback.
7. System shall have the ability to forgive (or reset) an individual credential holder or the entire credential-holder population anti-passback status to a neutral status.

S. Visitor Assignment:

1. Provide for and allow an operator to be restricted to only working with visitors. The visitor badging subsystem shall assign credentials and enroll visitors. Allow only those access levels that have been designated as approved for visitors.
2. Provide an automated log of visitor name, time and doors accessed, and name of person contacted.
3. Allow a visitor designation to be assigned to a credential holder.
4. Security access system shall be able to restrict the access levels that may be assigned to credentials issued to visitors.
5. Allow operator to recall visitors' credential-holder file once a visitor is enrolled in the system.
6. The operator may designate any reader as one that deactivates the credential after use at that reader. The history log shall show the return of the credential.
7. System shall have the ability to use the visitor designation in searches and reports. Reports shall be able to print all or any visitor activity.

T. Time and Attendance:

1. Time and attendance reporting shall be provided to match IN and OUT reads and display cumulative time in for each day and cumulative time in for length designated in the report.
2. Shall be provided to match IN and OUT reads and display cumulative time in for each day and cumulative time in for length designated in the report.

3. System software setup shall allow designation of selected access-control readers as time and attendance hardware to gather the clock-in and clock-out times of the users at these readers.

    a. Reports shall show in and out times for each day, total time in for each day, and a total time in for period specified by the user.
    b. Allow the operator to view and print the reports, or save the reports to a file.
    c. Alphabetically sort reports on the person's last name, by Location or location group. Include all credential holders or optionally select individual credential holders for the report.

U. Training Software: Enables operators to practice system operation, including alarm acknowledgment, alarm assessment, response force deployment, and response force communications. System shall continue normal operation during training exercises and shall terminate exercises when an alarm signal is received at the console.

V. Entry-Control Enrollment Software: Database management functions that allow operators to add, delete, and modify access data as needed.

1. The enrollment station shall not have alarm response or acknowledgment functions.
2. Provide multiple, password-protected access levels. Database management and modification functions shall require a higher operator access level than personnel enrollment functions.
3. The program shall provide means to disable the enrollment station when it is unattended, to prevent unauthorized use.
4. The program shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations. In the case of personnel identity-verification subsystems, this shall include biometric data. Allow entry of personnel identifying information into the system database using menu selections and data fields. The data field names shall be customized during setup to suit user and site needs. Personnel identity-verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.
5. Cardholder Data: Provide 99 user-defined fields. System shall have the ability to run searches and reports using any combination of these fields. Each user-defined field shall be configurable, using any combination of the following features:

    a. MASK: Determines a specific format with which data must comply.
    b. REQUIRED: Operator is required to enter data into field before saving.
    c. UNIQUE: Data entered must be unique.
    d. DEACTIVATE DATE: Data entered will be evaluated as an additional deactivate date for all cards assigned to this cardholder.
    e. NAME ID: Data entered will be considered a unique ID for the cardholder.

6. Personnel Search Engine: A report generator with capabilities such as search by last name, first name, group, or any predetermined user-defined data field; by codes not used in definable number of days; by skills; or by seven other methods.
7. Multiple Deactivate Dates for Cards: User-defined fields to be configured as additional stop dates to deactivate any cards assigned to the cardholder.
8. Batch card printing.
9. Default card data can be programmed to speed data entry for sites where most card data are similar.
10. Enhanced ASCII File Import Utility: Allows the importing of cardholder data and images.
11. Card Expire Function: Allows readers to be configured to deactivate cards when a card is used at selected devices.

2.5 SYSTEM DATABASE

A. Database and database management software shall define and modify each point in database using operator commands. Definition shall include parameters and constraints associated with each system device.

B. Database Operations:

1. System data management shall be in a hierarchical menu-tree format, with navigation through expandable menu branches and manipulated with use of menus and icons in a main menu and system toolbar.
2. Navigational Aids:

    a. Toolbar icons for add, delete, copy, print, capture image, activate, deactivate, and muster report.
    b. Point and click feature to facilitate data manipulation.
    c. Next and previous command buttons visible when editing database fields to facilitate navigation from one record to the next.
    d. Copy command and copy tool in the toolbar to copy data from one record to create a new similar record.

3. Data entry shall be automatically checked for duplicate and illegal data and shall be verified for valid format.
4. System shall generate a memo or note field for each item that is stored in database, allowing the storing of information about any defining characteristics of the item. Memo field is used for noting the purpose for which the item was entered, reasons for changes that were made, and the like.

C. File Management:

1. File management shall include database backup and restoration system, allowing selection of storage media, including 3.5-inch floppy disk, Zip and Jaz drives, and designated network resources.
2. Operations shall be both manual and automatic modes. The number of automatic sequential backups before the oldest backup will be overwritten; FIFO mode shall be operator selectable.

3. Backup program shall provide manual operation from any PC on the LAN and shall operate while system remains operational.

D. Operator Passwords:

1. Support up to 32,000 individual system operators, each with a unique password.
2. One to eight alphanumeric characters
3. Allow passwords to be case sensitive.
4. Passwords shall not be displayed when entered.
5. Passwords shall have unique and customizable password profile, and allow several operators to share a password profile. Include the following features in the password profile:

    a. Predetermine the highest-level password profile for access to all functions and areas of program.
    b. Allow or disallow operator access to any program operation, including the functions of View, Add, Edit, and Delete.
    c. Restrict doors to which an operator can assign access.

6. Operators shall use a user name and password to log on to system. This user name and password shall be used to access database areas and programs as determined by the associated profile.
7. Make provision to allow the operator to log off without fully exiting program. User may be logged off but program will remain running while displaying the login window for the next operator.

E. Access Key FOB/Code Operation and Management: Access authorization shall be by card, by a manually entered code (PIN), or by a combination of both (card plus PIN).

1. Access authorization shall verify the facility code first, the card or card-and-PIN validation second, and the access level (time of day, day of week, date), anti-passback status, and number of uses last.
2. Use data-entry windows to view, edit, and issue access levels. Access-authorization entry-management system shall maintain and coordinate all access levels to prevent duplication or the incorrect creation of levels.
3. Allow assignment of multiple cards/codes to a cardholder.
4. Allow assignment of up to four access levels for each Location to a cardholder. Each access level may contain any combination of doors.
5. Each door may be assigned four time zones.
6. Access codes may be up to 11 digits in length.
7. Software shall allow the grouping of locations so cardholder data can be shared by all locations in the group.
8. Visitor Access: Issue a visitor badge for data tracking or photo ID purposes without assigning that person a card or code.
9. Cardholder Tracing: Allow for selection of cardholder for tracing. Make a special audible and visible annunciation at control station when a selected card or code is used at a designated code reader. Annunciation shall include an automatic display of the cardholder image.

2. Allow each cardholder to be given either an unlimited number of uses or a number from one to 9999 that regulates the number of times the card can be used before it is automatically deactivated.
3. Provide for cards and codes to be activated and deactivated manually or automatically by date. Provide for multiple deactivate dates to be preprogrammed.

A. Security Access Integration:

1. Photo ID badging and photo verification shall use the same database as the security access and may query data from cardholder, group, and other personal information to build a custom ID badge.
2. Automatic or manual image recall and manual access based on photo verification shall also be a means of access verification and entry.
3. System shall allow sorting of cardholders together by group or other characteristic for a fast and efficient method of reporting on, and enabling or disabling, cards or codes.

B. Key control and tracking shall be an integrated function of cardholder data.

1. Provide the ability to store information about which conventional metal keys are issued and to whom, along with key construction information.
2. Reports shall be designed to list everyone who possesses a specified key.

C. Facility Codes: System shall accommodate up to 2048 facility codes per Location, with the option of allowing facility codes to work at all doors or only at particular doors.

D. Operator Comments:

1. With the press of one appropriate button on the toolbar, the user shall be permitted to enter operator comments into the history at any time.
2. Automatic prompting of operator comment shall occur before the resolution of each alarm.
3. Operator comments shall be recorded by time, date, and operator number.
4. Comments shall be sorted and viewed through reports and history.
5. The operator may enter comments in two ways; either or both may be used:

    a. Manually entered through keyboard data entry (typed), up to 65,000 characters per each alarm.
    b. Predefined and stored in database for retrieval on request.

6. System shall have a minimum of 999 predefined operator comments with up to 30 characters per comment.

E. Group:

1. Group names may be used to sort cardholders into groups that allow the operator to determine the tenant, vendor, contractor, department, division, or any other designation of a group to which the person belongs.
2. System software shall have the capacity to assign one of 32,000 group names to an access authorization.

3. Make provision in software to deactivate and reactivate all access authorizations assigned to a particular group.
4. Allow sorting of history reports and code list printouts by group name.

F. Time Zones:

1. Each zone consists of a start and stop time for seven days of the week and three holiday schedules. A time zone is assigned to inputs, outputs, or access levels to determine when an input shall automatically arm or disarm, when an output automatically opens or secures, or when access authorization assigned to an access level will be denied or granted.
2. Up to four time zones may be assigned to inputs and outputs to allow up to four arm or disarm periods per day or four lock or unlock periods per day; up to three holiday override schedules may be assigned to a time zone.
3. Data-entry window shall display a dynamically linked bar graph showing active and inactive times for each day and holiday, as start and stop times are entered or edited.
4. System shall have the capacity for 2048 time zones for each Location.

G. Holidays:

1. Three different holiday schedules may be assigned to a time zone. Holiday schedule consists of date in format MM/DD/YYYY and a description. When the holiday date matches the current date of the time zone, the holiday schedule replaces the time-zone schedule for that 24-hour period.
2. System shall have the capacity for 32,000 holidays.
3. Three separate holiday schedules may be applied to a time zone.
4. Holidays have an option to be designated as occurring on the designated date each year. These holidays remain in the system and will not be purged.
5. Holidays not designated to occur each year shall be automatically purged from the database after the date expires.

H. Access Levels:

1. System shall allow for the creation of up to 32,000 access levels.
2. One level shall be predefined as the Master Access Level. The Master Access Level shall work at all doors at all times and override any anti-passback.
3. System shall allow for access to be restricted to any area by reader and by time. Access levels shall determine when and where an Identifier is authorized.
4. System shall be able to create multiple door and time-zone combinations under the same access level so that an Identifier may be valid during different time periods at different readers even if the readers are on the same controller.

I. User-Defined Fields:

1. System shall provide a minimum of 99 user-defined fields, each with up to 50 characters, for specific information about each credential holder.
2. System shall accommodate a title for each field; field length shall be 20 characters.

3. A "Required" option may be applied to each user-defined field that, when selected, forces the operator to enter data in the user-defined field before the credential can be saved.
4. A "Unique" option may be applied to each user-defined field that, when selected, will not allow duplicate data from different credential holders to be entered.
5. Data format option may be assigned to each user-defined field that will require the data to be entered with certain character types in specific spots in the field entry window.
6. A user-defined field, if selected, will define the field as a deactivate date. The selection shall automatically cause the data to be formatted with the windows MM/DD/YYYY date format. The credential of the holder will be deactivated on that date.
7. A search function shall allow any one user-defined field or combination of user-defined fields to be searched to find the appropriate cardholder. The search function shall include a search for a character string.
8. System shall have the ability to print cardholders based on and organized by the user-defined fields.

J. Code Tracing:

1. System shall perform code tracing selectable by cardholder and by reader.
2. Any code may be designated as a "traced code" with no limit to how many codes can be traced.
3. Any reader may be designated as a "trace reader" with no limit to which or how many readers can be used for code tracing.
4. When a traced code is used at a trace reader, the access-granted message that usually appears on the monitor window of the central station shall be highlighted with a different color than regular messages. A short singular beep shall occur at the same time the highlighted message is displayed on the window.
5. The traced cardholder image (if image exists) shall appear on workstations when used at a trace reader.

2.6 SURGE AND TAMPER PROTECTION

A. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.

1. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

B. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-

alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.

2.7 FIXED MAP DISPLAY

A. A fixed map display shall show layout of the protected facilities. Zones corresponding to those monitored by the system shall be highlighted on the display. Status of each zone shall be displayed using digital displays as required within each designated zone. A digital display test switch shall be provided on the map display.

2.8 CONTROLLERS

A. Controllers: Intelligent peripheral control unit, complying with UL 294, that stores time, date, valid codes, access levels, and similar data downloaded from the central station or workstation for controlling its operation.

B. Subject to compliance with requirements in this article, manufacturers may use multipurpose controllers.

C. Battery Backup: Sealed, lead acid; sized to provide run time during a power outage of 90 minutes, complying with UL 924.

D. Alarm Annunciation Controller:

1. The controller shall automatically restore communication within 10 seconds after an interruption with the field device network, with dc line supervision on each of its alarm inputs.

    a. Inputs: Monitor dry contacts for changes of state that reflect alarm conditions. Provides at least eight alarm inputs, which are suitable for wiring as normally open or normally closed contacts for alarm conditions.
    b. Alarm-Line Supervision:

        1) Supervise the alarm lines by monitoring each circuit for changes or disturbances in the signal by monitoring for abnormal open, grounded, or shorted conditions using dc change measurements. System shall initiate an alarm in response to an abnormal current, which is a dc change of 5 percent or more for longer than 500 ms.
        2) Transmit alarm-line-supervision alarm to the central station during the next interrogation cycle after the abnormal current condition.

    c. Outputs: Managed by central-station software.

2. Auxiliary Equipment Power: A GFI service outlet inside the controller enclosure.

E. Entry-Control Controller:

1. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, biometric personnel identity-verification devices, door strikes, magnetic latches, gate and door operators, and exit push buttons.

    a. Operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the controller and the field-device network.
    b. Accept information generated by the entry-control devices; automatically process this information to determine valid identification of the individual present at the portal:

        1) On authentication of the credentials or information presented, check privileges of the identified individual, allowing only those actions granted as privileges.
        2) Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control.

    c. Maintain a date-, time-, and Location-stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

2. Inputs:

    a. Data from entry-control devices; use this input to change modes between access and secure.
    b. Database downloads and updates from the central station that include enrollment and privilege information.

3. Outputs:

    a. Indicate success or failure of attempts to use entry-control devices and make comparisons of presented information with stored identification information.
    b. Grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.
    c. Maintain a date-, time-, and Location-stamped record of each transaction and transmit transaction records to the central station.
    d. Door Prop Alarm: If a portal is held open for longer than time listed in a schedule, alarm sounds.

4. With power supplies sufficient to power at voltage and frequency required for field devices and portal-control devices.
5. Data Line Problems: For periods of loss of communication with the central station, or when data transmission is degraded and generating continuous checksum errors, the controller shall continue to control entry by accepting

identifying information, making authentication decisions, checking privileges, and controlling portal-control devices.

a. Store up to 1000 transactions during periods of communication loss between the controller and access-control devices for subsequent upload to the central station on restoration of communication.

6. Controller Power: NFPA 70, Class II power-supply transformer, with 12- or 24-V ac secondary, backup battery and charger.

a. Backup Battery: Valve-regulated, recombinant-sealed, lead-calcium battery; spill proof; with a full one-year warranty and a pro rata [19] [9]-year warranty. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
b. Backup Battery: Valve-regulated, recombinant-sealed, lead-acid battery; spill proof. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
c. Backup Power-Supply Capacity: 90 minutes of battery supply. Submit battery and charger calculations.
d. Power Monitoring: Provide manual, dynamic battery-load test, initiated and monitored at the control center; with automatic disconnection of the controller when battery voltage drops below controller limits. Report by using local controller-mounted digital displays and by communicating status to central station. Indicate normal power on and battery charger on trickle charge. Indicate and report the following:

1) Trouble Alarm: Normal power-off load assumed by battery.
2) Trouble Alarm: Low battery.
3) Alarm: Power off.

2.9 SECONDARY ALARM ANNUNCIATOR

A. Secondary Alarm Annunciation Site: A workstation with limited I/O capacity, consisting of a secondary alarm annunciation workstation to allow the operator to duplicate functions of the main operator interface and to show system status changes

2.10 FOB READERS, CREDENTIAL CARDS, AND KEYPADS

A. FOB-Reader Power: Powered from its associated controller, including its standby power source, and shall not dissipate more than 5 W.

B. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the controller. Response time shall be 800 ms or less, from

the time the card reader finishes reading the credential card until a response signal is generated.

C. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:

1. Indoors, controlled environment.
2. Indoors, uncontrolled environment.
3. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

D. Display: Digital visual indicator shall provide visible and audible status indications and user prompts. Indicate power on or off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.

E. Wiegand Key-Insert Reader: Set up for 33-bit data cards.

F. Touch-Plate and Proximity Readers:

1. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
2. Passive-detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
3. The FOB reader shall read proximity cards in a range from direct contact to at least 6 inches from the reader.

G. Keypads:

1. Entry-control keypads shall use a unique combination of alphanumeric and other symbols as an Identifier.
2. Keypads shall contain an integral alphanumeric/special symbols keyboard with symbols arranged in ascending ASCII-code ordinal sequence.
3. Communication protocol shall be compatible with the local processor.

H. Keypad Display:

1. Keypads shall include a digital visual indicator and shall provide visible and audible status indications and user prompts.
2. Display shall indicate power on or off and whether user passage requests have been accepted or rejected.
3. Design of the keypad display or keypad enclosure shall limit viewing angles of the keypad as follows:

a. Maximum Horizontal Viewing Angle: Plus or minus 5 degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display.

b. Maximum Vertical Viewing Angle: Plus or minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.

I. Keypad Response Time:

1. The keypad shall respond to passage requests by generating a signal to the local processor. The response time shall be 800 ms or less from the time the last alphanumeric symbol is entered until a response signal is generated.

J. Keypad Power:

1. The keypad shall be powered from the source as shown and shall not dissipate more than 150 W.

K. Keypad Mounting Method:

1. Keypads shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.

L. Keypad Duress Codes:

1. Keypads shall provide a means for users to indicate a duress situation by entering a special code.

M. Keypad and Wiegand-Swipe-Reader Combination: Designed to require an entry on the keypad before presenting the credential card.

1. Keypad: Allow the entry of four alphanumeric characters that are associated with a specific credential. Keypads shall contain an integral alphanumeric/special symbol keyboard with symbols arranged in ascending ASCII-code ordinal sequence. Keypad display or enclosure shall limit viewing angles of the keypad as follows:

a. Maximum Horizontal Viewing Angle: Plus or minus 5 degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display.
b. Maximum Vertical Viewing Angle: Plus or minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.

2. Wiegand Swipe Reader: Set up for 33-bit data cards to generate a unique card identification code. Comply with SIA AC-01.

N. Communication Protocol: Compatible with local processor.

O. Touch-Plate and Contactless Card Reader: The reader shall have "flash" download capability to accommodate card format changes. The card reader shall have capability of transmitting data to security control panel and shall comply with ISO/IEC 7816.

P. Credential Card Modification: Entry-control cards shall be able to be modified by lamination direct print process during the enrollment process without reduction of readability. The design of the credential cards shall allow for the addition of at least one slot or hole to accommodate the attachment of a clip for affixing the credential card to the badge holder used at the site.

Q. Card Size and Dimensional Stability: Credential cards shall be 2-1/8 by 3-3/8 inches . The credential card material shall be dimensionally stable so that an undamaged card with deformations resulting from normal use shall be readable by the card reader.

R. Card Material: Abrasion resistant, nonflammable, nontoxic, and impervious to solar radiation and effects of ultraviolet light.

S. FOB Construction:

1. Core and laminate or monolithic construction.
2. Lettering, logos, and other markings shall be hot stamped into the credential material or direct printed.
3. Incorporate a security enhancement.
4. Furnish equipment for on-site assembly and lamination of credential cards.

2.11 ENROLLMENT CENTER

A. Equipment for enrolling personnel into, and removing personnel from, system database, using central-station equipment.

1. Include equipment to enroll selected credentials.

B. Enrollment equipment shall support encoding of credential cards including cryptographic and other internal security checks as required for system.

1. Allow only authorized entry-control enrollment personnel to access the enrollment equipment using passwords.
2. Include enrollment-subsystem configuration controls and electronic diagnostic aids for subsystem setup and troubleshooting with the central station.
3. Enrollment-station records printer shall meet requirements of the report printer.

C. Entry-Control Enrollment Software:

1. Shall include database management functions for the system, and shall allow an operator to change and modify the data entered in the system as needed.
2. Software shall not have alarm response or acknowledgment functions as a programmable function.
3. Multiple, password-protected access levels shall be provided at the enrollment station.
4. Database management and modification functions shall require a higher operator-access level than personnel enrollment functions.

5. Software shall provide a means for disabling the enrollment station when it is unattended, to prevent unauthorized use.
6. Software shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations to include a credential unit in use at the installation.
7. In the case of personnel identity-verification subsystems, this data shall include biometric data.
8. Software shall allow entry of this data into the system database files through the use of simple menu selections and data fields. The data field names shall be customized to suit user and site needs.
9. Personnel identity-verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.

D. Accessories:

1. Steel desk-type console, swivel chair on casters, and equipment racks.
2. Console and Equipment Racks: Comply with EIA/ECA-310-E.
3. Equipment, with the exception of the printers, shall be rack mounted in the console and equipment racks.

E. System Capacity: Number of badges shall be limited only by hard disk space. Badge templates and images shall be in color, supporting the maximum color capability of Microsoft Windows.

F. Badge Configuration:

1. Software for badge template creation shall include a template consisting of background and predetermined locations of photographs, text objects and data fields for text, and bar-code and biometric information. Include automatic sizing of data fields placed on a badge to compensate for names, which may otherwise be too large to fit in the area designated.
2. Allow different badge templates to be used for each department, tenant, or visitor.
3. As a setup option, templates shall be automatically selected for the badge, based on the group to which the credential holder is assigned. Allow the operator to override the automatic template selection and use a template chosen by the operator for creating a badge.
4. Setup shall determine which graphics and credential-holder information will be displayed and where on the card it will be placed. All data in the security access system, such as name, code, group, access level, and any of the 99 user-defined fields, shall be selectable, with the ability to place them anywhere on the card.
5. System shall include an importing, filing, and recall system of stored images and shapes that can be placed on the badge.
6. Allow multiple images on the same badge, including, but not limited to, bar codes, digital photos, and signatures.
7. Support transparent backgrounds so that image is only surrounded by the intended background and not by its immediate background.

G. Photo Imaging: Integral to security access.

1. Import images from bitmap file formats, digital cameras, TWAIN cameras, or scanners. Allow image cropping and editing, WYSIWYG badge-building application, and badge print-preview and printing capabilities.
2. System shall support multiple images stored for each credential holder, including signatures, portrait views, and profile views.

H. Text Objects: Badge configuration shall provide for creation of custom text as an object, allowing font selection, typing, scaling, and formatting of the text object. Formatting options shall include changing font, font size, text flow, and text alignment; bending or curving the text object into a circle or semicircle; applying 3-D effects; and applying predefined effects such as tilt, extrusion, or beveling. Text shall be placed and optionally automatically centered within any region of the badge layout.

I. Badges and Credential Cards:

1. Badges are credential cards that do not contain data to be read by card readers.
2. Credential cards shall store uniquely coded data used by card readers as an Identifier.

    a. Magnetic-Stripe Cards: Comply with ISO/IEC 7810, ISO/IEC 7811-1, ISO/IEC 7811-2, ISO/IEC 7811-6, and ISO/IEC 7811-7. Use single-layer magnetic tape material that is coated with a plastic, slick protective coat and affixed to the back of the credential card near the top.
    b. Wiegand Wire-Effect Cards: Ferromagnetic wires laminated into the credential card using binary digits specified for Wiegand readers to generate a unique credential card identification code.
    c. Proximity Key Fobs: Use proximity detection without physical contact with the reader for proper operation.

J. Key FOB-Making Equipment: Consisting of a workstation, video camera, video-imaging equipment, and a printer.

1. Camera: NTSC color standard, RGB video output, 470 lines minimum horizontal resolution, and automatic white balance with full rated output under illumination of 0.5 fc (5 lx).
2. Video Imaging: Live-image capture software and hardware and a digital signature capture pad.
3. Standard workstation, modified as follows:

    a. Redundant workstation is not required.
    b. Printer is not required.
    c. UPS is not required.
    d. Sound card is not required.

4. Printer: Dye-sublimation resin thermal transfer, 300 dpi resolution, 16.7 million colors, accepting cards ranging in size from 2.1 by 3 inchesto 2.6 by 3.7 inches and having card thickness ranging from 0.020 to 0.060 inch . Printer shall have options for encoding magnetic stripe using tracks 1, 2, and 3. Throughput shall be not less than 60 seconds per KeY FOB.

2.12 DOOR AND GATE HARDWARE INTERFACE

A. Exit Device with Alarm: Operation of the exit device shall generate an alarm. Exit device and alarm contacts are specified in Section 087100 "Door Hardware."

B. Exit Alarm: Operation of a monitored door shall generate an alarm. Exit devices and alarm contacts are specified in Section 087100 "Door Hardware."

C. Electric Door Strikes: Use end-of-line resistors to provide power-line supervision. Signal switches shall transmit data to controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and they shall report a forced entry. Power and signal shall be from the controller. Electric strikes are specified in Section 087100 "Door Hardware."

D. Electromagnetic Locks: End-of-line resistors shall provide power-line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the controller. Electromagnetic locks are specified in Section 087100 "Door Hardware."

E. Vehicle Gate Operator: Interface electrical operation of gate with controls in this Section. Vehicle gate operators shall be connected, monitored, and controlled by the security access controllers. Vehicle gate and accessories are specified in Section 323113 "Chain Link Fences and Gates."

2.13 FIELD-PROCESSING SOFTWARE

A. Operating System:

1. Local processors shall contain an operating system that controls and schedules that local processor's activities in real time.
2. Local processor shall maintain a point database in its memory that includes parameters, constraints, and the latest value or status of all points connected to that local processor.
3. Execution of local processor application programs shall utilize the data in memory resident files.
4. Operating system shall include a real-time clock function that maintains the seconds, minutes, hours, date, and month, including day of the week.
5. Local processor real-time clock shall be automatically synchronized with the central station at least once per day to plus or minus 10 seconds (the time synchronization shall be accomplished automatically, without operator action and without requiring system shutdown).

B. Startup Software:

1. Causes automatic commencement of operation without human intervention, including startup of all connected I/O functions.
2. Local processor restart program based on detection of power failure at the local processor shall be included in the local processor software.
3. Initiates operation of self-test diagnostic routines.

4. Upon failure of the local processor, if the database and application software are no longer resident, the local processor shall not restart and systems shall remain in the failure mode indicated until the necessary repairs are made.
5. If the database and application programs are resident, the local processor shall immediately resume operation.

C. Operating Mode:

1. Local processors shall control and monitor inputs and outputs as specified, independent of communications with the central station or designated workstations.
2. Alarms, status changes, and other data shall be transmitted to the central station or designated workstations when communications circuits are operable.
3. If communications are not available, each local processor shall function in a stand-alone mode and operational data, including the status and alarm data normally transmitted to the central station or designated workstations, shall be stored for later transmission to the central station or designated workstations.
4. Storage for the latest 4000 events shall be provided at local processors, as a minimum.
5. Local processors shall accept software downloaded from the central station.
6. Panel shall support flash ROM technology to accomplish firmware downloads from a central location.

D. Failure Mode: Upon failure for any reason, each local processor shall perform an orderly shutdown and force all local processor outputs to a predetermined (failure-mode) state, consistent with the failure modes shown and the associated control device.

E. Functions:

1. Monitoring of inputs.
2. Control of outputs.
3. Reporting of alarms automatically to the central station.
4. Reporting of sensor and output status to central station upon request.
5. Maintenance of real time, automatically updated by the central station at least once a day.
6. Communication with the central station.
7. Execution of local processor resident programs.
8. Diagnostics.
9. Download and upload data to and from the central station.

2.14 FIELD-PROCESSING HARDWARE

A. Alarm Annunciation Local Processor:

1. Respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.

2. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
3. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
4. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
5. Local processor shall report line supervision alarms to the central station.
6. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 milliseconds.
7. Alarm condition shall be transmitted to the central computer during the next interrogation cycle.
8. Local processor outputs shall reflect the state of commands issued by the central station.
9. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
10. Local processor shall have at least four command outputs.
11. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.

B. Processor Power Supply:

1. Local processor and sensors shall be powered from an uninterruptible power source.
2. Uninterruptible power source shall provide eight hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored.
3. If the facility is without an emergency generator, the uninterruptible power source shall provide 24 hours of battery backup power.
4. There shall be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa.
5. Batteries shall be sealed, non-outgassing type.
6. Power supply shall be equipped with an indicator for ac input power and an indicator for dc output power.
7. Loss of primary power shall be reported to the central station as an alarm.

C. Auxiliary Equipment Power: A GFI service outlet shall be furnished inside the local processor's enclosure.

D. Entry-Control Local Processor:

1. Entry-control local processor shall respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.
2. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.

3. Entry-control local processor shall provide local entry-control functions including communicating with field devices such as card readers, keypads, biometric personnel identity-verification devices, door strikes, magnetic latches, gate and door operators, and exit push buttons.
4. Processor shall also accept data from entry-control field devices as well as database downloads and updates from the central station that include enrollment and privilege information.
5. Processor shall send indications of successful or failed attempts to use entry-control field devices and shall make comparisons of presented information with stored identification information.
6. Processor shall grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.
7. Entry-control local processor shall use inputs from entry-control devices to change modes between access and secure.
8. Local processor shall maintain a date-time- and location-stamped record of each transaction and transmit transaction records to the central station.
9. Processor shall operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the local processor and the central station.
10. Processor shall store a minimum of 4000 transactions during periods of communication loss between the local processor and the central station for subsequent upload to the central station upon restoration of communication.
11. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
12. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall also provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
13. Local processor shall report line supervision alarms to the central station.
14. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 ms.
15. Alarm condition shall be transmitted to the central station during the next interrogation cycle.
16. Entry-control local processor shall include the necessary software drivers to communicate with entry-control field devices. Information generated by the entry-control field devices shall be accepted by the local processor and automatically processed to determine valid identification of the individual present at the portal.
17. Upon authentication of the credentials or information presented, the local processor shall automatically check privileges of the identified individual, allowing only those actions granted as privileges.
18. Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control. The local processor shall maintain a date-time- and location-stamped record of each transaction.
19. Transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.

20. Local processor outputs shall reflect the state of commands issued by the central station.
21. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
22. Local processor shall have at least four addressable outputs.
23. The entry-control local processor shall also provide control outputs to portal-control devices.
24. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.
25. The system manufacturer shall provide strategies for downloading database information for panel configurations and cardholder data to minimize the required download time when using IP connectivity.

2.15 TIA 232-F ASCII INTERFACE SPECIFICATIONS

A. ASCII interface shall allow TIA 232-F connections to be made between the control station operating as the host PC and any equipment that will accept TIA 232-F ASCII command strings, such as CCTV switches, intercoms, and paging systems.

1. Alarm inputs in system shall allow for individual programming to output up to four unique ASCII character strings through two different COM ports on the host PC.
2. Inputs shall have the ability to be defined to transmit a unique ASCII string for alarm and one for restore through one COM port, and a unique ASCII string for a nonalarm, abnormal condition and one for a normal condition through the same or different COM port.
3. Predefined ASCII character strings shall have the ability to be up to 420 characters long with full use of all the ASCII control characters, such as return or line feed. Character strings shall be defined in the system database and then assigned to the appropriate inputs.
4. COM ports of the host PC used to interface with external equipment shall be defined in the setup portion of the software. COM port's baud rate, word length, stop bits, and parity shall be definable in the software to match that of the external equipment.

B. Pager-System Interface: Alarms shall be able to activate a pager system with customized message for each input alarm.

1. TIA 232-F output shall be capable of connection to a pager interface that can be used to call a paging system or service and send a signal to a portable pager. System shall allow an individual alphanumeric message per alarm input to be sent to the paging system. This interface shall support both numeric and alphanumeric pagers.

C. Alarm-System Interface:

1. TIA 232-F output shall be capable of transmitting alarms from other monitoring and alarm systems to central-station automation software.
2. Alternatively, alarms that are received by this access-control system are to be transferred to the alarm automation system as if they were sent through a digital alarm receiver.

a. System shall be able to transmit an individual message from any alarm input to a burglar-alarm automation monitoring system.
b. System shall be able to append to each message a predefined set of character strings as a prefix and a suffix.

2.16 CABLES

A. General Cable Requirements: Comply with requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security" and as recommended by system manufacturer for integration requirement.

B. PVC-Jacketed, TIA 232-F Cables:

1. Two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum-foil/polyester-tape shielded pairs with 100 percent shield coverage; PVC jacket.
2. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
3. NFPA 70, Type CM.
4. Flame Resistance: UL 1581 vertical tray.

C. Plenum-Type, TIA 232-F Cables:

1. Two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum-foil/polyester-tape shielded pairs with 100 percent shield coverage; plastic jacket.
2. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
3. NFPA 70, Type CMP.
4. Flame Resistance: NFPA 262 flame test.

D. PVC-Jacketed, TIA 485-A Cables: Two pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.

E. Plenum-Type, TIA 485-A Cables:

1. Two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

F. Multiconductor, PVC, Reader and Wiegand Keypad Cables:

1. No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semirigid PVC insulation, overall aluminum-foil/polyester-tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CMG.
3. Flame Resistance: UL 1581 vertical tray.

4. For TIA 232-F applications.

G. Paired, PVC, Reader and Wiegand Keypad Cables:

1. Three pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

H. Paired, PVC, Reader and Wiegand Keypad Cables:

1. Three pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum-foil/polyester-tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CM.
3. Flame Resistance: UL 1581 vertical tray.

I. Paired, Plenum-Type, Reader and Wiegand Keypad Cables:

1. Three pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum-foil/polypropylene-tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

J. Multiconductor, Plenum-Type, Reader and Wiegand Keypad Cables:

1. Six conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum-foil/polyester-tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

K. Paired, Lock Cables:

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
2. NFPA 70, Type CMG.
3. Flame Resistance: UL 1581 vertical tray.

L. Paired, Plenum-Type, Lock Cables:

1. One pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

M. Paired, Lock Cables:

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
2. NFPA 70, Type CMG.
3. Flame Resistance: UL 1581 vertical tray.

N. Paired, Plenum-Type, Lock Cables:

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

O. Paired, Input Cables:

1. One pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, overall aluminum-foil/polyester-tape shield with No. 22 AWG, stranded (7x30) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
2. NFPA 70, Type CMR.
3. Flame Resistance: UL 1666 riser flame test.

P. Paired, Plenum-Type, Input Cables:

1. One pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, aluminum-foil/polyester-tape shield (foil side out), with No. 22 AWG drain wire, 100 percent shield coverage, and plastic jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

Q. Paired, AC Transformer Cables:

1. One pair, twisted, No. 18 AWG, stranded (7x26) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
2. NFPA 70, Type CMG.

R. Paired, Plenum-Type, AC Transformer Cables:

1. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
2. NFPA 70, Type CMP.
3. Flame Resistance: NFPA 262 flame test.

S. LAN Cabling:

1. Comply with requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security."
2. NFPA 262.

2.17 TRANSFORMERS

A. NFPA 70, Class II control transformers, NRTL listed. Transformers for security access-control system shall not be shared with any other system.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

B. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

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

3.2 PREPARATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA/EIA 606-A, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.

1. Record setup data for control station and workstations.
2. For each Location, record setup of controller features and access requirements.
3. Propose start and stop times for time zones and holidays, and match up access levels for doors.
4. Set up groups, facility codes, linking, and list inputs and outputs for each controller.
5. Assign action message names and compose messages.
6. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
7. Prepare and install alarm graphic maps.
8. Develop user-defined fields.
9. Develop screen layout formats.
10. Propose setups for guard tours and key control.
11. Discuss badge layout options; design badges.
12. Complete system diagnostics and operation verification.
13. Prepare a specific plan for system testing, startup, and demonstration.

14. Develop acceptance test concept and, on approval, develop specifics of the test.
15. Develop cable and asset-management system details; input data from construction documents. Include system schematics and Visio Technical Drawings in electronic format.

D. In meetings with Architect and Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.

3.3 CABLING

A. All devices must be hard wired

B. Comply with NECA 1, "Good Workmanship in Electrical Construction."

C. Install cables and wiring according to requirements in Section 280513 "Conductors and Cables for Electronic Safety and Security."

D. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.

E. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental airspaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.

F. Install LAN cables using techniques, practices, and methods that are consistent with Category 5E rating of components and fiber-optic rating of components, and that ensure Category 6 and fiber-optic performance of completed and linked signal paths, end to end.

G. Boxes and enclosures containing security-system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.

H. Install end-of-line resistors at the field device location and not at the controller or panel location.

3.4 CABLE APPLICATION

A. Comply with TIA 569-B, "Commercial Building Standard for Telecommunications Pathways and Spaces."

B. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.

C. TIA 232-F Cabling: Install at a maximum distance of 50 ft..

D. TIA 485-A Cabling: Install at a maximum distance of 4000 ft..

E. Card Readers and Keypads:

1. Install number of conductor pairs recommended by manufacturer for the functions specified.
2. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from controller to the reader is 250 ft., and install No. 20 AWG wire if maximum distance is 500 ft..
3. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the controller.
4. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.

F. Install minimum No. 16 AWG cable from controller to electrically powered locks. Do not exceed 250 ft. .

G. Install minimum No. 18 AWG ac power wire from transformer to controller, with a maximum distance of 25 ft. .

3.5 GROUNDING

A. Comply with Section 280526 "Grounding and Bonding for Electronic Safety and Security."

B. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."

C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

E. Bond shields and drain conductors to ground at only one point in each circuit.

F. Signal Ground:

1. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
2. Bus: Mount on wall of main equipment room with standoff insulators.
3. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.

3.6 INSTALLATION

A. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with 1/4-inch high text and symbols as required. Push-button switches shall be connected to the controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric bolt, or other facility release device.

B. Install card readers, keypads, push buttons, and biometric readers.

C. All equipment shall be hard-wired.

3.7 IDENTIFICATION

A. In addition to requirements in this article, comply with applicable requirements in Section 260553 "Identification for Electrical Systems" and with TIA/EIA 606-A.

B. Using software specified in "Cable and Asset Management Software" Article, develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.

C. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.

D. At completion, cable and asset management software shall reflect as-built conditions.

3.8 SYSTEM SOFTWARE AND HARDWARE

A. Develop, install, and test software and hardware, and perform database tests for the complete and proper operation of systems involved. Assign software license to Owner.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections:

1. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA 568-B.1, "Commercial Building Telecommunications Cabling Standards - Part 1: General Requirements." Link performance for UTP cables must comply with minimum criteria in TIA/EIA 568-B.1.
2. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power-supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery operating time. Provide special equipment and software if testing requires special or dedicated equipment.
3. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

C. Devices and circuits will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.10 STARTUP SERVICE

A. Engage a factory-authorized service representative to supervise and assist with startup service.

1. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
2. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.

3.11 PROTECTION

A. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured with an activated burglar alarm and access-control system reporting to a central station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

3.12 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain security access system.

B. Develop separate training modules for the following:

1. Computer system administration personnel to manage and repair the LAN and databases and to update and maintain software.
2. Operators who prepare and input credentials to man the control station and workstations and to enroll personnel.
3. Security personnel.
4. Hardware maintenance personnel.
5. Corporate management.

END OF SECTION 281300

SECTION 281600-INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SCOPE

A. Design and install a complete Intrusion Detection System, hereinafter referred to as IDS, as specified in this section.

B. This Section includes the following:

1. Intrusion detection with hard-wired, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.
   a. Wireless system is not acceptable.
2. Responsibility for integrating electronic and electrical systems and equipment is specified in the following Sections, with Work specified in this Section:
   a. Division 08 Section "DOOR HARDWARE".

C. System shall be designed by an industry professional.

D. System shall be commercial grade.

E. System shall be capable of remote monitoring.

1.2 APPLICABLE PARAGRAPHS

A. Applicable paragraphs of SECTION 26 00 00 – Electrical Common Work, shall apply to this Section as though repeated herein.

B. Applicable paragraphs of SECTION 26 05 26 – Grounding and Bonding, shall

apply to this Section as though repeated herein.

C. Applicable paragraphs of SECTION 26 05 29 – Hangars and Supports, shall apply to this Section as though repeated herein.

D. Applicable paragraphs of SECTION 26 05 33 – Raceways and Boxes, shall apply to this Section as though repeated herein.

1.3 SUBMITTALS

A. Written approval from Owner is required for deviation from this standard. Work described in this Section includes providing all labor, materials, and equipment indicated, specified, and necessary for complete and operating systems in accordance with other sections of these specifications.

1. Prior to ordering the equipment, Contractor shall provide a submittal for review to include the following:

    a. Submit equipment prints, full electronic wiring diagrams and specification sheets for each item specified herein.
    b. Shop drawings, detailing the system including, but not limited to, the following:
        1) Equipment.
        2) Equipment location.
        3) Power Requirements

2. At completion, Contractor shall submit a certificate of completion of installation and service training.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN

A. Bosch. Multi-zone system, Radionics

B. Zone Designation:

1. Zone 1: Kitchen
2. Zone 2: Gym
3. Zone 3: Admin
4. Zone 4: Rest of School

C. System shall include door contacts, keypads, motion sensors,

D. System should be provided as required for complete installation using single-source units and accessories.

2.2 BURGLAR ALARM SYSTEM

A. The security control panel shall have a total capacity of 128 zones. Base panel shall have a capacity of 16 hardwire zones and 112 addressable zones on two addressable loops. All zones shall be fully supervised and programmable. Panel shall be complete with integral power supply and supervised battery charger, auxiliary power for powering security detection devices, programmable switched auxiliary power supply, integral supervised digital alarm communicator, supervised bell/siren output, and two general purpose programmable outputs which can be programmed as general purpose outputs or as the system's addressable loops.

B. Topology: The system shall be complete with a standard, non-shielded, 4-conductor station wire bus (Combus) for powering and communicating with remote hardwired system expansion modules and devices. The Combus shall be composed of up to 4 legs, with each leg up to 1,000 feet long.

C. Scheduling: The system shall provide for 99 date schedules with 4 intervals per schedule, 4 holiday schedules with 2 years of scheduling capacity, 50 open/close suppression schedules and 16 automation schedules. All schedules shall be programmable via the LCD keypads and via downloading either locally or remotely.

D. Panel Zone Expansion: The panel shall be expandable to a maximum of 128 zones by adding standard hardwired 8 and/or 16 zone modules connected to the base panel via the Combus, by adding up to 112 addressable detection devices to one or both of the addressable loops on the base panel, and by adding a 64 zone 900 MHz spread spectrum wireless receiver to the 4-wire communication bus. The system shall be capable of expansion using hardwired, addressable and wireless simultaneously in any mix that suits the application.

1. The system shall be addressable using Combus, hardwired.

E. System Keypads: The system shall accommodate up to 16 LCD keypads, which are powered from the base panel via the 4-wire communications bus. LCD keypads shall have a display capacity of at least 32 alphanumeric characters with adjustable brightness and contrast. Keys shall be backlit for low light level ease of use. Keypads shall includeindividual “Armed”, “Ready” and “Trouble” indicators, three keypad activated alarm keys, and programmable ‘function’ keys.

F. User Codes: The system shall provide for 1,000 user codes selectable as either 4 or 6 digits. For Access Control, user codes shall be assignable to 1 of 64 access levels. User codes shall be assignable to one or multiple partitions.

G. Partitions: the system shall be programmable for up to 8 fully independent partitions. Each partition shall have its own account Code. Keypads shall be assignable as partition” keypads or “global” keypads. Each zone in the system shall be assignable to one or more partitions.

H. Ground Fault Detection: The system shall include an integral ground fault detector, which shall detect a single ground fault on any extended conductor in the system.

I. Supervision: Each zone in the system shall be supervised. The base panel and any remote panel with its own AC inputs shall be supervised for AC loss. Batteries for the base panel and all remote panels shall be supervised for low

power and be short circuit protected. Each addressable device and each wireless input device shall be supervised for its presence. The Combus bus shall be supervised for low voltage and the presence of each enrolled module and keypad. Digital alarm communicators shall be supervised for telephone line trouble and failure to communicate and the system shall report any cellular communication panel trouble.

J. False Alarm Prevention: The system shall include the following false alarm prevention features: audible exit delay, arm/disarm bell squawk, audible exit fault, urgency on entry delay, o entry arming/disarming. Swinger shutdown programmable by zone, transmission delay by zone, AC fail, TLM trouble and low battery trouble transmission delay, recent close code transmission, police code (cross zone) transmission, opening after alarm transmission, and arming/disarming from outside the protected space using access control.

K. Central Station Reporting: The system shall provide high speed 20 Mbps 1400/2300 Hz. handshake, contact ID and SIA reporting formats and shall be capable of being programmed to call up to 3 telephone numbers. The system shall also allow communication to a pager. The telephone numbers shall be programmable for “backup” dialing should the primary number fail. The system shall be programmable for split reporting such that alarms/restorals, openings/closing and miscellaneous events can be sent to different telephone numbers. The system shall report a separate account code for each partition and for non-partition (system) events.

1. The system shall provide opening/closing scheduled suppression to prevent opens and closes from being reported to the central station. The system shall be capable of reporting all alarms, trouble, and system status information by combinations of all communication methods installed including: digital communicator, a cellular transmitter, and DVAC.

L. System Event Buffer: The system shall have a 3,000-event buffer. All events shall be printable from the system printer. The 2,800 most recent events shall be

viewable by keypad LCD display. All events shall be viewable by upload/download PC.

M. Power Supply/Relay Output Modules: The systems shall be capable of including up to 64 fully programmable output relays with form 'C' contacts rated 2Amps at 30VDC. Relays shall be added in modules of four and may be located anywhere on the Combus. Each module shall include a supervised 350mA 12VDC battery charger, and integral power supply to supply up to 1.0Amp of auxiliary power at 12VDC to power direct connected devices or re-power the Combus.

N. Low Power Outputs: The system shall be capable of including up to 144 low power outputs with each output able to supply 50mA at 12VDC. Outputs shall be added in increments of 16 and may be added anywhere on the Combus.

O. Remote Annunciation: The system shall be capable of remote zone alarm and system status annunciation, up to 144 points, by adding 32 and 64 point annunciators anywhere on the Combus. Annunciators shall be capable of being flush mounted. The annunciators shall provide bulls eye and graphic annunciation capability.

P. System Software: The base panel shall come complete with all the software to implement every system feature and allow the addition of every expansion or functional module without changes or addition to the basic software.

Q. System Programming:

1. The system shall be fully programmable via the LCD keypads and shall also allow event buffer viewing via the keypads.
2. Separate PC based upload/download software shall allow programming and operation from a directly connected local computer, or from a remote computer via a telephone line or LINKS cellular communications equipment. Remote access shall be controlled by the Owner to prevent unauthorized access.
3. All system programming shall be maintained in non-volatile memory such

that program information is maintained even if all AC and battery power is removed.

4. System shall be programmable over LAN.

2.3 FIELD DEVICES

A. Bosch D9412GV4 Panel

B. Bosch D2155 System keypad

C. 8-Zone Expander, Bosch D8125

D. Bosch DT 450T motion detectors

E. Bosch ISN-CC1-100N (360-degree motion detectors)

F. SENTROL/Interlogix Model 1076 Double Pole – Double Throw, color to match frame

G. Altronix power supply, to power all devices

H. POPIT shall be Bosch D9127T

I. Glass-Breaks - GE Security Solution 2000

J. Network Interface Module - Bosch B420

K. Audible Sirens – AMSECO SSX51

L. Vandal Protection – Safety Technology International

2.4 FIELD DEVICES

A. Minimum 18-AWG/4-Conductor

B. Non-Shielded

C. Purple Sheath

PART 3 EXECUTION

3.1 INSTALLATION

A. All wiring shall be in accordance with the National Electrical Code, Local Codes, and article 760 of NFPA Standard 70. All wiring sizes shall conform to

recommendations of the equipment manufacturer, and as indicated on the engineered shop drawings.

B. All wire shall be UL Listed CL2 for limited energy (300V) applications and shall be installed in conduit. Limited energy MPP wire may be run open in return air ceiling plenums provided such wire is UL Listed for such applications and is of the low smoke producing fluorocarbon type and complies with NEC Article 760 if so approved by the local authority having jurisdiction.

C. No AC wiring or any other wiring shall be run in the same conduit as security alarm wiring.

D. All wire shall be installed in an approved conduit/raceway system (except where permitted by NEC and the local authority having jurisdiction). Maximum conduit "fill" shall not exceed 40% per NEC.

E. Minimum conduit size shall be 3/4" EMT. Install conduit per engineered shop drawings.

F. Systems utilizing open wiring techniques with low smoke plenum cable shall provide conduit in all inaccessible locations, inside concealed walls, at all mechanical/electrical rooms, or other areas where wiring might be exposed or subject to damage.

G. All vertical wiring and all main trunk/riser wiring shall be installed in a complete raceway/conduit system. All riser boxes shall be adequately sized for the number of conductors traversing the respective box as well as the number of terminations required.

H. Telephone Cable: Provide a 4 pair Category 6 telephone cable from the Master Control Panel to the Telephone Equipment Room.

I. Each motion sensor, glass break, and set of door contacts shall be an

addressable zone, utilized by using the POPIT devices.

J. All plenum wiring is to be installed parallel and perpendicular to the building structure. Install wiring in D-rings or J-hooks. Support D-rings or J-Hooks. Cable shall be bundled on a maximum of 2'-6". D-rings or J-hooks shall be secured to the structure at a maximum of 5' on center. Bundling shall be with plenum rated cable ties. Cable shall not be directly attached to building structure.

K. Coordinate with BMCS for monitoring of arm/disarm state.

L. Security system devices indicated are for reference and coordination purposes only. The installing contractor shall design and provide a complete system as specified. The Contractor shall provide all security system devices required for complete corridor perimeter coverage acceptable to all governing authorities.

M. The system shall include intrusion for all egress corridors in the building.
1. The Control System shall be the product of a single manufacturer.
2. Tag all conductors or cables at each end
3. Installation of security panels
4. Interconnection of security panels
5. Installation of new security devices
6. Full coverage of all egress corridors
7. Preconstruction meeting with Owner’s personnel, installing technician and project superintendent
8. All stubs necessary.

N. The system shall be wired as a Class B system for all circuits

3.2 SYSTEM OPERATION

A. When an alarm condition is detected by any of the alarm initiating devices, the following functions shall occur:
1. The system keypad’s interior audible device shall sound until silenced by

using proper security code or after system time out.

2. A custom system alarm message shall be displayed on the LCD display. This display will show the alarm device location in plain English. Location and partition custom messages shall be field programmable.
3. The remote signaling tie connection shall be activated at the Owner's approved central security monitoring location and/or other Owner designated location.

3.3 SYSTEM ZONING AND PARTITIONING

A. The system shall employ intelligent initiating devices and interface devices capable of being recognized and enunciated at the main system keypad and devices partition keypad.

B. All zoning/device locations shall be field programmable.

3.4 COMMISSIONING THE SYSTEM

A. The installing contractor shall be responsible for verifying that each component of the system is fully operational and in conformity with the specifications. He shall also be responsible for insuring that all elements function together as a system in accordance with the specifications.

B. A state licensed and factory trained technical representative of the manufacturer shall supervise the final control panel connections and testing of the system. Upon completion of the acceptance tests, the owner and/or his representatives shall be instructed in the proper operation of the system.

C. The installing contractor shall functionally test each and every device in the entire system for proper operation and response. Any items found not properly installed or non-functioning shall be replaced or repaired and retested.

D. The installing contractor shall provide a complete written report on the functional

test of the entire system. A copy of the test report shall be provided with maintenance manuals. The test report shall be signed and dated by the licensed burglar alarm superintendent responsible for supervising the final system test and checkout.

E. The installing contractor's burglar alarm superintendent shall test the entire system in the presence of the local authorities having jurisdiction. The contractor shall be responsible for making any changes, adjustments, or corrections, as may be required by the local authorities. The Contractor shall affix his certification label and installation certificate to the interior of the main burglar alarm control panel.

F. The testing and acceptance shall be performed within 30 days after the burglar alarm installation is completed. The test shall be performed by a minimum of two qualified burglar alarm system technicians acceptable to the authority having jurisdiction. The test which is a comprehensive 100 percent inspection and test of all burglar alarm system equipment shall include the following:

1. Burglar alarm control equipment: a visual and functional test of the burglar alarm control and auxiliary control equipment.
2. A visual inspection shall be conducted to establish that all electrical connections and equipment, as required, are properly installed and operating.
3. A functional fault simulation test shall be conducted on all relevant field wiring terminations to ensure that wiring is properly supervised as required.
4. Indicators shall be tested to ensure proper function and operation.
5. Control panel auxiliary functions shall be functionally tested to verify proper operation.
6. Control panel supervisory and alarm current readings shall be taken to verify that the control panel has the appropriate power supplies and standby batteries to operate the system as required. A three-minute general alarm stress test, both under AC power and standby power, shall

be conducted to further ensure complete operation of the system.

7. Burglar alarm peripheral devices; All burglar alarm peripheral devices shall be functionally tested and the location and testing information recorded for each device.
8. Manual initiating devices:
    a. to ensure proper operation.
    b. Each automatic initiating device shall be functionally tested for proper wiring supervision.
    c. Each automatic initiating device shall be inspected to ensure proper placement and mounting as required by specifications.
9. Alarm signaling devices:
    a. Each alarm signaling device shall be tested and decibel reading taken at 10' from the device and recorded to ensure proper operation.
    b. Each alarm signaling device shall be functionally tested for proper wiring supervision.
    c. Decibel reading shall be taken to ensure that the alarm signal level can be clearly heard in all areas of the facility.
    d. All visual alarm indicators shall be functionally tested to ensure proper operation and that they are clearly visible.
10. Reporting: Upon completion of the initial verification audit, a report shall be sent to the
11. Architect/Engineer indicating that all burglar alarm equipment has been tested and is in 100 percent operation. The report shall also contain the audit testing information as to the location and operational status of each peripheral device. The 100 percent audit shall be performed by a factory trained representative.

G. It is the intent of these specifications and of the Architect/Engineer that a continued program of system maintenance be provided by the Owner. It is mandatory that the installing Contractor provide such services and make available these services to the Owner upon completion of the project.

H. Provide door contacts at all exterior doors. Coordinate with architect with door

jambs. Provide raceway as required to above accessible ceilings.

I. Provide motion detectors in corridors, and near all exterior doors.

J. Provide 1 keypad per zone near an exterior door. Provide box and raceway if installed on concrete walls.

K. System shall be hard-wired;

L. Controller shall be located in Main Server Room / Security Closet.

M. Coordinated with Owner and provide signaling devices as required.

N. Provide network interface as required for remote monitoring capability.

3.5 EQUIPMENT IDENTIFICATION

A. Each piece of equipment shall be provided with a permanently engraved or embossed or silk screen identification tag. The tag shall include the following information:
   1. Name of manufacturer.
   2. Manufacturer’s equipment description.
   3. Serial number and model number.
   4. Voltage and current rating.

3.6 SPARE PARTS AND TOOLS

A. Spare Parts:
   1. Six spare fuses of each size used in the system
   2. Six spare detectors of each type in the system
   3. Two copies of the final software programmed into the burglar alarm system.
   4. Devices listed above are to be installed as directed by Architect/Engineer or local code authorities at no additional cost to the Owner. Unused spare

parts are to be parts for Owner's cabinet.

B. Parts list: Furnish a list, in duplicate, of all other parts and accessories the manufacturer of the system recommends being stocked for maintenance.

3.7 KEYS

A. Keys and locks for all equipment shall be identical. Provide not less than six keys of each type required. Identify keys by an appropriate number stamped on each key or on a metal tag attached thereto. Provide a key numbering chart in each operation and maintenance manual furnished.

3.8 GRAPHIC FLOOR PLANS

A. Provide color coded floor plan detailed with room names, graphic room numbers and adequate information to direct people to the burglar alarm devices in alarm with Non-fading floor plan media.

B. Each plan shall clearly relate the room numbers on the annunciator to the area description on the floor plan. All burglar alarm devices located to correspond with the annunciator.

C. The floor plan shall be solvent welded in acrylic plastic.

1. Mount in an extruded aluminum frame next to the main burglar alarm control panel.

D. Post minimum 11x17 size drawing, color laminated As-Built of system identifying all devices, key pads, panels and partitions on the wall near main control panel.

3.9 ADDITIONAL REQUIREMENTS

A. The contractor is to ensure all areas of the egress corridors are covered with motion detectors.

B. Provide all accessories required for off-site monitoring. Coordinate with Owner for appropriate off-site monitoring service.

C. Alarm circuit power supplies and circuiting shall be designed and installed to accept an additional five (5) motion detection devices for future expansion. The initial design shall not exceed 70% of the rated power supply and circuit capability.

D. Provide surface mount door contacts on all outside doors (not covered by a motion sensor), roof hatches, and roof access doors.

E. Do not place guard covers over motion detectors.

F. Home run all wiring devices to the control panel or zone expander; an addressable loop system is not acceptable.

G. Alarm systems must have a dedicated 120 VAC circuit on an emergency power panel.

H. Intrusion detection shall be one system for entire building, armed and disarmed from any keypad in the building.

I. The inside hallways shall have motion detectors where shown on drawings.

3.10 SUBSTANTIAL COMPLETION

A. Final acceptance of the Burglar Alarm System by the Owner, local code authorities and Occupancy Permit has been issued.

3.11 WARRANTY

A. The contractor shall guarantee availability of local service by factory trained personnel of all specified equipment from an authorized distributor of all equipment specified under this section. On the premise maintenance shall be provided at no cost to the buyer for a period of one (1) year (parts and labor) from date of acceptance unless damage or failure is caused by misuse, abuse, neglect, or accident. Additionally, all manufacturer supplied products must be covered by a five (5) year (parts only) limited warranty from the date of acceptance. The warranty period shall begin on the date of acceptance by the Owner.

B. Warranty provisions shall be as follows:
   1. Provide five-year warranty of the System against defects in material and workmanship. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one year warranty shall be provided for labor.
   2. Contractor shall respond, excluding weekends and holidays, within 24 hours to any warranty service calls. If equipment cannot be repaired within 24 hours of service visit, the contractor shall provide "loaner" equipment to the facility at no charge.
   3. Make available a service contract offering continuing factory authorized service of the system after the initial warranty period.

3.12 TRAINING

A. Provide training course to all security personnel assigned by Owner’s Representative. The training shall include a course syllabus and hands-on participation. Training shall be conducted on a system identical to the one being installed on this project. The system shall be able to perform all system operations and simulate all types or forms of alarm conditions.

B. Provide a video of the training program to the Owner’s Representative to be used for periodic refresher course, training of the local security department and for

training of new employees.

C. The training course shall include, in addition to the above, a system overview, and a review of the operation and maintenance manual.

D. The instructor shall be factory trained and shall be thoroughly familiar with all parts of the installation on which instruction is to be given. The instructor shall be trained in operating theory as well as in practical operation and maintenance work.

END OF SECTION 281600

SECTION 283111-FIRE-ALARM SYSTEM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Scope

1. Provide a complete Fire Alarm system with voice evacuation capability.

B. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Heat detectors.
5. Notification appliances.
6. Remote annunciator.
7. Addressable interface device.
8. Digital alarm communicator transmitter

1.3 DEFINITIONS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. NICET: National Institute for Certification in Engineering Technologies.

D. PC: Personal computer.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.
13. Device layout on construction drawings is schematics. Contractor is required to provide all devices required by SFM review.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.

2. Shop Drawings shall be prepared by persons with the following qualifications:

   a. Trained and certified by manufacturer in fire-alarm system design.
   b. NICET-certified, fire-alarm technician; Level III minimum.

D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

   a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
   b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.

c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.

d. Riser diagram.

e. Device addresses.

f. Record copy of site-specific software.

g. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.

2) Frequency of testing of installed components.

3) Frequency of inspection of installed components.

4) Requirements and recommendations related to results of maintenance.

5) Manufacturer's user training manuals.

h. Manufacturer's required maintenance related to system warranty requirements.

i. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III [technician.

C. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

D. Installer shall have offices within 70 miles of project location. And shall have experience with installing, monitoring, and maintaining systems withing Pointe Coupee Parish

1.7 WARRANTY

A. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.

C. All components provided shall be listed for use with the selected system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:

1. Manual stations.
2. Heat detectors
3. Smoke detectors.
4. Automatic sprinkler system water flow.
5. Fire-extinguishing system operation.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances, including voice evacuation notices.
2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Unlock electric door locks in designated egress paths.
5. Activate voice/alarm communication system.
6. Record events in the system memory.
7. Record events by the system printer.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.

2. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Failure of battery charging.
8. Abnormal position of any switch at fire-alarm control unit or annunciator.
9. Voice signal amplifier failure.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit, and remote annunciators.
3. Record the event in memory.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.

2.3 PERFORMANCE REQUIREMENTS

A. FIRE-ALARM CONTROL UNIT

1. Manufacturer
    a. Fike
    b. Fire-Lite
    c. Notifier
    d. GE
    e. or pre-approved equivalent

2. General Requirements for Fire-Alarm Control Unit:
    a. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.
    b. system software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
    c. Include a real-time clock for time annotation of events on the event recorder and printer.
    d. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
    e. The FACP shall be listed for connection to a central-station signaling system service.
    f. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.
    g. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
    h. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

3. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
    a. Annunciator and Display: Liquid-crystal type, 40 characters, minimum.
    b. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

B. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, classification as required.

C. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.
3. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
4. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.
    a. Programmable tone and message sequence selection.
    b. Standard digitally recorded messages for "Evacuation" and "All Clear."
    c. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.
    d. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
    e. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

D. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals, supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

E. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed lead calcium

F. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.4 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.

B. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral or attached addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

C. Station Reset: Key- or wrench-operated switch.

D. Mounting Faceplate: Factory finished, white.

2.5 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
3. Integral Visual-Indicating Light: LED type, indicating detector has operated.

B. HEAT DETECTORS

1. General Requirements for Heat Detectors: Comply with UL 521.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

C. NOTIFICATION APPLIANCES

1. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.
2. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

3. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
4. Mounting: Wall mounted unless otherwise indicated.
5. Flashing shall be in a temporal pattern, synchronized with other units.
6. Strobe Leads: Factory connected to screw terminals.
7. Mounting Faceplate: Factory finished, white.

D. Voice/Tone Notification Appliances:

1. Comply with UL 1480.
2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
3. High-Range Units: Rated 2 to 15 W. Located in Children’s Area
4. Low-Range Units: Rated 1 to 2 W.
5. Mounting: Flush or surface mounted and bidirectional.
6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

E. Exit Marking Audible Notification Appliance:

1. Exit marking audible notification appliances shall meet the audibility requirements in NFPA 72.
2. Provide exit marking audible notification appliances at the entrance to all building exits.
3. Provide exit marking audible notification appliances at the entrance to areas of refuge with audible signals distinct from those used for building exit marking

2.6 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

B. Mounting: Flush cabinet, NEMA 250, Type 1.

C. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.7 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.8 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture [one] [two] telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.

4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.
4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

B. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

C. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

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

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.

2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Equipment Mounting:Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.
3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

D. Smoke- or Heat-Detector Spacing:

1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
4. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

E. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

F. Audible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

G. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches below the ceiling. Install all devices at the same height unless otherwise indicated.

H. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

A. Wiring for Fire Alarm system shall be routed in EMT.

B. Exposed EMT shall be painted red enamel.

C. Provide 3 – 3/4” spare raceways from FACP to above accessible ceiling.

3.4 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

B. IDENTIFICATION

1. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
2. Install instructions in fire-alarm control unit.

C. GROUNDING

1. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
2. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

C. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

D. Fire-alarm system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.6 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 283111

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.

B. Related Requirements:

1. Section 312513 "Erosion Control" for temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.

1. Use sufficiently detailed photographs or video recordings.

1.6 FIELD CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.

B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.

D. Utility Locator Service: Notify LA One Call: 811 (1-800-272-3020) for area where Project is located before site clearing.

E. Do not commence site clearing operations until temporary erosion- and sedimentation-control **and plant-protection** measures are in place.

F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."

B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Use only hand methods or air spade for grubbing within protection zones.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth **of 6 inches (150 mm)** in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to **72 inches (1800 mm)**.
2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials, and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312200 - GRADING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies the requirements for earthwork, including excavation, utility protection, filling, backfilling compaction, stabilization, grading and disposal of unacceptable and excess excavated material including but not limited to the following.

B. Provide subbase materials, drainage fill, and common fill materials for slabs, pavements and site improvements.

C. Provide suitable fill from off site if on site quantities are insufficient or unacceptable. Stockpile excess excavated material at a location designated by the Owner's Representative.

D. Refer to Section 01010-Summary of Work for sequence of construction.

1.3 QUALITY ASSURANCE

A. Reference Standards Applicable to this Section:

1. ASTM: American Society for Testing and Materials

    a. D 698: Test Methods for Moisture-Density Relations of Soils and soil Aggregate Mixtures Using 5.5 lb. Rammer and 12 in. Drop.
    b. D 1785: Specification for Poly (Vinyl Chloride) (PVC) Pipe, Schedules 40, 80, and 120. Schedules 40, 80, and 120.
    c. D 2487: Test Method for Classification of Soils for Engineering Purposes.
    d. D 4318: Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.

2. Grading Tolerances Outside Building Lines: Finish excavations and grade within a tolerance of 5/8" above or 1 1/4" below required grades. Do not leave depressions in graded areas. Haul off excess excavated material not required for fill off site and dispose of same.
3. Grading Tolerance for Fill under Building Slabs: Plus or minus 1/2 inch measured with a 10 foot straight edge.

B. Submittals

1. Test reports: Report and certification of fill materials.

C. Job Conditions:

1. Site information: Refer to Drawings.
2. Use of explosives: The use of explosives will not be permitted.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Classification: Acceptable material shall be as classified in ASTM D 2487, Groups GW, GP, GM, SM, SW, and SP.

B. Common Fill:

1. Mineral soil substantially free from organic and unsuitable materials and free from rock or gravel larger than 2” in diameter; 80 percent passing No. 40 sieve and not more than 50 percent passing No. 200 sieve.
2. Common Fill is intended to be used for construction of berms and excavated areas and to achieve proposed elevation prior to placement of topsoil.

C. Topsoil:

1. Secure adequate topsoil from an approved off-site location if on site quantities are insufficient or unacceptable. It shall be fertile, friable, natural loam containing a liberal amount of humus and shall be capable of sustaining vigorous plant growth. It shall be free of stone lumps, clods of hard earth, plants or their roots, sticks and other extraneous matter. The natural organic content by oven dry weight as measured by the "wet digestion" method shall not be less than 1.5%.
2. The pH of the topsoil shall not be less than 5.5 and shall not exceed 7.2. Sand content shall not exceed 50%, oven dry weight. Soil tests shall be run prior to topsoil sample approval and at Owners Representative's discretion throughout topsoil installation. Tests shall be done at Contractor's expense and results will suffice for fertilizer requirements in Section 02930 Planting. Topsoil not meeting these requirements will not be accepted.

D. Planting Backfill Mix: As specified in Section 329300 Plants

E. Crush Limestone Gravel Base

1. Intended use: Gravel base material is intended for use under concrete walks, brick pavers, and flagstone.

2. Gradation: Type A, Grade 2. No variances from this specification will be allowed.

Sieve Size	Percent Retained
1-3/4"	0-10
No. 4	45-75
No. 40	60-85

3. Plasticity Characteristics: Minimum Liquid Limit = 40; Maximum Plasticity Index = 12.
4. Compassion Specification: A minimum of 95 percent of ATM D 698-78, Method D maximum dry density at a moisture content slightly dry of optimum. Lift thicknesses should not exceed six inches compacted thickness.
5. Generic Name(s): Crushed Limestone Base. A;

F. Gravel Drain Material

1. Intended use: Gravel drain material is intended to be used as drainage backfill in conjunction with planting underdrains and cloth covered ADS pipe.
2. Gradation: ASTM C 33-82, Size 6T.

Sieve Size	Percent Retained
1"	0
3/4"	0 - 10
3/8"	45 - 80
No. 4	90 - 100
No. 8	95 – 100

3. Plasticity Characteristics: Non-plastic
4. Compaction Specification: Compact by vibratory means a range of 70 to 85 percent of TEX-113-E maximum dry density. Lift thickness should not exceed eight (8) inches. Compaction by flooding is not acceptable.
5. General Name(s): Pea Gravel.

G. Sharp Sand: Sand shall be thoroughly washed, coarse grade sharp, construction or brick sand, free of clay balls, weeds, and grass. So-called cushion sand, blow sand, or creek silt is not acceptable for substitution where sharp sand is specified.

PART 3 - EXECUTION

3.1 EXCAVATION

A. General

1. Contractor shall inspect the site and confirm actual grades and levels, and existing conditions under which the work is to be performed.
2. If unsuitable material or soft spots are encountered at the required subgrade elevations at the time of excavation or when compacting the subgrade, notify the Owners Representative.

3. The following materials shall be classed as unsuitable when found in the subgrade zone:

    a. Abandoned structures such as pipes or conduits, underground equipment, vaults, septic tanks, floor slabs or other similar constructions.
    b. Deposits of refuse or debris.

4. Embankments or fills shall be constructed in successive horizontal layers, not exceeding 8 in. in thickness. Each layer shall extend across the entire fill and shall be compacted to the required dry density as specified in Article 3.02 of this Section.

B. Preparation

1. Protection: Provide adequate protective measures of shoring, bracing, piling, planking and cribbing to protect existing adjacent construction.

    a. Protect all reference points, benchmarks and monuments from dislocation or damage. Replace or repair immediately any points damaged, destroyed, or dislocated.
    b. Sprinkle and dampen all dusty material from the beginning of work to its completion.
    c. Protect and maintain all conduits, drains, inlets, sewers, pipes and wires that are to remain on the property.
    d. Provide, erect and maintain all lights, barricades, warning signs, and guards as necessary.

2. Layout: All work shall be laid out by a licensed surveyor employed by the Contractor. Cost of all layout work shall be borne by Contractor. Refer to Special Conditions. Contractor shall be responsible for all elevations, dimensions and verifications of actual conditions. Refer discrepancies to Owners Representative for interpretation or necessary modifications.
3. Site preparation: Remove topsoil, grass, weeds, trees, shrubbery, roots and other vegetation from the areas to be excavated, filled or graded.
4. Construction Slopes: No slopes shall be constructed or excavated that violate the provisions of OSHA (Occupational Safety and Health Administration) criteria given in Article 1926, Sub-Part P, Table P-1, without having the geotechnical consultant specifically analyze such slopes. Refer to Special Conditions for other requirements.

C. Unauthorized Excavation

1. Unauthorized excavation shall consist of removal of materials beyond indicated subgrade elevations, limits or dimensions.
2. Remedial work shall be equal to that specified for normal earthwork in this Section.

D. Dewatering

1. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding the site and surrounding area.

2. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footing, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
3. Convey water removed from excavations and rainwater to collecting or run-off areas. Establish and maintain temporary drainage ditches and other diversions outside excavation limits. Do not use trench excavations as temporary drainage ditches.
4. Notify Owners Representative in writing of work delays due to water or water-affected conditions.

3.2 COMPACTION

A. General: Control soil compaction during construction and attain the minimum percentage of density specified in this Section.

B. Required Density and Moisture:

1. Compact fill material to 95 percent of the maximum dry density as determined in accordance with ACT D 698, Method A (Standard Proctor).
2. Obtain the specified compaction for fill material at a moisture content above optimum moisture. Determine optimum moisture in accordance with ACT D 698, Method A.

C. Moisture Control: Earthwork materials shall not be placed, spread, rolled or compacted during inclement weather. If such operations are interrupted by rain, operations shall not resume until the Contractor has determined that the moisture content and density of the previously placed material are within the specified limits.

3.3 BACKFILL AND FILL

A. Earthwork

1. Excavate to lines, elevations, and limits required by drawing details, plus sufficient distance and space to permit erection of forms, shoring and inspections. Excavate as required, regardless of types, conditions or moisture content of materials encountered. Refer to Uniform General Conditions for trenching requirements.
2. Grades: Cut all areas accurately to required cross-sections and grades. Take care to prevent excavation below required grades.
3. Materials shall be disposed of outside the limits of the project site and at the Contractor's responsibility. Make all necessary arrangements and obtain all permits required for traffic control during hauling operations.

B. Filling

1. Fill (or excavate as required) under items of construction as specified previously.

2. Filling: All granular fill shall be installed in loose lifts and uniformly compacted as specified for the types listed.
3. Preparations for filling:

    a. Complete stripping operations in advance of fill construction. Any material found in fill areas after stripping operation which, in the opinion of the Owners Representative, is unsuitable shall be removed from site.
    b. Areas on which any compacted earth fill is to be placed shall be rough graded, spot filled and leveled, and uniformly prepared to receive fills by means of power equipment.

4. All vegetation and root systems shall be removed prior to any select fill placement or construction. The resulting grade shall be proof-rolled, and any loose or soft spots shall be filled and compacted with an approved fill material. Fill materials used beneath vault, fountain and pool shall be a select, non-expansive soil meeting the Type I or Type II Select Fill gradation, plasticity and compaction criteria.
5. Placing Fill:

    a. Construct fill at location and to lines and grades required by drawings. Equipment for placing fills shall be capable of obtaining required density.
    b. Combined excavation and fill placing operations shall be such that materials when compacted in fill will be blended sufficiently to secure best practicable degree of compaction. Dump successive loads of material and spread and mix to give a horizontal layer of not more than specified in depth, loose measurement.
    c. No fill material shall be compacted until the layer of material has a uniform moisture content which will permit proper compaction, and material in each layer of fill, while being compacted, shall be maintained as nearly as practical at that degree of moisture content which is optimum for obtaining required compaction.
    d. If fill is to be placed on existing slopes that are steeper than 5 (horizontal) to 1 (vertical), such as could occur during undercutting of existing fill materials, then the new fill materials should be benched into the existing slopes in such a manner as to provide a good contact between the two materials, remove potential sliding planes, and allow relatively horizontal lift placement.
    e. After material has been brought to a uniform and satisfactory moisture content, each horizontal layer of all fill material shall be compacted as specified for each type.

C. Placing Topsoil

1. General: Topsoil shall be placed in all areas to receive hydromulch or solid sod.
2. Procedures: Excavate areas to receive topsoil a minimum depth of 2". Till or rake with fork bar to break-up compaction to 8" depth prior to placing topsoil.

D. Backfilling

1. General: Backfilling includes filling and compaction beneath concrete paving and structural concrete; against and around concrete after forms have been removed and inspection completed. Compact backfills as specified.
2. Procedures:

    a. Do not begin backfilling until construction below finish grade has been approved, underground utilities inspected; tested and approved, forms removed, and excavation cleaned of trash and debris. Bring backfields to required grades.
    b. Backfill shall not be placed in wet or frozen areas. Heavy equipment for spreading and compacting backfill shall not be operated closer to foundations, curbs, or walls than a distance equal to the height of backfill above the top of structural members; the area remaining shall be compacted by power driven hand tampers suitable for the material being compacted.

E. Reconditioning Subgrade Where Approved Compacted Subgrades are Distributed Contractor's subsequent operations or adverse weather: Scarify and compact subgrade to the required density prior to further construction thereon.

F. Grading

1. Establishment of grades: The Contractor shall be responsible for establishment of all grades by means of grade stakes placed at all abrupt changes of grade and elsewhere as required.
2. Rough grading: Rough grade to elevations required by drawings. Remove soft and unstable materials which will not readily compact when rolled and tamped. Fill resulting depressions with stable material and roll until required compaction is obtained.
3. Finish grade: Finish grade to elevations required by drawings less topsoil. All areas to be hydromulched or sodded shall receive imported topsoil to a depth indicated on drawings. At intermediate points for which finish grades are not indicated, finish grades shall be of uniform level or slope between points for which elevations are given. Round any abrupt changes in elevations. Make certain that finish grades slope away from structures in all directions to assure positive drainage.

G. Pavement Areas

1. Prepared subgrade for new pavement: Prior to pavement construction, the subgrade shall be scarified 6", uniformly recompacted to a minimum of ninety-five (95) percent of ASTM D-698, at, or slightly above, the optimum moisture determined by that test and maintained in a moist condition until the pavement is placed.
2. Restore, without extra cost to Owner, all paved areas of existing parking areas, streets, curbs, etc. that may be opened or damaged in performance of the work included in contract. Pavement work and lawn areas shall match existing and shall comply with the requirements of applicable governing ordinances.

H. Field Testing Earthwork: All earthwork shall be field tested by a recognized independent testing agency selected and paid for by the Owner. Payment for service authorized by Owner will be by the Owner, directly to the Testing Lab, unless specifically specified to the contrary. Proof test of materials and mixes shall be by Lab selected by the Owner but paid for by the Contractor. After approval, all authorized successful tests are paid for by the Owner.

I. Adjusting and Cleaning

1. Settlement or washing: Settlement or washing that occurs in areas, prior to acceptance of the work, shall be repaired and grades reestablished to the required elevations and slopes.
2. Clean up all debris caused by work of this section, keeping premises neat and clean at all times.

END OF SECTION 312200

SECTION 312513 – EROSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes installing, maintaining and removing:

1. Silt Fence
2. Temporary Construction Entrances
3. Diversion Channels
4. Sediment Traps
5. Rip Rap
6. Stone Check Dams
7. Inlet Protection
8. Site Stabilization.

B. Related Requirements:

1. Section 311000 - Site Clearing.
2. Section 312333 – Excavation Trenching and Backfilling.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-pound) rammer and a 457-mm (18-inch) drop.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft3 (2,700 kN-m/m3)).
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).;aljdf

C. LDOTD Standard Specificaitonsl:

1. Standard Specifications for Roads and Bridges, 2016, published by the Louisiana Department of Transportation.

1.3 SUBMITTALS

A. Section 013300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data on geotextile, posts, woven wire, concrete mix design, and pipe.

C. Manufacturer's Certificate: Certify products and aggregates meet or exceed specified requirements. Except for materials indicated to be stockpiled or otherwise remaining Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

D. Closeout Submittals: Section 017000 – Execution and Closeout Requirements: Requirements for submittals.

1.4 QUALITY ASSURANCE

A. Standard of quality shall conform to the standards and practices set forth in: “Louisiana Storm Water Management and Sedimentation Control Handbook for Land Disturbance Activities”, February 1998 or latest edition.

B. Maintain one copy of document on site.

PART 2 - PRODUCTS

2.1 GEOTEXTILE MATERIAL

A. Engineering Fabric Materials: Non-biodegradable conforming to Section 815.02 of LDOTD Standard Specifications:

1. Silt Fence: Type 3, Class A or B Engineering Fabric.
2. Under Rip Rap or Construction Entrances: Type 2 Engineering Fabric.

2.2 STONE, AGGREAGE, AND SOIL MATERIAL

A. Stone for Sediment Trap and Check Dam: Class B erosion control stone conforming to Division 800 of the LDOTD Standard Specifications. Minimum size 5 inches, midrange size 8 inches, and maximum size 12 inches equally distributed.

B. Stone for Rip Rap: Class 1 erosion control stone conforming to Division 800 of the LDOTD Standard Specifications. Minimum size 5 inches, midrange size 10 inches, and maximum size 17 inches equally distributed.

C. Washed Stone: Coarse aggregate, Gradation No. 57 conforming to Division 800 of the LDOTD Standard Specifications.

D. Aggregate for Construction Entrance: Coarse aggregate, Gradation No. 4 or larger with maximum size of 3 inch, conforming to Division 800 of the LDOTD Specifications.

E. Soil Fill: Clean natural soil with a plasticity index of 15 or less that is free of clay, rock, or gravel lumps larger than 2 inches in any dimension; debris; waste; frozen material; and any other deleterious material that might cause settlement. Suitable material excavated from the site may be used as soil fill under optimum moisture conditions.

2.3 PLANTING MATERIALS

A. General: Conform to rules and regulations as specified in the LDOTD Standard Specifications for seed, agricultural ground limestone, fertilizers, and mulch.

B. Temporary Seed Mixture: Engineering Fabric Materials: Non-biodegradable conforming to Section 815.02 of LDOTD Standard Specifications:

1. Late winter and early spring: Rye
2. Summer: Common Bermuda
3. Fall: Rye and Common Bermuda

C. Fertilizer: Commercial grade; recommended for grass.

D. Lime: ASTM C602, Class O agricultural ground limestone containing a minimum 80 percent calcium carbonate equivalent.

E. Mulch: Wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable

2.4 CONCRETE

A. Concrete: Class B concrete conforming to Section 701 of the LDOTD Standard Specifications.

1. Compressive strength of 2,500 psi at 28 days.
2. Air entrained.
3. Water cement ratio of 0.488 with rounded aggregate and 0.567 with angular aggregate.
4. Maximum slump of 2.5 inches for vibrated concrete and 4 inches for non-vibrated concrete.
5. Minimum cement content of 508 lbs per cubic yard for vibrated and 545 lbs per cubic yard for non-vibrated concrete.

2.5 PIPE MATERIALS

A. Pipe: Corrugated steel pipe and fittings conforming to Section 715.2.3 of LDOTD Standard Specifications.

2.6 ACCESSORIES

A. Posts for Silt Fence and Inlet Protection: Steel posts 5 feet long, 1-3/8 inches wide, minimum weight 1.25 lbs/ft. conforming to Section 815.4.6 of the LDOTD Standard Specifications.

B. Woven Wire Fence for Silt Fence: Minimum 32 inches high, minimum 5 horizontal wires, vertical wires spaced 12 inches apart, minimum 10 gage top and bottom wires, and minimum 12-1/2 gage; all other wires conforming to Section 815 of the LDOTD Standard Specifications.

C. Attachment Devices for Silt Fence: No. 9 staple, minimum 1-1/2 inches long, or other approved attachment devices.

D. Hardware Cloth for Inlet Protection: 24 gage, 1/4-inch mesh opening hardware cloth.

2.7 SOURCE QUALITY CONTROL (AND TESTS)

A. Section 014000 - Quality Requirements: Testing, inspection, and analysis requirements.

B. Perform tests on cement, aggregates, and mixes to ensure conformance with specified requirements.

C. Make rock available for inspection at producer’s quarry prior to shipment. Notify Architect/Engineer at least seven days before

D. Allow witnessing of inspections and tests at manufacturer’s test facility. Notify Architect/Engineer at least seven days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 013000 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify compacted subgrade is acceptable and ready to support devices and imposed loads.

C. Verify gradients and elevations of base or foundation for other work are correct.

3.2 SILT FENCE

A. Install in accordance with Section 815 of the LDOTD Standard Specifications at locations shown on Drawings.

B. Use wire fence with Class A fabric.

C. Class B fabric may be used without woven wire backing subject to the following:

1. Fabric is approved by Architect/Engineer.
2. 2. Maximum post spacing is 6 feet.
3. 3. Posts are inclined toward runoff source not more than 20 degrees from vertical.

3.3 TEMPORARY CONSTRUCTION ENTRANCES

A. Excavate and compact subgrade as specified in Section 312316.

B. Install construction entrances at the dimensions and locations as shown on Drawings. Minimum thickness is 6 inches.

C. Mound aggregate near intersection with public road to prevent site runoff entering road.

D. Periodically dress entrances with 2-inch thick course aggregate when aggregate becomes clogged with soil.

3.4 DIVERSION CHANNELS

A. Excavate channel

B. Windrow excavated material on low side of channel.

C. Compact to 95 percent maximum density.

D. On entire channel area, apply soil supplements and sow seed

E. Mulch seeded areas with hay.

3.5 SEDIMENT TRAPS

A. Clear site as specified in Section 310000.

B. Construct trap by excavating and forming embankments as specified in Section 312316.

C. Place coarse aggregate or rock at outlet as indicated on Drawings.

D. Place geotextile fabric as specified for rock lining.

E. On entire sediment trap area, apply soil supplements and sow seed as specified in Section 329219.

F. Mulch seeded areas with hay as specified in Section 329219.

G. Clean trap of accumulated sediment when directed but no less than when trap is half full of sediment.

3.6 ROCK LINING (RIP RAP)

A. Excavate to depth of rock lining as indicated on Drawings or nominal placement thickness as follows. Remove loose, unsuitable material below bottom of rock lining and replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.

B. Lay and overlay geotextile fabric over substrate. Lay fabric parallel to flow from upstream to downstream. Overlap edges upstream over downstream and upslope over downslope. Provide a minimum overlap of 3 feet. Offset adjacent roll ends a minimum of 5 feet when lapped. Cover fabric as soon as possible and in no case leave fabric exposed more than 4 weeks.

C. Carefully place rock on geotextile fabric to produce an even distribution of pieces with minimum of voids and without tearing geotextile.

D. Unless indicated otherwise, place full course thickness in one operation to prevent segregation and avoid displacement of underlying material. Arrange individual rocks for uniform distribution.

3.7 STONE CHECK DAM

A. Determine length required for ditch or depression slope and excavate, backfill, and compact foundation area to firm, even surface.

B. Place Class B erosion control stone in an even distribution of rock pieces with minimum voids to the indicated shape, height, and slope.

C. Construct washed stone filter blanket against upstream face of stone check dam to the thickness indicated on Drawings.

3.8 INLET PROTECTION

A. Install four posts around drainage structure and attach hardware cloth as indicated on Drawings.

B. Place Class B erosion control stone at base of fabric and mound at approximately 2:1.

C. Place washed stone filter blanket on upstream side(s). Determine length required for ditch or depression slope and excavate, backfill, and compact foundation area to firm, even surface.

3.9 SITE STABILIZATION

A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.

B. Construct, stabilize, and activate erosion controls before site disturbance within tributary areas of those controls.

C. Stockpile and waste pile heights shall not exceed 35 feet. Slope stockpile sides at 2:1 or flatter.

D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.

1. During non-germinating periods, apply mulch at recommended rates.
2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 329219 at 75 percent of permanent application rate with no topsoil.
3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 329219 permanent seeding specifications.

E. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.10 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

C. Perform laboratory material tests in accordance with ASTM D1557 or AASHTO 180.

D. Perform in place compaction tests in accordance with the following:

1. Density Tests: ASTM D1556, ASTM D2167, or ASTM D2922.
2. MMoisture Tests: ASTM D3017.

E. When tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

F. Frequency of Tests: Twice per lift for every 10,000 square feet..

3.11 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. When sediment accumulation in sedimentation structures has reached a point one-half depth of sediment structure or device, remove and dispose of sediment.

C. Do not damage structure or device during cleaning operations.

D. Do not permit sediment to erode into construction or site areas or natural waterways.

E. Clean channels when depth of sediment reaches approximately one-half channel depth.

3.12 SCHEDULES

A. Erosion Control Schedule:

Erosion Control Element	Location	Size
Silt Fence		
Temp Construction Entrances		
Diversion Channel		
Sediment Trap		
Rock Lining (Rip Rap)		
Stone Check Dams		
Inlet Protection		
Sediment Pond		

END OF SECTION 312513

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes soil treatment with termiticide.

1. Treat soil under building slabs, foundations and building foundation perimeters.

1.2 SUBMITTALS

A. Product Data: For termiticide.

1. Include the EPA-Registered Label for termiticide products.
2. Product Certificates: For termite control products, signed by product manufacturer.

B. Qualification Data: For Installer of termite control products.

C. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.

B. Source Limitations: Obtain termite control products through one source.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

1.5 COORDINATION

A. Coordinate and schedule soil treatment application with excavating, filling, grading, and concreting operations.

1. Do not schedule and perform applications when students are or expected to be on campus, and within-8-hours after application.

B. Coordinate termiticide application, such that subsequent work will promptly follow, without exposure of the termiticide application to inclement weather and other conditions that will disturb and void effectiveness of termiticide application. Should there be failure to schedule application to avoid inclement weather, or inadvertent delay by the Contractor to promptly follow with subsequent work covering and protecting the termiticide application resulting in the exposure and nulling of the termiticide application, re-application costs would be chargeable to the Contractor.

C. Allow termiticide applicator to treat soil under footings, grade beams, and ground-supported slabs before proceeding with subsequent construction.

1.6 WARRANTY

A. Warranty: Furnish written warranty, executed by Applicator and Contractor on Certificate Form issued by the State of Louisiana, certifying that applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity is discovered during warranty period, Contractor will re-treat soil and repair or replace damage caused by termite infestation.
   1. Warranty Period: Five years from date of Substantial Completion.

B. Renewable Option: At the end of the guaranty period, offer the Owner a renewable guaranty on a year-to-year basis, at the Owner's option, at an agreed upon annual fee.

PART 2 - PRODUCTS

2.1 TERMITICIDE

A. Termiticide Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Termidor SC.
   2. Premise 75.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Contractor shall perform earthmoving operations, and prepare areas ready to receive termiticide.

B. Contractor shall coordinate with Owner’s Applicator to examine substrates, areas, and conditions for compliance with requirements for moisture content of soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control.

C. Contractor shall make corrections to unsatisfactory conditions for Owner’s Applicator to apply termiticide.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 TERMITICIDE APPLICATION

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Provide trench and rodding around building perimeter. Make trenches 6-inches wide x 6-inces deep, and rods 12-inches on centers. Apply at rate of 4 gal. per linear foot of trench and per linear foot depth of holes, unless noted otherwise by manufacturer..

C. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

D. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

E. Post warning signs in areas of application.

F. Notify and recall Owner’s Applicator to reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.5 POST TREATMENT

A. One year after substantial completion of the project, applicator shall return to the project site to re-treat the project.

END OF SECTION 313116

SECTION 316329 - DRILLED CONCRETE PIERS AND SHAFTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Dry-installed drilled piers.

1.2 UNIT PRICES

A. Drilled Piers: Actual net volume of drilled piers in place and approved. Actual length, shaft diameter, and bell diameter if applicable, may vary, to coincide with elevations where satisfactory bearing strata are encountered.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For concrete reinforcement.

1.4 QUALITY ASSURANCE

A. Drilled-Pier Standard: Comply with ACI 336.1 unless modified in this Section.

1.5 PROJECT CONDITIONS

A. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.

1. Record and maintain information pertinent to each drilled pier and cooperate with Owner's testing and inspecting agency to provide data for required reports.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn, galvanized.

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I

2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag cement.

B. Normal-Weight Aggregate: ASTM C 33, graded, 3/4-inch- (19-mm-) nominal maximum coarse-aggregate size. Provide aggregate from a single source.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
3. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.3 STEEL CASINGS

A. Steel Pipe Casings: ASTM A 283/A 283M, Grade C, or ASTM A 36/A 36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1/D1.1M.

2.4 CONCRETE MIXTURES AND MIXING

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 limits as if concrete were exposed to deicing chemicals.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Proportion normal-weight concrete mixture as follows:

1. Compressive Strength (28 Days): 3000 psi.

2. Air Content: Do not air entrain concrete.

E. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Unclassified Excavation: Excavate to bearing elevations regardless of character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.

B. Excavate shafts for drilled piers to indicated elevations. Remove loose material from bottom of excavation.

C. Notify and allow testing and inspecting agency to test and inspect bottom of excavation. If unsuitable bearing stratum is encountered, make adjustments to drilled piers as determined by Architect.

1. Do not excavate shafts deeper than elevations indicated unless approved by Architect.
2. Payment for additional authorized excavation will be according to Contract provisions for changes in the Work.

D. Temporary Casings: Install watertight steel casings of sufficient length and thickness to prevent water seepage into shaft; to withstand compressive, displacement, and withdrawal stresses; and to maintain stability of shaft walls.

1. Remove temporary casings, maintained in plumb position, during concrete placement and before initial set of concrete.

E. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.

3.2 INSTALLATION

A. Install steel casings of minimum wall thickness indicated and of diameter not less than diameter of drilled pier.

B. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

C. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by Owner's independent testing and inspecting agency.

D. Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement. Vibrate top 60 inches (1500 mm) of concrete.

E. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a 60-inch (1500-mm) head of concrete above bottom of casing.

F. If hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to ACI 301 to maintain delivered temperature of concrete at no more than 90 deg F (32 deg C).

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Drilled-Pier Tests and Inspections: For each drilled pier, before concrete placement.

C. Concrete Tests and Inspections: ACI 301.

END OF SECTION 316329

SECTION 316329 - DRILLED CONCRETE PIERS AND SHAFTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Dry-installed drilled piers.

1.2 UNIT PRICES

A. Drilled Piers: Actual net volume of drilled piers in place and approved. Actual length, shaft diameter, and bell diameter if applicable, may vary, to coincide with elevations where satisfactory bearing strata are encountered.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Shop Drawings: For concrete reinforcement.

1.4 QUALITY ASSURANCE

A. Drilled-Pier Standard: Comply with ACI 336.1 unless modified in this Section.

1.5 PROJECT CONDITIONS

A. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.

1. Record and maintain information pertinent to each drilled pier and cooperate with Owner's testing and inspecting agency to provide data for required reports.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn, galvanized.

2.2 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I

2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag cement.

B. Normal-Weight Aggregate: ASTM C 33, graded, 3/4-inch- (19-mm-) nominal maximum coarse-aggregate size. Provide aggregate from a single source.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

D. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
3. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
4. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.3 STEEL CASINGS

A. Steel Pipe Casings: ASTM A 283/A 283M, Grade C, or ASTM A 36/A 36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1/D1.1M.

2.4 CONCRETE MIXTURES AND MIXING

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 limits as if concrete were exposed to deicing chemicals.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Proportion normal-weight concrete mixture as follows:

1. Compressive Strength (28 Days): 3000 psi.

2. Air Content: Do not air entrain concrete.

E. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Unclassified Excavation: Excavate to bearing elevations regardless of character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.

B. Excavate shafts for drilled piers to indicated elevations. Remove loose material from bottom of excavation.

C. Notify and allow testing and inspecting agency to test and inspect bottom of excavation. If unsuitable bearing stratum is encountered, make adjustments to drilled piers as determined by Architect.

1. Do not excavate shafts deeper than elevations indicated unless approved by Architect.
2. Payment for additional authorized excavation will be according to Contract provisions for changes in the Work.

D. Temporary Casings: Install watertight steel casings of sufficient length and thickness to prevent water seepage into shaft; to withstand compressive, displacement, and withdrawal stresses; and to maintain stability of shaft walls.

1. Remove temporary casings, maintained in plumb position, during concrete placement and before initial set of concrete.

E. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.

3.2 INSTALLATION

A. Install steel casings of minimum wall thickness indicated and of diameter not less than diameter of drilled pier.

B. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

C. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by Owner's independent testing and inspecting agency.

D. Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement. Vibrate top 60 inches (1500 mm) of concrete.

E. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a 60-inch (1500-mm) head of concrete above bottom of casing.

F. If hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to ACI 301 to maintain delivered temperature of concrete at no more than 90 deg F (32 deg C).

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Drilled-Pier Tests and Inspections: For each drilled pier, before concrete placement.

C. Concrete Tests and Inspections: ACI 301.

END OF SECTION 316329

SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes concrete paving:

1. Curbs and gutters.
2. Walks.

1.2 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash, slag cement, and other pozzolans.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each exposed product for each color and texture.

C. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.4 QUALITY ASSURANCE

A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").

1.5 FIELD CONDITIONS

A. Cold-Weather Concrete Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1.

B. Hot-Weather Concrete Placement: Comply with ACI 301.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 unless otherwise indicated.

2.2 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.

1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less. Do not use notched and bent forms.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.3 STEEL REINFORCEMENT

A. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

C. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.

2.4 CONCRETE MATERIALS

A. Cementitious Materials: Use the following cementitious materials, of same type, brand, and source throughout Project:

1. Portland Cement: ASTM C150/C150M, gray portland cement Type I.
2. Fly Ash: ASTM C618, Class C or Class F.

B. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N, uniformly graded. Provide aggregates from a single source.

C. Water: Potable and complying with ASTM C94/C94M.

2.5 CURING MATERIALS

A. Water: Potable.

B. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

C. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.

D. White, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 2, Class B, dissipating.

2.6 RELATED MATERIALS

A. Joint Fillers: ASTM D1751, asphalt-saturated cellulosic fiber in preformed strips.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:

1. Air Content, 3/4-inch Nominal Maximum Aggregate Size: 6 percent plus or minus 1-1/2 percent.

D. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.

E. Concrete Mixtures: Normal-weight concrete.

1. Compressive Strength (28 Days): 3000 psi.
2. Maximum W/C Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches, plus or minus 1 inch.

2.8 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C94/C94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

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

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 INSTALLATION OF STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded-wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness.

E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.

B. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

D. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. Screed paving surface with a straightedge and strike off.

G. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleedwater appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.8 INSTALLATION OF DETECTABLE WARNINGS

A. Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Section 321726 "Tactile Warning Surfacing."

1. Tolerance for Opening Size: Plus 1/4 inch, no minus.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by moisture curing.

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

3.10 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:

1. Elevation: 3/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-feet- long; unleveled straightedge not to exceed 1/2 inch.
4. Joint Spacing: 3 inches.
5. Contraction Joint Depth: Plus 1/4 inch, no minus.
6. Joint Width: Plus 1/8 inch, no minus.

3.11 REPAIR AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 323113 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Chain-link fencing and swing gates.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
b. Fence and gate posts, rails, and fittings.
c. Chain-link fabric, reinforcements, gate types, hardware, and attachments.
d. Gates and hardware.

B. Samples for Initial Selection: For each type of factory-applied finish.

1.3 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees][Installer agrees] to repair or replace components of fences[, gates, operators, and controls] that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure to comply with performance requirements.
b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
c. Faulty operation of gate operators and controls.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CHAIN-LINK FENCES, GENERAL

A. CLFMI Publications: Comply with the CLFMI Product Manual unless modified by requirements in the Contract Documents.

B. Chain-Link Fence and Gate Assemblies: Include materials applicable for a complete assembly of application types, consisting of commercial, industrial, and security chain-link fences and gates.

1. Source Limitations: Obtain chain-link fence and gate components from single source or manufacturer.

2.2 CHAIN-LINK FENCE FRAMEWORK

A. Posts and Rails: ASTM F1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thicknesses in accordance with ASTM F1043 or ASTM F1083 based on the following:

1. Fence Height: 96 inches.
2. Heavy-Industrial-Strength Material: Group IA, round steel pipe, Schedule 40.
    a. Line Post: 2.375 inches in diameter.
    b. End, Corner, and Pull Posts: 2.875 inches in diameter.
3. Horizontal Framework Members: top and intermediate rails in accordance with ASTM F1043.
    a. Top Rail: 1.66 inches in diameter.
4. Brace Rails: ASTM F1043.
5. Metallic Coating for Steel Framework:
    a. Type A: Not less than minimum 2.0 oz./sq. ft. average zinc coating in accordance with ASTM A123/A123M or 4.0 oz./sq. ft. zinc coating in accordance with ASTM A653/A653M.
6. Polymer coating over metallic coating.
    a. Color: Black, in accordance with ASTM F934.

2.3 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist in accordance with "CLFMI Product Manual" and requirements indicated below:

1. Fabric Height: 96 inches.
2. Steel Wire for Fabric: Wire diameter of 0.148 inch.
    a. Mesh Size: 2 inches.
    b. Polymer-Coated Fabric: ASTM F668, Class 1 over zinc-coated steel wire.
        1) Color: Black, in accordance with ASTM F934.
    c. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.
3. Selvage: Knuckled at both selvages.

2.4 CHAIN-LINK FITTINGS

A. Provide fittings in accordance with ASTM F626.

B. Post Caps: Provide for each post.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:

1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.
2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate rails to posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: In accordance with ASTM F626.

1. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, in accordance with the following:
    a. Hot-Dip Galvanized Steel: 0.106-inch-diameter wire[; galvanized coating thickness matching coating thickness of chain-link fence fabric].

I. Finish:

1. Metallic Coating for Pressed Steel or Cast Iron: Not less than 1.2 oz./sq. ft. of zinc.
    a. Polymer coating over metallic coating.

2.5 CHAIN-LINK WIRE AND TIES

A. Polymer-Coated Steel Wire: [0.148-inch- diameter, tension wire in accordance with ASTM F1664, Class 1 over zinc-coated steel wire.

1. Color: Black, in accordance with ASTM F934.

2.6 CHAIN-LINK SWING GATES

A. General: ASTM F900 for gate posts and single/double swing gate types.

1. Gate Leaf Width: See drawings for widths indicated.
2. Framework Member Sizes and Strength: Based on gate fabric height of more than 72 inches.

B. Swing Gate Pipe and Tubing:

1. Swing Gate Posts: Round tubular steel.
2. Gate Frames and Bracing: Round tubular steel.
3. Zinc-Coated Steel: ASTM F1043 and ASTM F1083; protective coating and finish to match fence framework.

C. Swing Frame Corner Construction: Welded.

D. Swing Gate Hardware:

1. Hinges: 360-degree inward and outward swing.
2. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate.

2.7 CONCRETE

A. Concrete Post Footings: Minimum 28-day compressive strength of 2500 psi.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

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

3.2 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.3 INSTALLATION OF CHAIN-LINK FENCES

A. Install chain-link fencing in accordance with ASTM F567 and more stringent requirements specified.

B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

    a. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
    b. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches deep and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed in accordance with anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.

D. Terminal Posts: Install terminal end, corner, and gate posts in accordance with ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.

E. Line Posts: Space line posts uniformly at 10 feet o.c.

F. Post Bracing and Intermediate Rails: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at midheight of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Tension Wire: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch- diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:

1. Extended along bottom of fence fabric. Install bottom tension wire within 6 inches of bottom of fabric and tie to each post with not less than same diameter and type of wire.

H. Top Rail: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

I. Intermediate Rails: Secure to posts with fittings.

J. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 2-inch bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.

L. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric in accordance with ASTM F626. Bend ends of wire to minimize hazard to individuals and clothing.

1. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

3.4 INSTALLATION OF GATES

A. Install gates in accordance with manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.5 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Lubricate hardware and other moving parts.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 323113

SECTION 323116 – SEWER

PART 1 – GENERAL

1.1 SUMMARY

A. The work covered by this section consists of furnishing all equipment, tools and labor for installing a new sanitary sewer system including sewer mains (including fittings), sewer cleanout, sewer manholes and tie-ins as shown on the plans and as specified herein.

1.2 RELATED REQUIREMENTS

A. The following publications, referred to thereafter by the basic designation only, form a part of this specification to the extent indicated by the references thereto.

1. American Society for Testing and Materials (ASTM) Standards, Latest Editions

D1557-91	Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
D23121-89	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
D2729-96	Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.
D3034-97	Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.

2. Louisiana Standard Specifications for Roads and Bridges, 2016 Edition.

1.3 QUALITY CONTROL

A. Submittals

1. Product Data: Provide indicating pipe, pipe accessories.

2. Manufacturer’s Certificate: Certify that products meet or exceed specified requirements.

B. Project record documents: Record location of pipe runs, connections, cleanouts, and invert elevations

C. Regulatory Requirements: Conform to applicable code for materials and installation for the work of this section.

D. Field Measurements: Verify that field measurements and elevations are as indicated.

PART 2 – MATERIALS

2.1 MATERIALS

A. Pipe: PVC pipe shall be Schedule 40

B. Pipe Accessories: Fittings for gravity sewers shall be the same material as pipe, molded or formed to suit pipe size and end design, in required wyes and clean-outs, and other configurations required.

C. Frame and Grating: Frame and grating for manhole and cleanouts shall be as shown on drawings. Frames and grating shall conform to ASTM A536, Grade 60, heavy duty, ductile iron with word “SEWER” on top.

D. Bedding Material:

1. Stone for bedding shall consist of 100% crushed stone meeting the following gradation:

U.S. Sieve	% Passing by Weight
1 ½ inches (37.5 mm)	100
1 inch (25 mm)	90-100
¾ inch (19.0 mm)	70-100
No. 4 (4.75 mm)	35-65
No. 40 (425 µm)	12-32
No. 200 (75 µm)	5-12

2. For material passing the No. 40 (425 µm) sieve, comply with the following requirements:

Liquid Limit (Max.)	25
Plasticity Index (Max)	5

E. Backfill Material

1. Backfill material shall be granular material adhering to the following gradation:

U.S. Sieve	% Passing by Weight
½ inch	100
No. 10	75-100
No. 200	0-10

F. Geotextile Fabric: Geotextile fabric shall be Mirafi 600X or approved equal.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify that trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with fine coarse aggregate.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 BEDDING

A. Place bedding material at trench bottom, level materials in continuous layers not exceeding 8 inches compacted depth, and compact to ninety (95) percent of the maximum dry density determined in accordance with ASTM D1557.

B. Maintain optimum moisture content of bedding material to attain required compaction density.

C. Drainage fabric shall be installed as shown on the plans. Edges of fabric shall be furnished to prevent the outer yarn from pulling away from the fabric. Fabric shall be secured to each side to a manner acceptable to the engineer.

3.4 PIPE INSTALLATION

A. Install pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Seal joints watertight.

B. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

C. Install bedding at sides and over top of pipe as shown on the plans.

D. Do not displace or damage pipe when compacting.

E. Connect to building sanitary sewer outlet and municipal sewer system where shown on the drawings.

3.5 BACKFILLING

A. Trenches shall be backfilled with granular material.

B. Backfill may be placed and compacted by either conventional methods or flooding methods. Granular backfill materials loosened due to subsequent operations shall be re-compacted by approved methods to required density.

1. Conventional Methods:
   Backfill shall be placed at or near optimum moisture content. Backfill material shall be thoroughly compacted around haunches and then compacted in layers not exceeding 12 inches. Each layer shall be compacted by approved methods to at least ninety-five percent (95%) of maximum density at optimum water content as determined by ASTM D-1557 prior to placement of a subsequent layer.
2. Flooding Methods:

The compacted thickness of the first layer of backfill shall be equal to ½ the outside diameter of the conduit, but not exceeding a compacted thickness of three (3) feet. The remainder of backfill shall be placed in layers not exceeding three (3) feet compacted thickness. During placement, backfill materials shall be thoroughly saturated with water and satisfactory drainage of backfill materials shall be provided. Each layer of backfill shall be compacted to at least 95 percent of maximum density at optimum water content as determined by ASTM D-1557, prior to placing a subsequent layer.

3.6 TESTING

A. Deflection Test

1. Deflection tests shall be performed on all flexible pipe. The test shall be conducted after the final backfill has been in place at least 30 days to permit stabilization of the soil-pipe system.
2. No pipe shall exceed a deflection of 5 percent. If deflection exceeds 5 percent, replacement or correction shall be accomplished in accordance with requirements in the approved specifications.
3. The rigid ball or mandrel used for the deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM Specification, including the appendix, to which the pipe is manufactured. The test shall be performed without mechanical pulling devices.

B. Leakage Tests:

Leakage tests shall be specified. This may include appropriate water or low pressure air testing. The testing methods selected should take into consideration the range in groundwater elevations during the test and anticipated during the design life of the sewer.

C. Water (Hydrostatic) Test:

The leakage exfiltration or infiltration shall not exceed 200 gallons per inch of pipe diameter per mile per day (0.02 m3/mm of pipe dia./km/day) for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of 2 feet.

D. Alignment:

In general, sewers 24 inches (600 mm) or less shall be laid with straight alignment between manholes. Straight alignment shall be checked by either using a laser beam or lamping.

3.7 MANHOLE INSTALLATION

A. Form bottom of excavation clean and smooth to correct elevations.
B. Establish elevations and pipe inverts for inlets and outlets as indicated.
C. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

3.8 Protection

A. Protect finished installation.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 323216

SECTION 331417 – WATER DISTRIBUTION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. The work covered by this section consists of furnishing all equipment, materials, tools and labor for installing the water distribution system as indicated on the plans.

1.2 APPLICABLE PUBLICATIONS

A. The following publications, referred to thereafter by the basic designation only, form a part of this specification to the extent indicated by the references thereto.

1. American Society for Testing and Materials (ASTM) Standards, Latest Editions

D 698	Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3)
D 1784	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
D 3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

2. American National Standards Institute/American Water Works Association (ANSI/AWWA)

C104/A21.4	Cement Mortar Lining for Ductile Pipe & Fittings for Water
C105/A21.5	Polyethylene Encasement for Ductile-Iron Pipe Systems
C110/A21.10	Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in. (75 mm through 1200 mm), for Water and Other Liquids
C111/A21.11	Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
C153/A21.53	Ductile-Iron Compact Fittings, 3 in. through 16 in., for Water and Other Liquids
C502	Resilient Seated Gate Valves for Water Supply Service
C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. through 12 in., for Water Distribution

C901 Polyethylene (PE) Pressure Pipe and Tubing, ½ in. through 3 in., for Water Service

3. Federal Specifications (Fed. Spec.)
   SS-S-00210 Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints

1.3 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall deliver, store, protect and handle products in accordance with the manufacturer's recommendations.

1.4 SUBMITTALS

A. Manufacturer's Certification: The contractor shall submit manufacturer's detailed product data for materials, fabrication and installation certifying that all products meet or exceed specified requirements.

PART 2 – MATERIALS

2.1 MATERIALS

A. Pipe and Fittings

1. PVC Pipe:
   PVC pipe shall be unplasticized polyvinyl chloride pipe manufactured and factory tested in accordance with the latest requirements of ANSI/AWWA C900, DR-18 for pipe 4" through 12" in diameter. All PVC pipe shall have a standard laying length of 20 feet (+/- 1"). Pipe furnished shall have integral cast bells or couplings using elastomeric gaskets conforming to ASTM F 477. Gaskets supplied with PVC pipe shall be reiber gaskets that lock the gaskets in place. Joints shall conform to ASTM D 3139. PVC pipe shall be made from clean, virgin, approved class 12454-B PVC as
   defined in ASTM D 1784.
2. Fittings:
   Fittings shall be ductile iron of the flanged type, mechanical joint type or push-on type. The type of fitting shall be at the location shown on the drawings. Flanged and mechanical joint fittings shall conform to ANSI/AWWA C110/A21.10 with rubber gasketed joints conforming to ANSI/AWWA C111/A21.11. All bolts used for flanges and mechanical joints shall be A151 Type 304 stainless steel nuts. Flanges shall conform to 125 pound standard drilling for use with flanged ductile iron fittings. Push-on fittings shall conform to ANSI/AWWA C153/A21.53 with rubber gasketed joints conforming to ANSI/AWWA C111/A21.11. All ductile iron fittings shall have cement mortar lining and seal coating, where applicable, in accordance with ANSI/AWWA C104/A21.4. All ductile iron fittings installed underground shall be wrapped, when
   installed, with 8 mils of polyethylene encasement as specified in ANSI/AWWA

C105/A21.5.

3. All bolts required for installation of mechanical joints or flanged fittings shall be stainless steel as hereinbefore specified and shall be furnished with the fittings. All bolts required for installation of gate valves on flanged tees and for installation of hydrants are herein specified elsewhere.
4. All ductile iron fittings, clamps, rods, etc. shall be bituminous coated as specified in ANSI/AWWA C110/A21.10. Clamps and rods shall be A151 Type 304 stainless steel with A151 Type 303 stainless steel nuts.

B. Valves

1. Valves shall be provided with inlet and outlet ends as shown on the plans. Bolts used in the manufacture and assembly of valves shall be stainless steel. Bolts used for installation of these items shall be of #304 stainless steel and shall be furnished with the valves.
2. Valves installed underground shall be encased in polyethylene as specified in ANSI/AWWA C105/A21.5.
3. Gate valves shall be non-rising stem, iron body, bronze mounted, resilient wedge type designed for 150 pounds per square inch working pressure and tested to 300 pounds per square inch, conforming to ANSI/AWWA C509. Valves shall be key-operated, and two (2) keys shall be furnished to the Owner, at the completion of the work. Valves shall open by turning to the left.

C. Valve Boxes

1. There shall be provided for each valve a standard ductile iron extension valve box of suitable length to provide the necessary cover on the pipe and to permit setting valve box flush with the finish grade. Extensions may be of the sliding or screw type. Covers of valve boxes shall have the word “WATER” cast on the top. Valve boxes shall be set within 2’ by 2’ by 4” concrete slabs set at grade (nontraffic areas only)

D. Marking Tape

1. Non-metallic pipe shall be marked with metallic marking tape as required by Louisiana Department of Transportation and Development, Office of Highways.

E. Joint Restrainers

1. Joint restrainers shall be Uniflange Model 900, 1300 or 1350 Restrainers as applicable or approved equal. All bolts and rods shall be #304 Stainless Steel (include cost of rods and bolts in applicable bid item). Joint restrainers shall be installed in accordance with manufacturer's recommendations.
2. After installation coat restrainers completely with Kopper's 300M or approved equal.

F. Ear Lugs

1. All push-on (RT) fittings, valves and fire hydrants shall be manufactured with ear lugs for connection to joint restrainers.

G. Insulation Kits

1. Insulation kits shall consist of one mylar insulating sleeve per bolt and neoprene faced phenolic gasket. Kit shall be as manufactured by Advance Products and Systems, Inc. or approved equal.

H. Service Connection Materials

1. Tubing shall be high performance, high molecular weight, high density polyethylene pipe and conforming to ANSI/AWWA C901. The pipe shall be type PE 3408 with a minimum cell classification of PE 334434C. Polyethylene pipe shall be a minimum pressure class of 125 psi with a maximum SDR of 13.5. Polyethylene Tubing shall be installed with a THW#14 Solid Strand Copper Wire taped to polyethylene tubing and ground to corporate stop and meter. A loose length of 18" of wire shall be left in meter. The purpose of this wire is to allow for tracing the line by induction at the meter. Ends of tracing wire shall be insulated by coating with a dielectric sealant, electricians' tape and scotch guard.

2. Corporation Stops shall be Ford Meter Box Company F1100 w/pack joint or approved equal.

3. Service saddle shall be all bronze manufactured by Ford, Mueller or approved equal.

I. Backflow Preventers

1. Backflow preventer shall be a double check valve backflow preventer type Series 709 as manufactured by the Watts Regulator Company or approved equal.
2. The double 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. Seats shall be replaceable without special tools. It shall be a complete assembly including tight closing resilient wedge shutoff valves and test cocks. The assembly shall meet the requirements of AWWA C510.
3. The backflow preventer shall be manufactured of FDA approved epoxy coated cast iron check valve bodies with bronze seats suitable for supply pressures up to 175 psi and water temperatures up to 110 degrees F continuous, 140 degrees F intermittent. The backflow preventer shall include NRS gate valve shut-offs on the intake and discharge sides of the double check valves. Gate valves shall be key operated, and two (2) keys shall be furnished to the Owner at the completion of the work. Valves shall open by turning to the left

J. Backflow Preventer Enclosure

1. Backflow Preventer enclosures shall be constructed of reinforced aluminum with access doors for testing/certification purposes and must be totally removable for maintenance.
2. The enclosure shall be structurally lined with a unicellular, non-wicking insulation consisting of a sandwich laminate or applied spray.

3. The enclosure shall contain a thermostatically controlled heat source mounted to the interior wall or on the backflow preventer to provide protection to -30 degrees F. No wood or “particle board shall be allowed in the assembly. Insulation mounted with glue will be cause for rejection.
4. Power source will be protected with a ground fault circuit interrupting receptacle, UL Standard 943, NEMA 3R, installed inside the box.
5. The enclosure shall contain drain openings sized to accommodate the maximum discharge of the reduced pressure zone assembly. Drain openings shall open to discharge under the most severe conditions. These openings shall be protected against intrusion of either wind, debris or animal.
6. The enclosure shall be provided with a means of permanent anchor (6” thick concrete slab reinforced with welded wire fabric) and lockable doors and/or lid to prevent theft or vandalism.
7. All “wet” portions of the backflow prevention assembly shall be protected within the enclosure. Fire department hose connections and OSY indicating valve handles shall be maintained outside of the enclosure.
8. The enclosure shall be factory assembled and delivered to the site ready to install with no drilling, screwing or riveting of the enclosure required on site.
9. The enclosure and heat source shall be warrantied for a period of one (1) year.

K. Geo-Grid
1. The contractor shall furnish a bi-axial geo-grid to be installed as shown on the project plan sheet. Geo-grid shall be Tensar BX1200 or Syntec SBX12. The contractor shall submit product data for any alternative geo-grid materials to the Engineer for review and approval prior to the start of construction.

PART 3 – EXECUTION

3.1 EXCAVATION

A. All excavations shall be carried down to the depth required for the satisfactory installation of required pipe, valves, fittings and other appurtenances shown on the Drawings. Excavation shall be carried to depths sufficient to provide a minimum depth of cover between top of pipe and original ground surface of 3'-0", unless otherwise shown on the Drawings or necessary to clear existing work.

B. Excavations shall be open cuts with vertical sides. Bracing of the sides and the top of the tunnel shall be to the satisfaction of the Engineer.

C. The width of trenches shall be such as to allow proper laying of pipe and backfilling of trench, but shall not exceed 24 inches plus the outside diameter of the pipe barrel. Where sheeting is required, the trench shall be measured to the inside face of the sheeting. At each joint a bell or coupling hole shall be dug of sufficient size to make proper caulking or assembly as easy as possible.

D. Contractor shall remove all water found in trenches or other excavations required under this Contract and shall keep them free from water while pipe-laying is in progress.

E. All material excavated shall be placed to permit proper access for prosecution and inspection of the work.
F. The Engineer shall have the authority at any time to require the Contractor to discontinue the use of any excavating machine or other appliance which, in his judgement, is not adapted to the situation in which it is being used. He may require the last four (4) inches in depth of excavation to be done by hand, or by such machine as is acceptable to him, and may forbid the use of such methods of excavation as seem likely to disturb the sub-grade.
G. Open trenches shall be backfilled by the end of the workday.

3.2 SHEETING AND BRACING
A. Contractor shall furnish, put into place, and maintain such sheeting, bracing, etc. as may be required to prevent failure or caving of the excavations. All existing structures, poles, or utilities likely to be affected by his Contract operations shall be adequately supported. Full responsibility for the security of such construction and of all excavations shall be with the Contractor.

3.3 LAYING PIPE
A. All pipe and fittings shall be carefully examined for defects and any found to be defective shall be immediately removed from the site.
B. The Contractor shall provide proper tools for the safe and convenient handling of the pipe and care shall be taken to prevent damage to the inside or outside coating. Any damage to the coating or lining caused by the Contractor's operations shall be repaired to the Engineer's satisfaction before the pipe or fitting is laid in the trench. Cost of such repair work shall be borne by the Contractor.
C. Before being placed in the trench, pipe and fittings shall be thoroughly cleansed and the necessary precautions shall be taken to keep the inside clean until final acceptance of the work. When pipe-laying is stopped, all openings shall be securely plugged to prevent the entrance of water, mud, small animals or other obstructions. The trench shall be kept dry while pipe is being laid.
D. The pipe and fittings shall be laid to the line and grade established by the Engineer. Generally, the pipe shall be laid so as to have a cover over the top of the pipe approximately 3'-0" and alignment as indicated on the plans. If it becomes necessary to deflect the pipe from a straight line, either in the vertical or horizontal plane, the amount of deflection at each joint shall not exceed that recommended by the pipe manufacturer.
E. Pipe laid around bends shall be properly blocked with concrete or treated timber to resist all thrust forces. All plugs, blanked openings, fittings, and other appurtenances shall be secured by means of treated timber or concrete thrust blocks.
F. A measuring device shall be used around the entire circumference of each pipe joint to insure that each pipe is properly positioned within the pipe joint and that each gasket is properly positioned within the pipe joint and has not "rolled" out of position. This measuring device procedure shall be performed at each pipe joint laid to insure proper pipe installation as per manufacturer's specifications for pipe expansion and joint seal.

3.4 JOINTING PIPE, FITTINGS, ETC.

A. The pipe will be furnished complete with sleeves, rubber rings, and lubricant. Joints shall be made in strict accordance with the manufacturer's recommendations.

B. Generally, all joints between pipe and fittings or valves shall be of the "push-on" rubber ring type; however, outlets on tees at connections to abutting lines and for attachment of valves and fire hydrants will be flanged to suit the flanged valves and hydrants.

C. All "bends" and tees at turns and end of line are to be provided with lugs, clamps and stainless steel tie rods and will also be installed using treated timber or concrete thrust blocks.

3.5 BACKFILLING

A. Trenches shall be backfilled with granular material.

B. Backfill may be placed and compacted by either conventional methods or flooding methods. Granular backfill materials loosened due to subsequent operations shall be re-compacted by approved methods to required density.

1. Conventional Methods: Backfill shall be placed at or near optimum moisture content. Backfill material shall be thoroughly compacted around haunches and then compacted in layers not exceeding 12 inches. Each layer shall be compacted by approved methods to at least ninety-five percent (95%) of maximum density at optimum water content as determined by ASTM D-1557 prior to placement of a subsequent layer.
2. Flooding Methods: The compacted thickness of the first layer of backfill shall be equal to ½ the outside diameter of the conduit, but not exceeding a compacted thickness of three (3) feet. The remainder of backfill shall be placed in layers not exceeding three (3) feet compacted thickness. During placement, backfill materials shall be thoroughly saturated with water and satisfactory drainage of backfill materials shall be provided. Each layer of backfill shall be compacted to at least 95 percent of maximum density at optimum water content as determined by ASTM D-1557, prior to placing a subsequent layer.

3.6 INSTALLING VALVES AND VALVE BOXES

A. Valves, complete with valve boxes and concrete slabs, shall be installed at locations indicated on plans or as directed by the Engineer. All valves shall be thoroughly cleansed and tested for ease of operation and shall be installed closed with stems vertical.

3.7 INSTALLING FIRE HYDRANTS

A. Fire hydrants shall be inspected, cleansed, and installed, with valve closed, as shown on plans and in conformance with manufacturer's instructions. Pumper connection shall be set 18" above finish grade.

3.8 PRESSURE TESTING

A. The required water mains shall be subjected to a cold water pressure test of one hundred (100) pounds per square inch for a period of not less than 20 minutes. The tests

shall be made as far as practicable, in sections of no more than two thousand (2000) feet in length, using plugs or other suitable closures between valves. The Contractor shall furnish a suitable pump, pressure gauge and water meter or other appliance for measuring the water pumped. Water required for testing purposes shall be furnished by the Owner. The amount of leakage under the stated pressure shall not exceed 100 gallons per day for each mile of pipe for each inch of pipe diameter. Any defective work disclosed by the test shall be repaired by the Contractor at no additional cost to the Owner and the test performed again.

3.9 STERILIZATION

A. Scope: After the required waterline is pressure tested and testing approved, the waterline, including also any sections of existing system which may have become contaminated, including pipe, valves, meters, etc., shall be sterilized prior to being placed in use with a solution of HTH, liquid chlorine, or other approved disinfectant containing not less than 50 parts per million of available chlorine. A standard chlorine sampling and test kit shall be used to verify at least 50 parts per million of available chlorine by testing 5 ml of the chlorinated water @ 50 ppm from the waterline to be tested combined with 95 ml of distilled water @ 0 ppm to register at least 2.5 ppm on the chlorine sampling kit.

B. Equipment and Materials: For this work the Contractor shall furnish a 3/4" sampling tap with corporation stop with smooth non-threaded chrome or stainless steel discharge end at the beginning and end of the waterline and every 4000' internal or part thereof and also suitable plugs or caps for the pipe, injection pumps, pipe connections and other equipment together with all labor required. After the waterline is found in compliance with the potable water sample standards set forth by the Louisiana State Sanitary Code as determined by the Louisiana Department of Health and Hospitals, all leads from the taps shall be removed up to the corporation stops and a 2" x 4" x 2" wooden stake painted blue with the words sampling tap shall be driven in the ground directly above the sampling tap.

C. Procedure

1. While the disinfectant is being applied to any section of the system, the water shall be allowed to escape at all extremities of this section until an orthotolidin test shows a deep orange color. The disinfectant shall be allowed to remain in the pipe for 24 hours, after which the lines shall be thoroughly flushed and bacteriological samples taken at all sampling taps and only at sampling taps. Sampling from fire hydrants will not be allowed. If samples indicate that the lines are not completely disinfected, the sterilization procedure shall be repeated on that part of the system. Sterilization, procuring samples, etc., shall conform with requirements of Louisiana Department of Health and Hospitals.
2. The Contractor shall notify the Engineer as to the progress of the proper flushing and disinfection of the line and when the line is ready for collection and testing of water samples in compliance of the Safe Drinking Water Act. The Engineer and only the Engineer shall advise the Louisiana Health Department of the work progress and request sampling dates and times. When the Engineer receives a letter from the Louisiana Health Department stating that laboratory results have been obtained by the Health Department

that indicates that the water in the line is in compliance with the Safe Drinking Water Act the Engineer will notify the Contractor to that effect. Required waterlines shall not be placed in service until this time.

END OF SECTION 331417

SECTION 334100 - STORM UTILITY DRAINAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies reinforced concrete pipe (RCP) material requirements and approved installation requirements.

1.3 REFERENCE STANDARDS

A. RCP Pipe shall meet ASTM C76 or AASHTO M170

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements
apply to product selection:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 JOINTS

A. Pipe shall be joined using a bell & spigot joint meeting the requirements of ASTM C76 or AASHTO M170. The joint shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM C443. The gasket shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

2.3 FITTINGS

A. Fittings shall conform to ASTM C76 or AASHTO M170. Bell and spigot connections shall utilize inline gaskets meeting the watertight joint performance requirements of ASTM C443.

2.4 FILTER FABRIC

A. Filter fabric shall be a non-woven geotextile filter fabric. See Table 1019-1 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition and its latest revisions.

2.5 CATCH BASINS

A. Catch Basins shall comply with Section 702 of the Louisiana Standard Specifications for Roads and Bridges, 2016 Edition and its latest revisions. The dimensions of grate and structure shall be in accordance with the plan sheets.

2.7 FIELD PIPE AND JOINT PERFORMANCE

A. To assure watertightness, manufacture performance verification may be accomplished by testing in accordance with ASTM C76. Contact the manufacturer for recommended leakage rates.

2.8 PIPE AND FITTING MATERIAL PROPERTIES

A. Polypropylene compound for pipe and fitting production shall be impact modified copolymer meeting the material requirements of ASTM F2881, Section 6.

PART 3 – EXECUTION

3.1 TRENCHING

A. The trench shall be excavated to the depth required to place the required bedding for the drainage pipe or drainage structure. The width of the trench shall be sufficient to permit the necessary compacting of the backfill/bedding under and around the utility or structure and shall not be less than the minimum width shown on the drawings or specified elsewhere.

B. Contractor shall design a support system to safely and adequately support the trench walls and any adjacent structures or pavement. The trench system shall conform to OSHA and any local and state law or regulation having jurisdiction over trench systems for excavation and utility connections.

C. Trench support system shall be provided and utilized in such a manner that does not allow adjacent material, other than water, to flow into the trench.

D. Sheeting, if contractor determines it is required, shall either be left in place or pulled so that adjacent ground or required compaction of bedding/backfill is not adversely affected. The upper part of any sheeting/bracing left in place shall be cut off three (3) feet below existing ground.

E. No greater length of trench shall be opened in advance of the completed structure, nor left unfilled to the rear thereof, than shall seem proper to the Engineer who will be guided by the circumstances in each case.

F. The Contractor shall be responsible for protection and security of his work and workmen, Protection of existing utilities, fences and other structures within the limits of construction and stability of the trench.

3.2 DEWATERING

A. Do not allow water to accumulate in excavations. The Contractor shall provide and maintain pumps or other means of removing water from the excavation. The water shall be removed in such a manner as not to cause damage to existing facilities, work in progress or completed work and in a manner not to introduce solid material into the existing drainage or sewerage system.

3.3 PIPE BEDDING

A. Bedding shall be installed to the lines, grades and thickness shown on the plans.
B. See Division 31 Fill and Backfill specification.

3.4 GEOTEXTILE FABRIC

A. Drainage fabric shall be wrapped around all joints and shall extend a minimum of twelve (12) inches on each side of joint centerline. The minimum overlap of fabric shall be eighteen (18) inches.

3.5 PIPE INSTALLATION

A. Proper equipment shall be provided for lowering the sections of pipe into the prepared trench without damage.
B. Pipe laying shall begin at the downstream end of the drainage pipe line. The lower segment of the pipe shall be in contact with the shaped bedding throughout its full length. The Bell or Groove ends of the conduit shall be placed facing upstream. Bell-holes shall be dug of sufficient size to allow the whole length of the pipe barrel to be bedded and supported, and to allow the joints to be properly made.
C. The method of joining pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even.

3.6 BACKFILL

A. Conduits shall be inspected before backfill is placed and any found to be damaged or out of required alignment or grade shall be removed and re-laid or replaced. At the time of final acceptance, all conduits installed by the Contractor shall be cleaned of all debris and soil to the invert elevation of the conduit.
B. Backfill may be placed and compacted by either conventional methods or flooding methods. Granular backfill materials loosened due to subsequent operations shall be re-compacted by approved methods to required density.

1. Conventional Methods:

Backfill shall be placed at or near optimum moisture content. Backfill material shall be thoroughly compacted around haunches and then compacted in layers not exceeding 12 inches. Each layer shall be compacted by approved methods prior to placement of a subsequent layer. See Division 31 Fill and Backfill.

2. Flooding Methods:
   The compacted thickness of the first layer of backfill shall be equal to ½ the outside diameter of the conduit, but not exceeding a compacted thickness of three (3) feet. The remainder of backfill shall be placed in layers not exceeding three (3) feet compacted thickness. During placement, backfill materials shall be thoroughly saturated with water and satisfactory drainage of backfill materials shall be provided. Each layer of backfill shall be compacted prior to placing a subsequent layer. See Division 31 Fill and Backfill.

END OF SECTION 334100

MY Environmental Consulting, LLC.

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Limited Asbestos Sampling Report

MYEC Project No. 24-088

For Work Performed At:

McKinley High School
800 E. McKinley St.
Baton Rouge, LA 70802

Prepared For:

Mr. Coey Malveaux
Environmental Specialist
East Baton Rouge Parish School System
4070 Tunica St.
Baton Rouge, LA 70805

Report Date:
March 28, 2024

MY Environmental Consulting, LLC.

9141 Interline Ave. Ste. 2A, Baton Rouge, LA 70809❖ Tel: (203) 606-6369 ❖ www.MYEnvironmentalConsulting.com

Project Information

PROJECT NUMBER: 24-088

SCOPE OF WORK:

MY Environmental Consulting (MYEC) conducted a limited asbestos survey at Mckinley High School. The survey encompassed suspect materials throughout the campus.

CLIENT:

Mr. Coey Malveaux
East Baton Rouge Parish School System
4070 Tunica St.
Baton Rouge, Louisiana 70805

PROJECT LOCATION:

MCKINLEY HIGH SCHOOL
800 E. McKinley St.
Baton Rouge, LA 70802

FIELD WORK CONDUCTED BY:

Trent Knight
LDEQ Accredited Asbestos Inspector
(207108)

William S. Knight
LDEQ Accredited Asbestos Inspector
(40959)

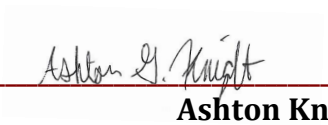
PROJECT DATE (S)

March 23, 2024 – March 24, 2024

REPORT PREPARED BY:

William S. Knight
MY Environmental Consulting

REPORT REVIEWED BY:



Ashton Knight
MY Environmental Consulting

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MY Environmental Consulting, LLC.

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Limited Asbestos Sampling Report

PROJECT NUMBER: 24-088

PROJECT OVERVIEW

On March 23, 2024 – March 24, 2024, MY Environmental Consulting (MYEC) conducted a limited asbestos survey at the McKinley High School, located at 800 E. McKinley St. in Baton Rouge, Louisiana. McKinley High School is currently owned and occupied by the East Baton Rouge Parish School System.

This survey was conducted at the request of the EBRPSS in order to identify the presence of asbestos throughout the campus.

General Walkthrough/Management Plan Review

The facility was operational at the time of inspection. This survey was conducted at the request of Coey Malveaux, Environmental Specialist for East Baton Rouge Parish School System.

Walkthrough & Inventory of Suspect Materials:

The survey began with a general walkthrough of the facility. During the walkthrough, the Inspector took inventory of all materials that may contain asbestos.

Homogeneous areas were identified utilizing past inspection and re-inspection reports. Suspect materials with a previously assigned homogenous area number remained the same. Materials mentioned in the Management Plan and materials present in the facility that were not previously assigned a homogeneous number were assigned a new number by MYEC.

Asbestos Bulk Sampling

For the survey at McKinley High School, **one hundred and sixty-four (164)** bulk samples of suspect material were collected and analyzed for asbestos content. Of those one hundred and sixty-four (164) bulk samples, **twenty five (25)** were confirmed via polarized light microscopy and point count analysis to have an asbestos content greater than 1% in at least one component.

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-01	All	2x2 Worm/Pin Ceiling Tile	Building E	Misc.	Non-Friable	None
EBR032324SK -02	All	2x2 Worm/Pin Ceiling Tile	Building E	Misc.	Non-Friable	None
EBR032324SK-03	All	2x2 Worm/Pin Ceiling Tile	Building E	Misc.	Non-Friable	None
EBR032324SK-04	All	Tan Cove Base	Building E	Misc.	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-05	All	Tan Cove Base	Building E	Misc.	Non-Friable	None
EBR032324SK-06	All	Tan Cove Base	Building E	Misc.	Non-Friable	None
EBR032324SK-07	All	Black Cove Base	Building E	Misc.	Non-Friable	None
EBR032324SK-08	All	Black Cove Base	Building E	Misc.	Non-Friable	None
EBR032324SK-09	All	Black Cove Base	Building E	Misc.	Non-Friable	None
EBR032324SK-10	All	12" Speckled Floor Tile Overlaying FT/MT	Building E	Misc.	Non-Friable	None
EBR032324SK-11	All	12" Speckled Floor Tile Overlaying FT/MT	Building E	Misc.	Non-Friable	None
EBR032324SK–12	All	12" Speckled Floor Tile Overlaying FT/MT	Building E	Misc.	Non-Friable	None
EBR032324SK-13	1	CMU Wall Paint/Texture	Building E 102	Misc.	Non-Friable	Trace Chrysotile
EBR032324SK-14	All	CMU Wall Paint/Texture	Building E 102	Misc.	Non-Friable	None
EBR032324SK-15	All	CMU Wall Paint/Texture	Building E 102	Misc.	Non-Friable	None
EBR032324SK-16	All	Plaster Ceiling	Building E	Surfacing	Friable	None
EBR032324SK-17	All	Plaster Ceiling	Building E	Surfacing	Friable	None
EBR032324SK-18	All	Plaster Ceiling	Building E	Surfacing	Friable	None
EBR032324SK-19	All	Plaster Ceiling	Building E	Surfacing	Friable	None
EBR032324SK-20	All	Plaster Ceiling	Building E	Surfacing	Friable	None
EBR032324SK-21	All	Vibration Dampener	Building E	Misc.	Non-Friable	None
EBR032324SK-22	All	Vibration Dampener	Building E	Misc.	Non-Friable	None
EBR032324SK-23	All	Vibration Dampener	Building E	Misc.	Non-Friable	None
EBR032324SK-24	All	TSI Elbow	Building E	TSI	Non-Friable	None
EBR032324SK-25	All	TSI Elbow	Building E	TSI	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-26	All	TSI Elbow	Building E	TSI	Non-Friable	None
EBR032324SK-27	All	TSI Straight	Building E	TSI	Non-Friable	None
EBR032324SK-28	All	TSI Straight	Building E	TSI	Non-Friable	None
EBR032324SK-29	All	TSI Straight	Building E	TSI	Non-Friable	None
EBR032324SK-30	All	Smooth Ceiling Tile	Building E	Misc.	Non-Friable	None
EBR032324SK-31	All	Smooth Ceiling Tile	Building E	Misc.	Non-Friable	None
EBR032324SK-32	All	Smooth Ceiling Tile	Building E	Misc.	Non-Friable	None
EBR032324SK-33	**1**	**Door Caulk**	**Building B**	**Misc.**	**Non-Friable**	**2% Chrysotile**
EBR032324SK-34	**1**	**Door Caulk**	**Building B**	**Misc.**	**Non-Friable**	**2% Chrysotile**
EBR032324SK-35	**1**	**Door Caulk**	**Building B**	**Misc.**	**Non-Friable**	**2% Chrysotile**
EBR032324SK-36	All	Drywall and JC	Building B	Misc.	Non-Friable	None
EBR032324SK-37	All	Drywall and JC	Building B	Misc.	Non-Friable	None
EBR032324SK-38	All	Drywall and JC	Building B	Misc.	Non-Friable	None
EBR032324SK-39	All	2x2 Worm Pin CT	Building B	Misc.	Non-Friable	None
EBR032324SK-40	All	2x2 Worm Pin CT	Building B	Misc.	Non-Friable	None
EBR032324SK-41	All	2x2 Worm Pin CT	Building B	Misc.	Non-Friable	None
EBR032324SK-42	**4**	**12" White Speckled Floor Tile Overlaying Floor Tile**	**Building B First Floor**	**Misc.**	**Non-Friable**	**4% Chrysotile (MT)**
EBR032324SK-43	**2 and 3**	**12" White Speckled Floor Tile Overlaying Floor Tile**	**Building B First Floor**	**Misc.**	**Non-Friable**	**3% Chrysotile (Tan FT) 4% Chrysotile (MT)**
EBR032324SK-44	**4**	**12" White Speckled Floor Tile Overlaying Floor Tile**	**Building B First Floor**	**Misc.**	**Non-Friable**	**3% Chrysotile (MT)**
EBR032324SK-45	All	TSI Straight	Building B	TSI	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-46	All	TSI Straight	Building B	TSI	Non-Friable	None
EBR032324SK-47	All	TSI Straight	Building B	TSI	Non-Friable	None
EBR032324SK-48	All	TSI Elbow	Building B	TSI	Non-Friable	None
EBR032324SK-49	All	TSI Elbow	Building B	TSI	Non-Friable	None
EBR032324SK-50	All	TSI Elbow	Building B	TSI	Non-Friable	None
EBR032324SK-51	All	2x2 Smooth Ceiling Tile	Building B	Misc.	Non-Friable	None
EBR032324SK-52	All	2x2 Smooth Ceiling Tile	Building B	Misc.	Non-Friable	None
EBR032324SK-53	All	2x2 Smooth Ceiling Tile	Building B	Misc.	Non-Friable	None
EBR032324SK-54	**1 and 2**	**9" Brown Floor Tile**	**Building B**	**Misc.**	**Non-Friable**	**5% Chrysotile 4% Chrysotile**
EBR032324SK-55	**1 and 2**	**9" Brown Floor Tile**	**Building B**	**Misc.**	**Non-Friable**	**5% Chrysotile 4% Chrysotile**
EBR032324SK-56	**1 and 2**	**9" Brown Floor Tile**	**Building B**	**Misc.**	**Non-Friable**	**5% Chrysotile 4% Chrysotile**
EBR032324SK-57	**3 and 4**	**12" Beige Streaks Floor Tile Overlaying 9" Floor Tile**	**Building B Second Floor**	**Misc.**	**Non-Friable**	**3% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-58	**3 and 4**	**12" Beige Streaks Floor Tile Overlaying 9" Floor Tile**	**Building B Second Floor**	**Misc.**	**Non-Friable**	**3% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-59	**3 and 4**	**12" Beige Streaks Floor Tile Overlaying 9" Floor Tile**	**Building B Second Floor**	**Misc.**	**Non-Friable**	**3% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-60	All	2x2 Worm Pin CT	Building G	Misc.	Non-Friable	None
EBR032324SK-61	All	2x2 Worm Pin CT	Building G	Misc.	Non-Friable	None
EBR032324SK-62	All	2x2 Worm Pin CT	Building G	Misc.	Non-Friable	None
EBR032324SK-63	All	Drywall and JC	Building G	Misc.	Non-Friable	None
EBR032324SK-64	All	Drywall and JC	Building G	Misc.	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-65	All	Drywall and JC	Building G	Misc.	Non-Friable	None
EBR032324SK-66	All	Cove Base	Building G	Misc.	Non-Friable	None
EBR032324SK-67	All	Cove Base	Building G	Misc.	Non-Friable	None
EBR032324SK-68	All	Cove Base	Building G	Misc.	Non-Friable	None
EBR032324SK-69	All	12” Floor Tile	Building G	Misc.	Non-Friable	None
EBR032324SK-70	All	12” Floor Tile	Building G	Misc.	Non-Friable	None
EBR032324SK-71	All	12” Floor Tile	Building G	Misc.	Non-Friable	None
EBR032324SK-72	1	CMU Wall Coating	Building G	Surfacing	Friable	0.75% Chrysotile
EBR032324SK-73	1	CMU Wall Coating	Building G	Surfacing	Friable	0.50% Chrysotile
EBR032324SK-74	1	CMU Wall Coating	Building G	Surfacing	Friable	0.75% Chrysotile
EBR032324SK-75	1	CMU Wall Coating	Building G	Surfacing	Friable	0.50% Chrysotile
EBR032324SK-76	1	CMU Wall Coating	Building G	Surfacing	Friable	0.75% Chrysotile
EBR032324SK-77	All	Smooth Ceiling Tile	Building G	Misc.	Non-Friable	None
EBR032324SK-78	All	Smooth Ceiling Tile	Building G	Misc.	Non-Friable	None
EBR032324SK-79	All	Smooth Ceiling Tile	Building G	Misc.	Non-Friable	None
EBR032324SK-80	All	2x2 Worm Pin CT	Building F	Misc.	Non-Friable	None
EBR032324SK-81	All	2x2 Worm Pin CT	Building F	Misc.	Non-Friable	None
EBR032324SK-82	All	2x2 Worm Pin CT	Building F	Misc.	Non-Friable	None
EBR032324SK-83	All	Beige Floor Tile	Building F	Misc.	Non-Friable	None
EBR032324SK-84	All	Beige Floor Tile	Building F	Misc.	Non-Friable	None
EBR032324SK-85	All	Beige Floor Tile	Building F	Misc.	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-86	All	Cove Base	Building F	Misc.	Non-Friable	None
EBR032324SK-87	All	Cove Base	Building F	Misc.	Non-Friable	None
EBR032324SK-88	All	Cove Base	Building F	Misc.	Non-Friable	None
EBR032324SK-89	All	2x2 Worm Pin CT	Building C	Misc.	Non-Friable	None
EBR032324SK-90	All	2x2 Worm Pin CT	Building C	Misc.	Non-Friable	None
EBR032324SK-91	All	2x2 Worm Pin CT	Building C	Misc.	Non-Friable	None
EBR032324SK-92	All	12” Floor Tile	Building C Rm 106	Misc.	Non-Friable	None
EBR032324SK-93	All	12” Floor Tile	Building C Rm 106	Misc.	Non-Friable	None
EBR032324SK-94	All	12” Floor Tile	Building C Rm 106	Misc.	Non-Friable	None
EBR032324SK-95	All	Cove Base	Building C	Misc.	Non-Friable	None
EBR032324SK-96	All	Cove Base	Building C	Misc.	Non-Friable	None
EBR032324SK-97	All	Cove Base	Building C	Misc.	Non-Friable	None
EBR032324SK-98	**3 and 4**	**12” Brown Streaked Floor Tile Overlaying Floor Tile**	**Building C**	**Misc.**	**Non-Friable**	**5% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-99	**3 and 4**	**12” Brown Streaked Floor Tile Overlaying Floor Tile**	**Building C**	**Misc.**	**Non-Friable**	**5% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-100	**3 and 4**	**12” Brown Streaked Floor Tile Overlaying Floor Tile**	**Building C**	**Misc.**	**Non-Friable**	**5% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-101	All	Drywall and JC	Building C	Misc.	Non-Friable	None
EBR032324SK-102	All	Drywall and JC	Building C	Misc.	Non-Friable	None
EBR032324SK-103	All	Drywall and JC	Building C	Misc.	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032324SK-104	**3 and 4**	**Blue Carpet Overlaying 9" Floor Tile**	**Building C Library**	**Misc.**	**Non-Friable**	**3% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-105	**3 and 4**	**Blue Carpet Overlaying 9" Floor Tile**	**Building C Library**	**Misc.**	**Non-Friable**	**3% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032324SK-106	**3 and 4**	**Blue Carpet Overlaying 9" Floor Tile**	**Building C Library**	**Misc.**	**Non-Friable**	**3% Chrysotile (FT) 5% Chrysotile (MT)**
EBR032424SK-107	All	2x2 Smooth CT	Building A Restrooms	Misc.	Non-Friable	None
EBR032424SK-108	All	2x2 Smooth CT	Building A Restrooms	Misc.	Non-Friable	None
EBR032424SK-109	All	2x2 Smooth CT	Building A Restrooms	Misc.	Non-Friable	None
EBR032424SK-110	All	Cove Base	Building A	Misc.	Non-Friable	None
EBR032424SK-111	All	Cove Base	Building A	Misc.	Non-Friable	None
EBR032424SK-112	All	Cove Base	Building A	Misc.	Non-Friable	None
EBR032424SK-113	All	2x2 Worm Pin CT	Building A	Misc.	Non-Friable	None
EBR032424SK-114	All	2x2 Worm Pin CT	Building A	Misc.	Non-Friable	None
EBR032424SK-115	All	2x2 Worm Pin CT	Building A	Misc.	Non-Friable	None
EBR032424SK-116	All	Floor Tile on Floor Float	Building A	Misc.	Non-Friable	None
EBR032424SK-117	All	Floor Tile on Floor Float	Building A	Misc.	Non-Friable	None
EBR032424SK-118	All	Floor Tile on Floor Float	Building A	Misc.	Non-Friable	None
EBR032424SK-119	All	Drywall and JC	Building A	Misc.	Non-Friable	None
EBR032424SK-120	All	Drywall and JC	Building A	Misc.	Non-Friable	None
EBR032424SK-121	All	Drywall and JC	Building A	Misc.	Non-Friable	None
EBR032424SK-122	All	Spray on Wall Texture	Building A	Surfacing	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032424SK-123	All	Spray on Wall Texture	Building A	Surfacing	Non-Friable	None
EBR032424SK-124	All	Spray on Wall Texture	Building A	Surfacing	Non-Friable	None
EBR032424SK-125	All	Spray on Wall Texture	Building A	Surfacing	Non-Friable	None
EBR032424SK-126	All	Spray on Wall Texture	Building A	Surfacing	Non-Friable	None
EBR032424SK-127	All	Carpet	Building A	Misc.	Non-Friable	None
EBR032424SK-128	All	Carpet	Building A	Misc.	Non-Friable	None
EBR032424SK-129	All	Carpet	Building A	Misc.	Non-Friable	None
EBR032424SK-130	All	Drywall and JC	Building D	Misc.	Non-Friable	None
EBR032424SK-131	All	Drywall and JC	Building D	Misc.	Non-Friable	None
EBR032424SK-132	All	Drywall and JC	Building D	Misc.	Non-Friable	None
EBR032424SK-133	**4**	**12" White Floor Tile Overlaying 12" Brown Floor Tile**	**Building D**	**Misc.**	**Non-Friable**	**4% Chrysotile (MT)**
EBR032424SK-134	**4**	**12" White Floor Tile Overlaying 12" Brown Floor Tile**	**Building D**	**Misc.**	**Non-Friable**	**4% Chrysotile (MT)**
EBR032424SK-135	**4**	**12" White Floor Tile Overlaying 12" Brown Floor Tile**	**Building D**	**Misc.**	**Non-Friable**	**4% Chrysotile (MT)**
EBR032424SK-136	All	Cove Base	Building D	Misc.	Non-Friable	None
EBR032424SK-137	All	Cove Base	Building D	Misc.	Non-Friable	None
EBR032424SK-138	All	Cove Base	Building D	Misc.	Non-Friable	None
EBR032424SK-139	All	Smooth CT	Building D	Misc.	Non-Friable	None
EBR032424SK-140	All	Smooth CT	Building D	Misc.	Non-Friable	None
EBR032424SK-141	All	Smooth CT	Building D	Misc.	Non-Friable	None
EBR032424SK-142	All	Ceramic Wall Tile and Grout	Building D	Misc.	Non-Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032424SK-143	All	Ceramic Wall Tile and Grout	Building D	Misc.	Non-Friable	None
EBR032424SK-144	All	Ceramic Wall Tile and Grout	Building D	Misc.	Non-Friable	None
EBR032424SK-145	All	Plaster Ceiling	Building D	Surfacing	Friable	None
EBR032424SK-146	All	Plaster Ceiling	Building D	Surfacing	Friable	None
EBR032424SK-147	All	Plaster Ceiling	Building D	Surfacing	Friable	None
EBR032424SK-148	All	Plaster Ceiling	Building D	Surfacing	Friable	None
EBR032424SK-149	All	Plaster Ceiling	Building D	Surfacing	Friable	None
EBR032424SK-150	All	Ceramic Floor Tile and Grout	Building D	Misc.	Non-Friable	None
EBR032424SK-151	All	Ceramic Floor Tile and Grout	Building D	Misc.	Non-Friable	None
EBR032424SK-152	All	Ceramic Floor Tile and Grout	Building D	Misc.	Non-Friable	None
EBR032424SK-153	All	Sink Coating	Building D	Surfacing	Non-Friable	None
EBR032424SK-154	All	Sink Coating	Building D	Surfacing	Non-Friable	None
EBR032424SK-155	All	Sink Coating	Building D	Surfacing	Non-Friable	None
EBR032424SK-156	All	2x2 Worm Pin CT	Building D	Misc.	Non-Friable	None
EBR032424SK-157	All	2x2 Worm Pin CT	Building D	Misc.	Non-Friable	None
EBR032424SK-158	All	2x2 Worm Pin CT	Building D	Misc.	Non-Friable	None
EBR032424SK-159	**1**	**TSI Elbow**	**Building D**	**TSI**	**Friable**	**2% Chrysotile (Sealant)**
EBR032424SK-160	**1**	**TSI Elbow**	**Building D**	**TSI**	**Friable**	**2% Chrysotile (Sealant)**
EBR032424SK-161	**1**	**TSI Elbow**	**Building D**	**TSI**	**Friable**	**2% Chrysotile (Sealant)**
EBR032424SK-162	**1**	**TSI Straight**	**Building D**	**TSI**	**Friable**	**2% Chrysotile (Sealant)**
EBR032424SK-163	All	TSI Straight	Building D	TSI	Friable	None

Sample ID	Layer	Material	Location	Type	Friable or Non-Friable	% Asbestos
EBR032424SK-164	All	TSI Straight	Building D	TSI	Friable	None

Methodology, Conclusions, & Recommendations

PROJECT NUMBER: 24-088

SAMPLING METHODS AND NOTES

Asbestos Sampling

Trent Knight (AI #207108), and William S. Knight (AI#240959) representing MYEC, was the LDEQ accredited asbestos inspector that conducted this survey.

The facility was operational and occupied at the time of inspection. Discreet or non-destructive sampling methods were used where possible. It is possible that materials exist throughout the facility that could not be identified during non-destructive sampling activity. Although MYEC attempted to identify all ACM, it is important to note that there may be other ACMs on-site that were inaccessible during the survey.

Sample locations and quantities were selected pursuant to regulatory guidelines outlined in LAC 33:III.2709. Samples were collected from locations that were accessible and representative of each homogeneous area as a whole. Materials that were not accessible or could not be accessed safely were not sampled during this survey. Because of this, this survey is limited to the specific materials sampled on March 23, 2024 – March 24, 2024.

To ensure accuracy of results, suspect materials were sampled down to the substrate. Materials were thoroughly wetted prior to sample collection to control and minimize potential fiber release as well as minimize the amount of debris created by sampling activity. Any visible debris created during sampling was promptly wet-wiped. Sampling tools were washed and/or wet-wiped after each sample to prevent cross contamination.

The Inspectors determined friability by touching each sampled material. Materials that could be easily crumbled or pulverized by hand pressure were considered friable. Asbestos fibers in friable material are considerably more likely to be released when disturbed. Materials were determined to be friable during this survey, but none of those materials were found to contain asbestos.

Materials were classified into 3 categories: Miscellaneous Material, Surfacing Material, or Thermal Systems Insulation (TSI) Material. Materials were classified using the following criteria:

1. **Thermal Systems Insulation (TSI)** - TSI includes material used to retard heat transfer from one medium to another. TSI is applied to piping, boilers, furnaces, vents, tanks, ducts, or other interior structural components to prevent heat loss or gain, water condensation, or for other purposes. When asbestos containing TSI is in good condition and undamaged, it can be successfully managed in place. All TSI material must be maintained in an intact state and undamaged condition (LAC 33:III.2717.B.3.)
2. **Surfacing Material** - This category includes substances that are applied to surfaces by either spraying or by troweling to provide a desired texture. Surfacing materials impart one or more desirable properties to surfaces including an aesthetically pleasing appearance, sound attenuation, to provide resistance to

marring, fire retardation, and for other purposes. This material may be applied to ceilings, walls, structural beams, pipes, roof decks, and other building components. If non-friable and in good condition, surfacing materials can often be effectively managed in place.

3. **Miscellaneous Materials** – This category includes interior or exterior building material in structural components, structural members, or fixtures, such as floor and ceiling tiles, not including surfacing material or thermal systems insulation. If non-friable and in good condition, miscellaneous materials can easily be managed in place.

Materials in the same category that were uniform in color and texture were identified as a homogeneous area. Homogeneous areas are each assigned a unique number consisting of the facility's building number and the materials number (i.e. 01-001 = Building 01, Material 001).

Detailed project notes were recorded by MYEC. The notes and bulk sample data can be found in **Appendix 2 – MYEC Field Notes**.

Laboratory Analysis and Methods

CA Labs, LLC, located at 12232 Industriplex, Suite 32, Baton Rouge, LA 70809-7105, (NVLAP Lab Code: 200772-0) conducted offsite Polarized Light Microscopy (PLM) analysis of bulk asbestos samples using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600/R-93-116 Improved). CA Labs, LLC is an accredited lab in the state of Louisiana by the LDEQ (LELAP Lab ID: 03069). CA Labs, LLC performs PLM analysis by following Lab Certification is attached in in **Appendix 3.**

A material is considered to be an ACM if that material [or product] contains **more than 1% asbestos** as determined by laboratory analysis using Polarized Light Microscopy (PLM) and Polarized Light Point Count.

CONCLUSIONS

1. The following materials do contain asbestos and therefore, should be removed or repaired in accordance with the standards set by the EPA and the State of Louisiana.
    a. Building B
        i. Door Caulk
        ii. 12" Beige Streaks Floor Tile Overlaying 9" Floor Tile
        iii. 9" Brown Floor Tile
    b. Building C
        i. 12" Brown Streaked Floor Tile Overlaying Floor Tile
        ii. Carpet Overlaying 9" Floor Tile
    c. Building D
        i. 12" White Floor Tile Overlaying 12" Brown Floor Tile
        ii. TSI Elbow
        iii. TSI Straight

RECOMMENDATIONS

1. **Asbestos Containing Materials:**
    a. School facilities with known or assumed ACM should be periodically inspected, re-inspected, and assessed (periodic surveillance) in accordance with LAC 33:III.2707.
    b. If any of the aforementioned ACMs become friable or severely damaged prior to their removal, the LEA should implement in a timely manner the appropriate response actions (removal, repair, enclosure, encapsulate) as detailed in LAC 33:III.2717.
    c. MYEC recommends that all ACM be removed from a facility being demolished and/or renovated PRIOR to demolition or renovation work in accordance with the EPA's National Emissions Standards for Hazardous Air Pollutants (NESHAP) and the State of Louisiana Environmental Regulatory Code (LAC Title 33, Part III, Chapter 51, Subchapter M – Emissions Standards for Asbestos).
    d. Asbestos-containing materials should be removed and disposed of by a Licensed Abatement Contractor.
    e. If renovations occur, any unforeseen materials that may be uncovered during demolition or other activity should be sampled and analyzed for asbestos content. These materials should be treated as an ACM while awaiting analysis results, and therefore should not be crumbled, pulverized, broken, or otherwise disturbed.

2. **Eliminated Materials:**
    a. It is the opinion of MY Environmental Consulting that all materials sampled during this survey with no asbestos structures detected be **eliminated** as an ACM.
    b. These materials do not require abatement prior to renovation or demolition activity. See **Table 1** for more details**.**

LIMITATIONS

PROJECT NUMBER: 24-088

MY Environmental Consulting, LLC warrants that services provided shall be performed in accordance with established and recognized general industry standards and analytical testing procedures. No other warranties, expressed or implied, are made by My Environmental Consulting.

The scope of this report is limited to the matters expressly covered. All recommendations, findings and conclusions stated in this report are based upon the facts and circumstances as they existed at the time that this report was prepared (e.g., Federal, State, and Local laws, rules, regulations and general industry standards). A change in any fact or circumstances upon which this report is based may adversely affect the recommendations, findings, and conclusions expressed in this report.

The conclusions and recommendations describe only the conditions present at the time of our survey that could be observed in accessible areas. Other similar conditions may exist in inaccessible areas, such as behind walls, above permanent ceilings, or beneath flooring. Therefore, caution must be exercised during any demolition / renovation activity.

The conditions of potentially hazardous materials often change with time. These changes in condition occur because of physical damage, weathering, aging, degradation, and other reasons, and often increase the hazards associated with asbestos-containing or other hazardous materials. The recommendations in this report should be periodically re-assessed and updated if necessary. This review should be included in the recommended periodic inspections.

My Environmental Consulting does not warrant or guarantee any quantity estimations or cost estimations presented in this report. Although My Environmental Consulting believes estimates presented in this report are reasonable, the use of such estimates shall be at the user's own risk and shall constitute a release and agreement to defend and indemnify MY Environmental from and against any liability in connection with cost and/or quantity estimations.

This report shall not be used as a scope of work for abatement without prior approval from MY Environmental Consulting.

APPENDICES

TECHNICAL DETAILS AND ATTACHMENTS

APPENDIX 1: LABORATORY ANALYSIS REPORT

APPENDIX 2: MY ENVIRONMENTAL CONSULTING FIELD NOTES

APPENDIX 3: ACCREDITATION CERTIFICATES

Appendix 1:
Laboratory Analysis Report

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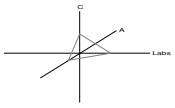

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Materials Characterization - Bulk Asbestos Analysis

Laboratory Analysis Report - Polarized Light

MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Attn: Rob Martin
Customer Project: 24-088
Reference #: CBR24031910 Date: 3/27/2024

Analysis and Method

Summary of polarizing light microscopy (PLM / Stereomicroscopy bulk asbestos analysis) using the methods described in 40CFR Part 763 Appendix E to Subpart E (Interim and EPA 600 / R-93 / 116 (Improved). The sample is first viewed with the aid of stereomicroscopy. Numerous liquid slide preparations are created for analysis under the polarized microscope where identifications and quantifications are preformed. Calibrated liquid refractive oils are used as liquid mouting medium. These oils are used for identification (dispersion staining). A calibrated visual estimation is reported, should any asbestiform mineral be present. Other techniques such as acid washing are used in conjugation with refractive oils for detection of smaller quantities of asbestos. All asbestos percentages are based on calibrated visual estimation traceable to NIST standards for regulated of asbestos. Traceability to measurement and calibration is achieved by using known amounts and types of asbestos from standards where analyst and laboratory accuracy are measured. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the detection limit of 0.50% (well above the laboratory definition of trace).

Discussion

Vermiculite containing samples may have trace amounts of actinolite-tremolite, where not found be PLM should be analyzed using TEM methods and / or water separation techniques. Suspected actinolite/vermiculite presence will be indicated through the sample comment section of this report.

Fibrous talc containing samples may even contain a related asbestos fiber known as anthophyllite. Under certain conditions the same fiber may actually contain both talc and anthophyllite (a phenomenon called intergrowth). Again, TEM detection methods are recommended. CA Labs PLM report comments will denote suspected amounts of asbestiform anthophyllite with talc, where further analysis is recommended.

Some samples (floor tiles, surfacings, etc.) may contain fibers too small to be detectable by PLM analysis and should be analyzed by TEM bulk protocols.

A "trace asbestos" will be reported if the analyst observes far less than 1% asbestos. CA Labs defines "trace asbestos" as a few fibers detected by the analyst in several preparations and will indicate as such under these circumstances.

Quantification of <1% will actually be reported as <=1% (allowable variance close to 1% is high). Such results are ideal for point counting, and the technique is mandatory for friable samples (NESHAP, Nov. 1990 and clarification letter 8 May 1991) under 1% percent asbestos and the "trace asbestos". **In order to make all initial PLM reports issued from CA Labs NESHAP compliant, all <1% asbestos results (except floor tiles) will be point counted at no additional charge.**

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one these disciplines .Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of AIHA accreditation. Analysis performed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

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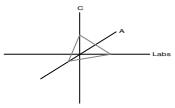

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Overview of Project Sample Material Containing Asbestos

Customer Project: 24-088 **CA Labs Project #:** CBR24031910

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
EBR-032324-SK13	*13-1*	*White Textured Surfacing*	***2% Chrysotile***	***White Textured Surfacing***
EBR-032324-SK33	*33-1*	*Tan Surfaced Tan Sealant*	***2% Chrysotile***	***Tan Surfaced Tan Sealant***
EBR-032324-SK34	*34-1*	*Tan Surfaced Tan Sealant*	***2% Chrysotile***	***Black Mastic***
EBR-032324-SK35	*35-1*	*Tan Surfaced Tan Sealant*	***2% Chrysotile***	***Tan Floor Tile***
EBR-032324-SK42	*42-4*	*Black Mastic*	***4% Chrysotile***	***Yellow and Black Mastic***
EBR-032324-SK43	*43-2*	*Tan Floor Tile*	***3% Chrysotile***	***Brown Floor Tile***
	43-3	*Black Mastic*	***4% Chrysotile***	***Gray Floor Tile***
EBR-032324-SK44	*44-4*	*Yellow and Black Mastic*	***3% Chrysotile***	***Yellow Sealant***

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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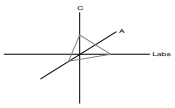

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Overview of Project Sample Material Containing Asbestos

Customer Project: 24-088 **CA Labs Project #:** CBR24031910

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
EBR-032324-SK54	*54-1*	*Brown Floor Tile*	***5% Chrysotile***	
	54-2	*Black Mastic*	***4% Chrysotile***	
EBR-032324-SK55	*55-1*	*Brown Floor Tile*	***5% Chrysotile***	
	55-2	*Black Mastic*	***4% Chrysotile***	
EBR-032324-SK56	*56-1*	*Brown Floor Tile*	***5% Chrysotile***	
	56-2	*Black Mastic*	***4% Chrysotile***	
EBR-032324-SK57	*57-3*	*Gray Floor Tile*	***3% Chrysotile***	
	57-4	*Black Mastic*	***5% Chrysotile***	

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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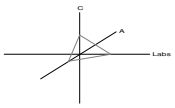

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LELAP #03069

Overview of Project Sample Material Containing Asbestos

Customer Project: 24-088 **CA Labs Project #:** CBR24031910

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
EBR-032324-SK58	*58-3*	*Gray Floor Tile*	***3% Chrysotile***	
	58-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK59	*59-3*	*Gray Floor Tile*	***3% Chrysotile***	
	59-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK72	*72-1*	*White Textured Surfacing*	***2% Chrysotile***	
EBR-032324-SK73	*73-1*	*White Textured Surfacing*	***2% Chrysotile***	
EBR-032324-SK74	*74-1*	*White Textured Surfacing*	***2% Chrysotile***	
EBR-032324-SK75	*75-1*	*White Textured Surfacing*	***2% Chrysotile***	

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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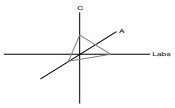

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TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Overview of Project Sample Material Containing Asbestos

Customer Project: 24-088 **CA Labs Project #:** CBR24031910

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
EBR-032324-SK76	*76-1*	*White Textured Surfacing*	***2% Chrysotile***	
EBR-032324-SK98	*98-3*	*Gray Floor Tile*	***5% Chrysotile***	
	98-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK99	*99-3*	*Gray Floor Tile*	***5% Chrysotile***	
	99-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK100	*100-3*	*Gray Floor Tile*	***5% Chrysotile***	
	100-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK104	*104-3*	*Gray Floor Tile*	***3% Chrysotile***	

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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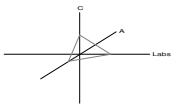

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Overview of Project Sample Material Containing Asbestos

Customer Project: 24-088 **CA Labs Project #:** CBR24031910

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
	104-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK105	*105-3*	*Gray Floor Tile*	***3% Chrysotile***	
	105-4	*Black Mastic*	***5% Chrysotile***	
EBR-032324-SK106	*106-3*	*Gray Floor Tile*	***3% Chrysotile***	
	106-4	*Black Mastic*	***5% Chrysotile***	
EBR-032424-SK133	*133-4*	*Yellow and Black Mastic*	***4% Chrysotile***	
EBR-032424-SK134	*134-4*	*Yellow and Black Mastic*	***4% Chrysotile***	
EBR-032424-SK135	*135-4*	*Yellow and Black Mastic*	***4% Chrysotile***	

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

ca - carbonate
gypsum - gypsum
bi - binder
or - organic
ma - matrix
mi - mica
ve - vermiculite
ot - other
pe - perlite
qu - quartz
fg - fiberglass
mw - mineral wool
wo - wollastinite
ta - talc
sy - synthetic
ce - cellulose
br - brucite
ka - kaolin (clay)
pa - palygorskite (clay)

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Dedicated to Quality

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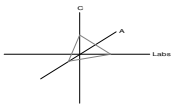

NVLAP #200772-0
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Overview of Project Sample Material Containing Asbestos

Customer Project: 24-088 **CA Labs Project #:** CBR24031910

Sample #	Layer #	Analysts Physical Description of Subsample	Asbestos type / calibrated visual estimate percent	List of Affected Building Material Types
EBR-032424-SK159	*159-1*	*Yellow Sealant*	***2% Chrysotile***	
EBR-032424-SK160	*160-1*	*Yellow Sealant*	***2% Chrysotile***	
EBR-032424-SK161	*161-1*	*Yellow Sealant*	***2% Chrysotile***	
EBR-032424-SK162	*162-1*	*Tan Sealant on Tan Wrap with Foil*	***2% Chrysotile***	

Glossary of abbreviations (non-asbestos fibers and non-fibrous minerals):

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or - organic
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mi - mica
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NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032324-SK01		*01-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		01-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK02		*02-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		02-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK03		*03-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		03-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK04		*04-1*	*Gray Cove Base*	*Y*	***None Detected***		100% qu, ma

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

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9. < 1% Result point counted positive
10. TEM analysis suggested

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Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		04-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK05		*05-1*	*Gray Cove Base*	*Y*	***None Detected***		100% qu, ma
		05-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK06		*06-1*	*Gray Cove Base*	*Y*	***None Detected***		100% qu, ma
		06-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK07		*07-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		07-2	*Clear Mastic*	*Y*	***None Detected***		100% qu, bi

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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
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Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032324-SK08		*08-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		08-2	*Clear Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK09		*09-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		09-2	*Clear Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK10		*10-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		10-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		10-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
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Date: 3/27/2024
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Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		10-4	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK11		*11-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		11-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		11-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		11-4	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK12		*12-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		12-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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		12-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		12-4	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK13	***10***	*13-1*	*White Textured Surfacing*	*N*	***2% Chrysotile***		98% qu, mi, bi, ca
EBR-032324-SK14	***10***	*14-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, mi, bi, ca
EBR-032324-SK15	***10***	*15-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, mi, bi, ca
EBR-032324-SK16		*16-1*	*Gray Surfaced White Finishing Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca
		16-2	*Tan Plaster*	*Y*	***None Detected***		100% qu, ma, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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Polarized Light Asbestiform Materials Characterization

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462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
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Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032324-SK17		*17-1*	*Gray Surfaced White Finishing Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca
		17-2	*Tan Plaster*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK18		*18-1*	*Gray Surfaced White Finishing Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca
		18-2	*Tan Plaster*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK19		*19-1*	*Gray Surfaced White Finishing Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca
		19-2	*Tan Plaster*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK20		*20-1*	*Gray Surfaced White Finishing Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca

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		20-2	*Tan Plaster*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK21		*21-1*	*White and Black Covering*	*N*	***None Detected***	40% sy	60% qu, ma, ot
EBR-032324-SK22		*22-1*	*White and Black Covering*	*N*	***None Detected***	40% sy	60% qu, ma, ot
EBR-032324-SK23		*23-1*	*White and Black Covering*	*N*	***None Detected***	40% sy	60% qu, ma, ot
EBR-032324-SK24		*24-1*	*Tan Wrap with Black Mastic*	*N*	***None Detected***	10% ce 40% ce	50% qu, ma, bi, ot
		24-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK25		*25-1*	*Tan Wrap with Black Mastic*	*N*	***None Detected***	10% ce 40% ce	50% qu, ma, bi, ot

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Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		25-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK26		*26-1*	*Tan Wrap*	*N*	***None Detected***	10% fg 50% ce	40% qu, ma, ot
		26-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
		26-3	*Yellow Fibrous Insulation*	*Y*	***None Detected***	100% fg	
EBR-032324-SK27		*27-1*	*Tan Wrap with Black Mastic*	*N*	***None Detected***	10% ce 40% ce	50% qu, ma, bi, ot
		27-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK28		*28-1*	*Tan Wrap with Black Mastic*	*N*	***None Detected***	10% ce 40% ce	50% qu, ma, bi, ot

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

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10. TEM analysis suggested

CA Labs
Dedicated to Quality

CA Labs, L.L.C.
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Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

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		28-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK29		*29-1*	*Tan Wrap*	*N*	***None Detected***	10% ce 40% ce	50% qu, ma, bi, ot
		29-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK30		*30-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		30-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK31		*31-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		31-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy

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EBR-032324-SK32		*32-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		32-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK33		*33-1*	*Tan Surfaced Tan Sealant*	*N*	***2% Chrysotile***		98% qu, ma, bi, ca
EBR-032324-SK34		*34-1*	*Tan Surfaced Tan Sealant*	*N*	***2% Chrysotile***		98% qu, ma, bi, ca
EBR-032324-SK35		*35-1*	*Tan Surfaced Tan Sealant*	*N*	***2% Chrysotile***		98% qu, ma, bi, ca
EBR-032324-SK36		*36-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		36-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy

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EBR-032324-SK37		*37-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		37-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK38		*38-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		38-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK39		*39-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		39-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK40		*40-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi

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		40-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK41		*41-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		41-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK42		*42-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		42-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		42-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
	10	*42-4*	*Black Mastic*	*Y*	***4% Chrysotile***		96% qu, bi

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EBR-032324-SK43		*43-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		43-2	*Tan Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca
		43-3	*Black Mastic*	*Y*	***4% Chrysotile***		96% qu, bi
EBR-032324-SK44		*44-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		44-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
	10	*44-3*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		44-4	*Yellow and Black Mastic*	*N*	***3% Chrysotile***		97% qu, bi

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EBR-032324-SK45		*45-1*	*Tan Wrap*	*N*	***None Detected***	20% fg 50% ce	30% qu, ot
		45-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK46		*46-1*	*Tan Wrap*	*N*	***None Detected***	20% fg 50% ce	30% qu, ot
		46-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK47		*47-1*	*Tan Wrap*	*N*	***None Detected***	20% fg 50% ce	30% qu, ot
		47-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK48		*48-1*	*Tan Wrap*	*N*	***None Detected***	20% fg 50% ce	30% qu, ot

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		48-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK49		*49-1*	*Tan Wrap*	*N*	***None Detected***	20% fg 50% ce	30% qu, ot
		49-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK50		*50-1*	*Tan Wrap*	*N*	***None Detected***	20% fg 50% ce	30% qu, ot
		50-2	*Yellow Foam Insulation*	*Y*	***None Detected***		100% ot
EBR-032324-SK51		*51-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		51-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy

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EBR-032324-SK52		*52-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		52-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK53		*53-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		53-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK54		*54-1*	*Brown Floor Tile*	*Y*	***5% Chrysotile***		95% qu, ma, ca
		54-2	*Black Mastic*	*Y*	***4% Chrysotile***		96% qu, bi
EBR-032324-SK55		*55-1*	*Brown Floor Tile*	*Y*	***5% Chrysotile***		95% qu, ma, ca

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Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		55-2	*Black Mastic*	*Y*	***4% Chrysotile***		96% qu, bi
EBR-032324-SK56		*56-1*	*Brown Floor Tile*	*Y*	***5% Chrysotile***		95% qu, ma, ca
		56-2	*Black Mastic*	*Y*	***4% Chrysotile***		96% qu, bi
EBR-032324-SK57		*57-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		57-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		57-3	*Gray Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca
		57-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

1. Fire Damage significant fiber damage - reported percentages reflect unaltered fibers
2. Fire Damage no significant fiber damages effecting fibrous percentages
3. Actinolite in association with Vermiculite
4. Layer not analyzed - attached to previous positive layer and contamination is suspected
5. Not enough sample to analyze
6. Anthophyllite in association with Fibrous Talc
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10. TEM analysis suggested

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EBR-032324-SK58		*58-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		58-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		58-3	*Gray Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca
		58-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK59		*59-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		59-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		59-3	*Gray Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca

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		59-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK60		*60-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		60-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK61		*61-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		61-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK62		*62-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		62-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe

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EBR-032324-SK63		*63-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		63-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK64		*64-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		64-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK65		*65-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		65-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK66		*66-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma

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		66-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK67		*67-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		67-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK68		*68-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		68-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK69		*69-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		69-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi

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EBR-032324-SK70		*70-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		70-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK71		*71-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		71-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK72		*72-1*	*White Textured Surfacing*	*N*	***2% Chrysotile***		98% qu, mi, bi, ca
EBR-032324-SK73		*73-1*	*White Textured Surfacing*	*N*	***2% Chrysotile***		98% qu, mi, bi, ca
EBR-032324-SK74		*74-1*	*White Textured Surfacing*	*N*	***2% Chrysotile***		98% qu, mi, bi, ca

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EBR-032324-SK75		*75-1*	*White Textured Surfacing*	*N*	***2% Chrysotile***		98% qu, mi, bi, ca
EBR-032324-SK76		*76-1*	*White Textured Surfacing*	*N*	***2% Chrysotile***		98% qu, mi, bi, ca
EBR-032324-SK77		*77-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		77-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK78		*78-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		78-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK79		*79-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi

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		79-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK80		*80-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		80-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK81		*81-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		81-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK82		*82-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		82-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe

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EBR-032324-SK83		*83-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		83-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK84		*84-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		84-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK85		*85-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK86		*86-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		86-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi

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7. Contamination suspected from other building materials
8. Favorable scenario for water separation on vermiculite for possible analysis by another method
9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs
Dedicated to Quality

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032324-SK87		*87-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		87-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK88		*88-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		88-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK89		*89-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		89-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK90		*90-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

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		90-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK91		*91-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		91-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032324-SK92		*92-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK93		*93-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK94		*94-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032324-SK95		*95-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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		95-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK96		*96-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		96-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK97		*97-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		97-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032324-SK98		*98-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		98-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi

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		98-3	*Gray Floor Tile*	*Y*	***5% Chrysotile***		95% qu, ma, ca
		98-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK99		*99-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		99-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		99-3	*Gray Floor Tile*	*Y*	***5% Chrysotile***		95% qu, ma, ca
		99-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK100		*100-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca

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		100-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		100-3	*Gray Floor Tile*	*Y*	***5% Chrysotile***		95% qu, ma, ca
		100-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK101		*101-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		101-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK102		*102-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		102-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy

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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
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Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032324-SK103		*103-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		103-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032324-SK104		*104-1*	*Blue Carpet*	*N*	***None Detected***	70% sy	30% qu, ma
		104-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		104-3	*Gray Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca
		104-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK105		*105-1*	*Blue Carpet*	*N*	***None Detected***	70% sy	30% qu, ma

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		105-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		105-3	*Gray Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca
		105-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi
EBR-032324-SK106		*106-1*	*Blue Carpet*	*N*	***None Detected***	70% sy	30% qu, ma
		106-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		106-3	*Gray Floor Tile*	*Y*	***3% Chrysotile***		97% qu, ma, ca
		106-4	*Black Mastic*	*Y*	***5% Chrysotile***		95% qu, bi

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EBR-032424-SK107		*107-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		107-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK108		*108-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		108-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK109		*109-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		109-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK110		*110-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma

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		110-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK111		*111-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		111-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK112		*112-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		112-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK113		*113-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		113-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe

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9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs
Dedicated to Quality

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032424-SK114		*114-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		114-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032424-SK115		*115-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		115-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032424-SK116		*116-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		116-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		116-3	*Gray Leveling Plaster*	*Y*	***None Detected***		100% qu, ma, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

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		116-4	*Black Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK117		*117-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		117-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		117-3	*Gray Leveling Plaster*	*Y*	***None Detected***		100% qu, ma, ca
		117-4	*Black Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK118		*118-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		118-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi

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		118-3	*Gray Leveling Plaster*	*Y*	***None Detected***		100% qu, ma, ca
		118-4	*Black Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK119		*119-1*	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		119-2	*White Surfaced White Compound*	*N*	***None Detected***		100% qu, mi, bi, ca
		119-3	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK120		*120-1*	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		120-2	*White Surfaced White Compound*	*N*	***None Detected***		100% qu, mi, bi, ca

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		120-3	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK121		*121-1*	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		121-2	*White Surfaced White Compound*	*N*	***None Detected***		100% qu, mi, bi, ca
		121-3	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK122		*122-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, ma, bi, ca
EBR-032424-SK123		*123-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, ma, bi, ca
EBR-032424-SK124		*124-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, ma, bi, ca

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EBR-032424-SK125		*125-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, ma, bi, ca
EBR-032424-SK126		*126-1*	*White Textured Surfacing*	*N*	***None Detected***		100% qu, ma, bi, ca
EBR-032424-SK127		*127-1*	*Blue Carpet*	*N*	***None Detected***	70% sy	30% qu, ma
		127-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK128		*128-1*	*Blue Carpet*	*N*	***None Detected***	70% sy	30% qu, ma
		128-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK129		*129-1*	*Blue Carpet*	*N*	***None Detected***	70% sy	30% qu, ma

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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		129-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK130		*130-1*	*White Compound*	*Y*	***None Detected***		100% qu, mi, ca
		130-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK131		*131-1*	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		131-2	*White Surfaced White Compound*	*N*	***None Detected***		100% qu, mi, bi, ca
		131-3	*White Compound Beneath Tape*	*Y*	***None Detected***		100% qu, mi, ca
EBR-032424-SK132		*132-1*	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy

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		132-2	*White Surfaced White Compound*	*N*	***None Detected***		100% qu, mi, bi, ca
		132-3	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK133		*133-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		133-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		133-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		133-4	*Yellow and Black Mastic*	*N*	***4% Chrysotile***		96% qu, bi
EBR-032424-SK134		*134-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca

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		134-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		134-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		134-4	*Yellow and Black Mastic*	*N*	***4% Chrysotile***		96% qu, bi
EBR-032424-SK135		*135-1*	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
		135-2	*Yellow Mastic*	*Y*	***None Detected***		100% qu, bi
		135-3	*Tan Floor Tile*	*Y*	***None Detected***		100% qu, ma, ca
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EBR-032424-SK136		*136-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		136-2	*White Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK137		*137-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		137-2	*White Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK138		*138-1*	*Black Cove Base*	*Y*	***None Detected***		100% qu, ma
		138-2	*White Mastic*	*Y*	***None Detected***		100% qu, bi
EBR-032424-SK139		*139-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi

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9. < 1% Result point counted positive
10. TEM analysis suggested

CA Labs
Dedicated to Quality

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Characterization

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		139-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK140		*140-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		140-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK141		*141-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi
		141-2	*White Drywall with Paper*	*N*	***None Detected***	10% ce	90% qu, gy
EBR-032424-SK142		*142-1*	*Green Ceramic Tile*	*N*	***None Detected***		100% qu, ma, ot
		142-2	*Gray Grout*	*Y*	***None Detected***		100% qu, ma, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

ca - carbonate	mi - mica	fg - fiberglass	ce - cellulose
gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
bi - binder	ot -other	wo - wollastinite	ka - kaolin (clay)
or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

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CA Labs Project #: CBR24031910

Date: 3/27/2024
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Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032424-SK143		*143-1*	*Green Ceramic Tile*	*N*	***None Detected***		100% qu, ma, ot
		143-2	*Gray Grout*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK144		*144-1*	*Green Ceramic Tile*	*N*	***None Detected***		100% qu, ma, ot
		144-2	*Gray Grout*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK145		*145-1*	*White and Gray Plaster*	*N*	***None Detected***		100% qu, ma, ca
EBR-032424-SK146		*146-1*	*Gray Plaster*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK147		*147-1*	*Tan Surfaced White and Gray Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
ma - matrix	qu - quartz	sy - synthetic	

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Customer Project: 24-088

Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
Samples Received: 3/25/2024
Date Of Sampling: 03/23-24/2024
Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032424-SK148		*148-1*	*Tan Surfaced White and Gray Plaster*	*N*	***None Detected***		100% qu, ma, bi, ca
EBR-032424-SK149		*149-1*	*Gray Plaster*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK150		*150-1*	*Red Ceramic Tile*	*N*	***None Detected***		100% qu, ma, ot
		150-2	*Gray Grout*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK151		*151-1*	*Red Ceramic Tile*	*N*	***None Detected***		100% qu, ma, ot
		151-2	*Gray Grout*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK152		*152-1*	*Red Ceramic Tile*	*N*	***None Detected***		100% qu, ma, ot

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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gypsum - gypsum	ve - vermiculite	mw - mineral wool	br - brucite
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or - organic	pe - perlite	ta - talc	pa - palygorskite (clay)
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Polarized Light Asbestiform Materials Characterization

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CA Labs Project #: CBR24031910

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Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		152-2	*Gray Grout*	*Y*	***None Detected***		100% qu, ma, ca
EBR-032424-SK153		*153-1*	*Black and Gray Sealant*	*N*	***None Detected***		100% qu, ma, bi
EBR-032424-SK154		*154-1*	*Black and Gray Sealant*	*N*	***None Detected***		100% qu, ma, bi
EBR-032424-SK155		*155-1*	*Black and Gray Sealant*	*N*	***None Detected***		100% qu, ma, bi
EBR-032424-SK156		*156-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		156-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032424-SK157		*157-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
Preparation Method: HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion attaining / becke line method.

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Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
		157-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032424-SK158		*158-1*	*White Surfacing*	*Y*	***None Detected***		100% qu, bi, ca
		158-2	*Tan Ceiling Tile*	*Y*	***None Detected***	20% fg 40% ce	40% qu, ma, pe
EBR-032424-SK159		*159-1*	*Yellow Sealant*	*Y*	***2% Chrysotile***		98% qu, ma
		159-2	*Black Blown Glass Insulation*	*Y*	***None Detected***		100% ot
EBR-032424-SK160		*160-1*	*Yellow Sealant*	*Y*	***2% Chrysotile***		98% qu, ma
		160-2	*Black Blown Glass Insulation*	*Y*	***None Detected***		100% ot

Analysis Method: Interim (40CFR Part 763 Appendix E to Subpart E) / Improved (EPA-600 / R-93/116)
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Polarized Light Asbestiform Materials Characterization

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Turnaround Time: 2 day

CA Labs Project #: CBR24031910

Date: 3/27/2024
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Purchase Order #:

Sample #	Comment	Layer #	Analysts Physical Description of Subsample	Homogeneous (Y/N)	Asbestos type / calibrated visual estimate percent	Non-asbestos fiber type / percent	Non-fibrous type / percent
EBR-032424-SK161		*161-1*	*Yellow Sealant*	*Y*	***2% Chrysotile***		98% qu, ma
		161-2	*Black Blown Glass Insulation*	*Y*	***None Detected***		100% ot
EBR-032424-SK162		*162-1*	*Tan Sealant on Tan Wrap with Foil*	*N*	***2% Chrysotile***	10% fg 40% ce	48% qu, ma, ot
EBR-032424-SK163		*163-1*	*Tan Wrap*	*N*	***None Detected***	10% fg 40% ce	50% qu, ma, ot
		163-2	*Yellow Fibrous Insulation*	*Y*	***None Detected***	100% fg	
EBR-032424-SK164		*164-1*	*Tan Wrap*	*N*	***None Detected***	10% fg 40% ce	50% qu, ma, ot
		164-2	*Yellow Fibrous Insulation*	*Y*	***None Detected***	100% fg	

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www.MYEnvironmentalConsulting.com

CBR24031910

CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William A. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24 15:15	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-01	2x2 Ceiling Tile	ASB		
-02	↓	↓		
-03	↓	↓		
-04	Tan Cove Base	↓		
-05	↓	↓		
-06	↓	↓		
-07	Black Cove Base	↓		
-08	↓	↓		
-09	↓	↓		
-10	12" Double Layered Floor Tile	↓		
-11	↓	↓		
-12	↓	↓		
-13	CMU Wall Paint/Texture	↓		
-14	↓	↓		

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CHAIN OF CUSTODY

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Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-15	CMU Wall Paint/Texture	ASB		
-16	Plaster Ceiling			
-17				
-18				
-19				
-20				
-21	Vibration Dampener			
-22				
-23				
-24	TSI Elbow			
-25				
-26				
-27	TSI Straight			
-28				

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CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William A. Wright	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-29	TSI Straight	ASB		
-30	Smooth Ceiling Tile	↓		
-31	↓	↓		
-32	↓	↓		
-33	Door Caulk	↓		
-34	↓	↓		
-35	↓	↓		
-36	Drywall + JC	↓		
-37	↓	↓		
-38	↓	↓		
-39	2x2 Worm Pin CT	↓		
-40	↓	↓		
-41	↓	↓		
↓ -42	First Floor Double Layered Floor Tile	↓		

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Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ROUTINE ☒OTHER: 2 Day (specify)

Special Instructions: _____

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Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-43	First Floor Double Layered Floor Tile	ASB		
-44	↓	↓		
-45	TSI Straight			
-46	↓			
-47	↓			
-48	TSI Elbow			
-49	↓			
-50	↓			
-51	Smooth Ceiling Tile			
-52	↓			
-53	↓			
-54	9" Brown Floor Tile			
-55	↓			
-56	↓	↓		

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Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

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Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK -57	Double Layered Floor Tile	ASB		
-58	↓	↓		
-59	↓	↓		
-60	2x2 Worm Pin CT	↓		
-61	↓	↓		
-62	↓	↓		
-63	Drywall & JC	↓		
-64	↓	↓		
-65	↓	↓		
-66	Cove Base	↓		
-67	↓	↓		
-68	↓	↓		
-69	12" Floor Tile	↓		
-70	↓	↓		

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Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

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Special Instructions: _____

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Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-71	12" Floor Tile	ASB		
-72	CMU Wall Coating			
-73	↓			
-74	↓			
-75	↓			
-76	↓			
-77	Smooth Ceiling Tile			
-78	↓			
-79	↓			
-80	2x2 Worm Pin CT			
-81	↓			
-82	↓			
-83	Beige Floor Tile			
-84	↓	↓		

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CBR24031910

CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William L. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-85	Beige Floor Tile	ASB		
-86	Cove Base			
-87	↓ ↓			
-88	↓ ↓			
-89	2x2 Worm Pin CT			
-90	↓ ↓ ↓ ↓			
-91	↓ ↓ ↓ ↓			
-92	12" Floor Tile			
-93	↓ ↓ ↓			
-94	↓ ↓ ↓			
-95	Cove Base			
-96	↓ ↓			
-97	↓ ↓			
↓ -98	Double Layered Floor Tile	↓		

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CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William L. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032324SK-99	Double Layered Floor Tile	ASB		
-100	↓ ↓ ↓ ↓	↓		
-101	Drywall + JC			
-102	↓ ↓ ↓			
-103	↓ ↓ ↓			
-104	Carpet Overlaying 9" FT + MT			
-105	↓ ↓ ↓ ↓ ↓ ↓			
-106	↓ ↓ ↓ ↓ ↓ ↓			
EBR032424SK-107	2x2 Smooth CT			
-108	↓ ↓ ↓			
-109	↓ ↓ ↓			
-110	Cove Base			
-111	↓ ↓			
-112	↓ ↓	↓		

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CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William K. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032424SK-113	2x2 Worn Pin CT	ASB		
-114	↓	↓		
-115	↓	↓		
-116	Floor Tile on Floor Flat	↓		
-117	↓	↓		
-118	↓	↓		
-119	Drywall + JC	↓		
-120	↓	↓		
-121	↓	↓		
-122	Spray on Wall Texture	↓		
-123	↓	↓		
-124	↓	↓		
-125	↓	↓		
-126	↓	↓		

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CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William L. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032424SK-127	Carpet	ASB		
-128	↓	↓		
-129	↓			
-130	Drywall + JC			
-131	↓ ↓ ↓			
-132	↓ ↓ ↓			
-133	Double Layered Floor Tile			
-134	↓ ↓ ↓ ↓			
-135	↓ ↓ ↓ ↓			
-136	Cove Base			
-137	↓ ↓			
-138	↓ ↓			
-139	Smooth CT			
-140	↓ ↓	↓		

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CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William K. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 9:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032424SK-141	Smooth CT	ASB		
-142	Ceramic Wall Tile & Grout	↓		
-143	↓			
-144	↓			
-145	Plaster Ceiling			
-146	↓			
-147				
-148				
-149	↓			
-150	Ceramic Floor Tile & Grout			
-151	↓			
-152	↓			
-153	Sink Coating			
-154	↓	↓		

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CHAIN OF CUSTODY

Project No: 24-088	Relinquished By: (signature) William K. Knight	Relinquished By: (signature)
Date Sampled: 3/23/24 - 3/24/24	Date and Time: 3/24/24	Date and Time:
Number of Samples: 164	Accepted By: (signature)	Accepted By: (signature)
Type of Samples: PLM	Date and Time: 3-25-2024 8:00	Date and Time:

Turnaround Time Requested: ☐ RUSH ☐ ROUTINE ☒ OTHER: 2 Day (specify)

Special Instructions: _____

Please email results to: Ashton @MYEnvironmentalConsulting.com

Sample Number	Sample Description	Chemical Agent	Time (min.)	Volume ☐ L or ☐ ml
EBR032424SK-155	Sink Coating	ASB		
-156	2x2 Worm Pin CT			
-157	↓			
-158	↓			
-159	TSI Elbow			
-160	↓			
-161	↓			
-162	Straight			
-163	↓			
-164	↓	↓		

CA Labs
Dedicated to Quality

CA Labs, L.L.C.
12232 Industriplex, Suite 32
Baton Rouge, LA 70809
Phone 225-751-5632
Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Point Count

Laboratory Analysis Report - Point Count

Analysis and Method

Point counting was performed on a polarized light microscope with a calibrated reticle according to the revised NESHAP method of November 20, 1990 (Federal Register, V.55, N.224, 11/20/90). Original asbestos content of bulk materials was determined using procedures outlined in the interim method (40 CFR part 763, Appendix E to subpart E) and AHERA method (EPA-600/R-93/116). Samples were prepared using HCL acid washing for carbonate based samples, chemical reduction for organically bound components, oil immersion for identification of asbestos types by dispersion staining / becke line method.

Qualifications

CA Labs is accredited by the National Voluntary Accreditation Program (NVLAP) for selected test methods for airborne fiber analysis (TEM), and for bulk asbestos fiber analysis (PLM). All analysts have a college degree in a natural science (geology, biology, or environmental science) or are recognized by a state professional board in one of these disciplines. Extensive in-house training programs are used to augment education background of the analyst. The group leader of polarized light has received supplemental McCrone Research training for asbestos identification. This report is not covered by the scope of NVLAP or AIHA accreditation. Analysis performed at CA Labs, LLC 12232 Industriplex, Suite 32 Baton Rouge, LA 70809.

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 24 Hour

CA Labs Project #: CBR24042146

Date: 4/3/2024
Samples Received: 4/3/2024
Date Of Sampling:
Purchase Order #:

Sample #	Layer #	Analysts Physical Description of Subsample	Homo-geneous (Y/N)	Point Counted % / Asbestos Type
13	13-1	*White Textured Surfacing*	*N*	***Trace Chrysotile***
72	72-1	*White Textured Surfacing*	*N*	***0.75% Chrysotile***
73	73-1	*White Textured Surfacing*	*N*	***0.50% Chrysotile***

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Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

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Dedicated to Quality

CA Labs, L.L.C.
12232 Industriplex, Suite 32
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Phone 225-751-5632
Fax 225-751-5634

NVLAP #200772-0
TDSHS #300370
CDPHE #AL-18111
LELAP #03069

Polarized Light Asbestiform Materials Point Count

Laboratory Analysis Report - Point Count

Customer Info: **Attn:** Rob Martin
MY Environmental Consulting, LLC
462 Linda Circle
Baton Rouge, LA 70806

Phone # 203-606-6369
Fax #

Customer Project: 24-088

Turnaround Time: 24 Hour

CA Labs Project #: CBR24042146

Date: 4/3/2024
Samples Received: 4/3/2024
Date Of Sampling:
Purchase Order #:

Sample #	Layer #	Analysts Physical Description of Subsample	Homo-geneous (Y/N)	Point Counted % / Asbestos Type
74	74-1	*White Textured Surfacing*	*N*	***0.75% Chrysotile***
75	75-1	*White Textured Surfacing*	*N*	***0.50% Chrysotile***
76	76-1	*White Textured Surfacing*	*N*	***0.75% Chrysotile***

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Approved Signatories:

Zo Andriampenomanana
Analyst

Senior Analyst
Alicia Stretz

Laboratory Director
Chris Williams

CA LABS

CA Labs, LLC
12232 Industriplex Blvd Suite 31/32
Baton Rouge, LA 70809

Phone: 225-751-5632
Fax: 225-751-5634
Mobile: 225-993-3471

ref. CBR24031910

Chain of Custody **CA Labs job#: CBR** 24042146

CA Labs Client Name: MY

Billing Address:

Client Address:

(If Different)

Phone Number: 2253615494

Send Reports to (email address):

Fax Number:

PO#

Project Name: 24-088-

Contact: Ashton Knight

Project Number:

Results Reported Via: Email X Fax ____ Verbal ____

Total # Samples Submitted:	Total # Samples to be Analyzed:	Material Matrix:
6	6	Air/Bulk/Wipe

Circle analysis and TA time: **Please call ahead for availability of all rush/afterhours samples.**

TEM:	AHERA	EPA Level II	Wipe	Micro-Vac	NIOSH 7402	Chatfield Bulk	Amphibole Separation
TAT	4 hour		8 hour	24 hour	2 day	3 day	5 day

PLM:	AHERA		400 Point Counts	1000 Point Counts		Gravimetric Point Count	
TAT	2 hour	4 hour	8 hour	24 hour	2 day	3 day	5 day

Optical/IAQ:	Allergen: Tape/Bulk/Swab		Air-O-Cell	PCM		PCM (TWA)	
TAT	2 hour	4 hour	8 hour	24 hour	2 day	3 day	5 day

Lead:	Paint Chips	Soil	Wipes	Air	TCLP
TAT	4 hour	8 hour	24 hour	2 day	3 day	5 day

Other analysis not listed: + Stop TAT: ____

Sample Information:

Sample Number:	Sample Location:	Sample Date/Time:	Sample Volume(L)
13			
72			
73			
74			
75			
76			

Custody Information:

Samples relinquished: per Client via email Signature/Date/Time | Samples received: [signature] 4/3 9:15 Signature/Date/Time

Samples relinquished: ____ Signature/Date/Time Samples received: ____ Signature/Date/Time

Gmail

Administration Baton Rouge <calabsbr@calabsinc.com>

ref: CBR240319/0

Re: 24-088 - PLM

1 message

CBR240421460

Ashton Knight <Ashton@myenvironmentalconsulting.com> Wed, Apr 3, 2024 at 9:06 AM
To: Administration Baton Rouge <calabsbr@calabsinc.com>
Cc: "MY Environmental Consulting, LLC" <myenvironmental@gmail.com>, Trenton Knight <trent@myenvironmentalconsulting.com>

Good Morning,

Please point count samples 13, 72-76 on a positive stop. 24hr TAT.

Thank you!

Ashton Knight
Project Manager
MY Environmental Consulting

(225)361-5494

ashton@myenvironmentalconsulting.com

MYEnvironmentalConsulting.com

9141 Interline Ave., Ste. 2A, Baton Rouge, LA

On Wed, Mar 27, 2024 at 8:29 AM Administration Baton Rouge <calabsbr@calabsinc.com> wrote:

--
CA Labs BR
12232 Industriplex Blvd Ste 32
Baton Rouge, LA 70809
Office: 225-751-5632
Fax: 225-751-5634

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4/3 9:15

Appendix 2:
MY Environmental Consulting Field Notes

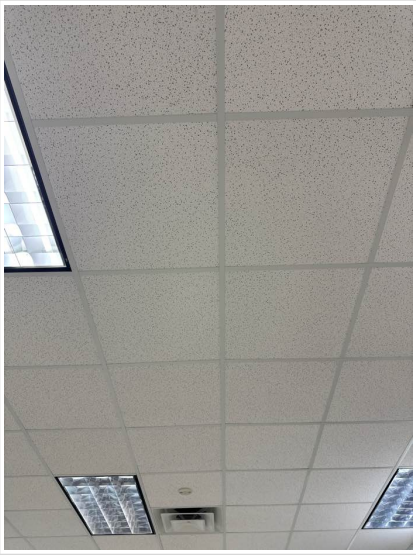
Date Submitted: 03-23-2024 05:33 PM
Submitted By: myenvironmental@gmail.com

Asbestos Data Sheet

General Information

Project Number	24-088
Inspector	William S. Knight
Inspector AI Number	240959
Date/Time	03-23-2024
Client	EBRPSS
Location	McKinley HS

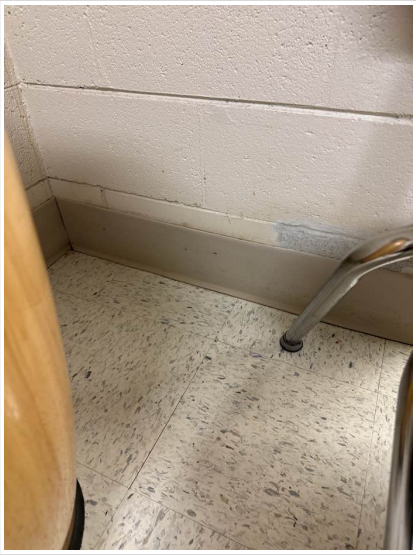
Bulk Sample

Sample ID	EBR032324SK-01,02,03
Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Ceiling Tile
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	2160 sqft
Multi Photo	

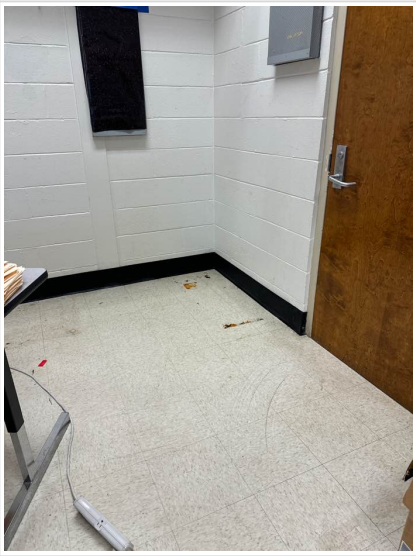
Bulk Sample (1)

Sample ID	04,05,06
Material Description (Ie. 12" White Floor Tile and Mastic)	Tan Cove Base
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No

Asbestos Data Sheet

Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (2)

Sample ID	07,08,09
Material Description (Ie. 12" White Floor Tile and Mastic)	Black Cove Base
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Asbestos Data Sheet

Bulk Sample (3)

Sample ID	-10,11,12
Material Description (Ie. 12" White Floor Tile and Mastic)	12” Double Layered Floor Tile
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	4320 sqft
Multi Photo	

Bulk Sample (4)

Sample ID	13,14,15

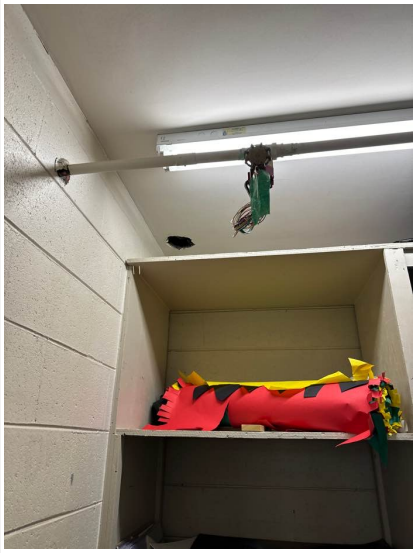
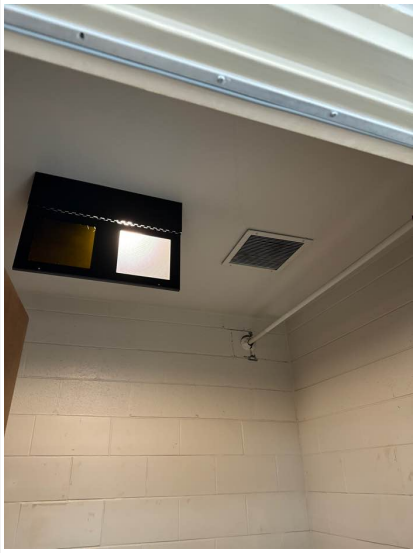
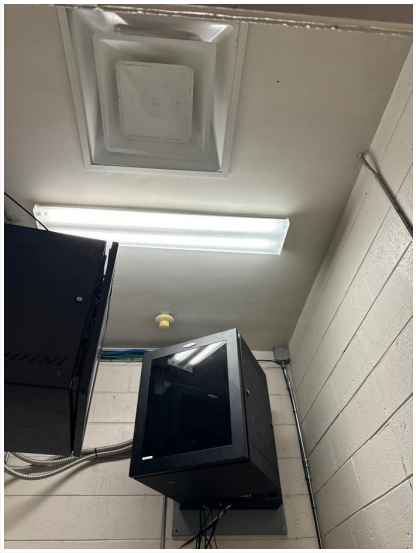
Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	CMU Wall Paint/Texture
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Mod
Condition	Damaged
Quantity: (sf/lf)	5760 sqft
Multi Photo	

Bulk Sample (5)

Sample ID	16,17,18,19,20
Material Description (Ie. 12" White Floor Tile and Mastic)	Plaster Ceiling
Sample Location	Building E
Material Type	Surfacing
Friable?	Yes
Disturbance Potential	Low
Condition	Damaged
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	
	
	

Asbestos Data Sheet

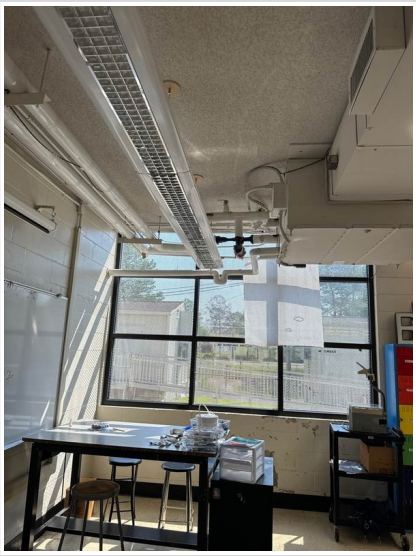
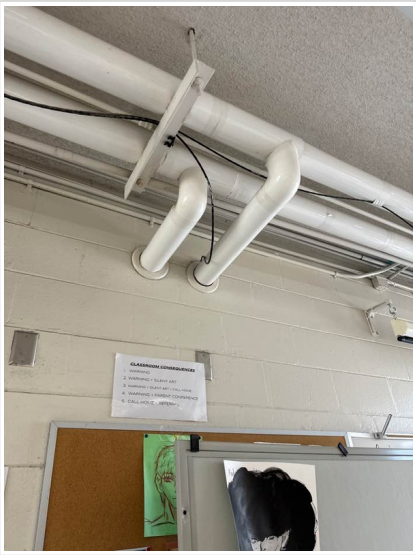
Bulk Sample (6)

Sample ID	21,22,23
Material Description (Ie. 12" White Floor Tile and Mastic)	Vibration Dampener
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (7)

Sample ID	24,25,26

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	TSI Elbow
Sample Location	Building E
Material Type	TSI
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	
	

Asbestos Data Sheet

Bulk Sample (8)

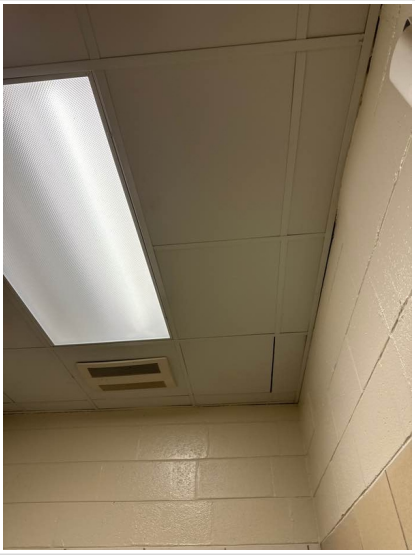
Sample ID	27,28,29
Material Description (Ie. 12" White Floor Tile and Mastic)	TSI Straight
Sample Location	Building E
Material Type	TSI
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Bulk Sample (9)

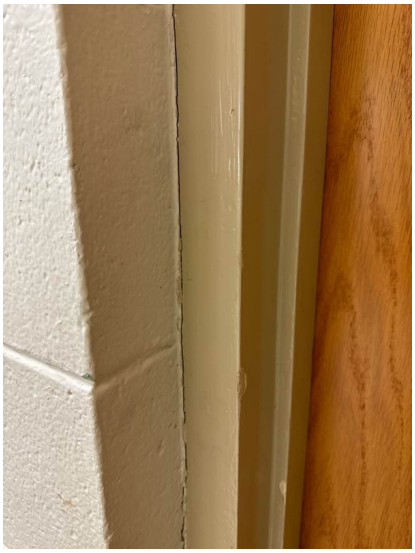
Asbestos Data Sheet

Sample ID	30,31,32
Material Description (Ie. 12" White Floor Tile and Mastic)	Smooth Ceiling Tile
Sample Location	Building E
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	40
Multi Photo	

Bulk Sample (10)

Sample ID	33,34,35
Material Description (Ie. 12" White Floor Tile and Mastic)	Door Caulk
Sample Location	Building B
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Damaged
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

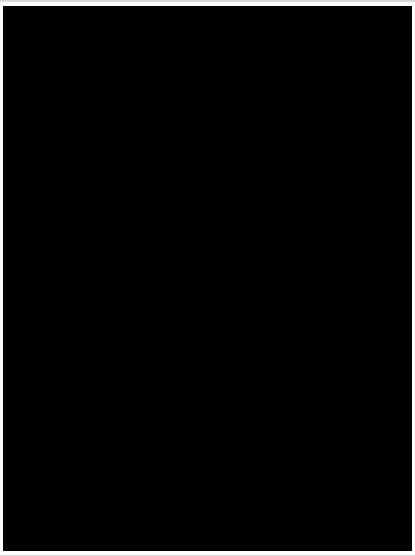
Bulk Sample (11)

Sample ID	36,37,38
Material Description (Ie. 12" White Floor Tile and Mastic)	Drywall and JC
Sample Location	Building B
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (12)

Sample ID	39,40,41

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Worm Pin CT
Sample Location	Building B
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

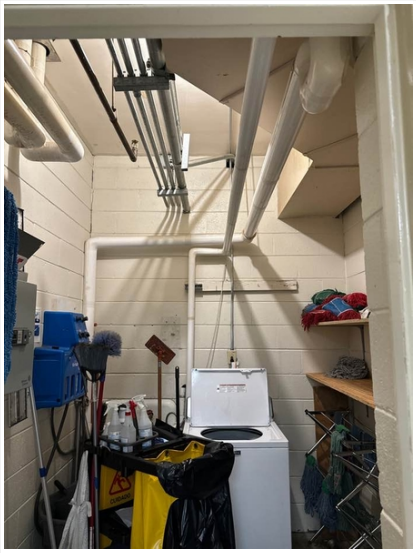
Bulk Sample (13)

Sample ID	42,43,44
Material Description (Ie. 12" White Floor Tile and Mastic)	First Floor Double Layered Floor Tile
Sample Location	Building B
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

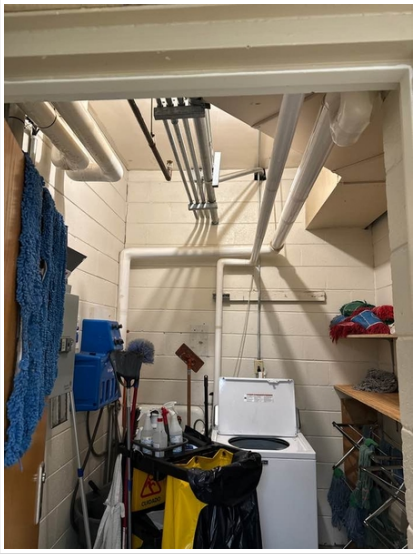
Bulk Sample (14)

Sample ID	45,46,47
Material Description (Ie. 12" White Floor Tile and Mastic)	TSI Straight
Sample Location	Building B
Material Type	TSI
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (15)

Sample ID	48,49,50

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	TSI Elbow
Sample Location	Building B
Material Type	TSI
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

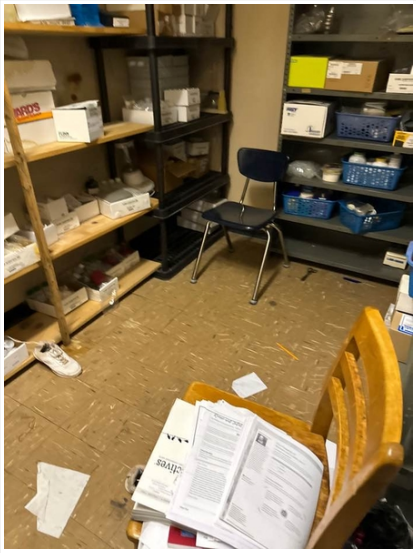
Bulk Sample (16)

Sample ID	51,52,53
Material Description (Ie. 12" White Floor Tile and Mastic)	Smooth Ceiling Tile
Sample Location	Building B
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	40 sqft

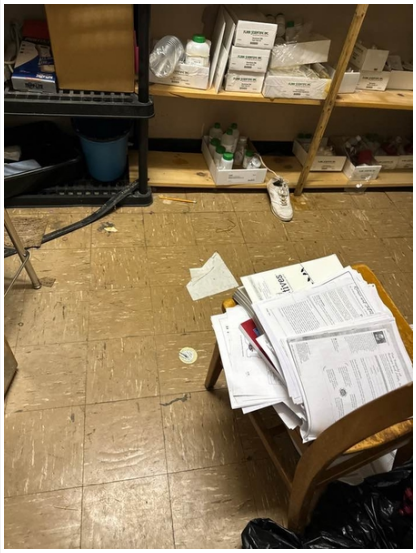
Asbestos Data Sheet

Multi Photo	

Bulk Sample (17)

Sample ID	54,55,56
Material Description (Ie. 12" White Floor Tile and Mastic)	9” Brown Floor Tile
Sample Location	Building B
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	

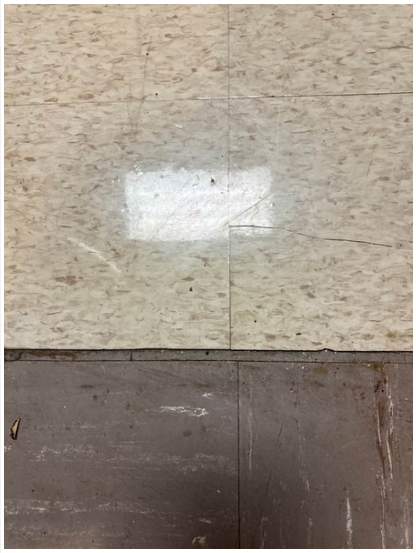
Asbestos Data Sheet

Bulk Sample (18)

Sample ID	57,58,59
Material Description (Ie. 12" White Floor Tile and Mastic)	Double Layered Floor Tile
Sample Location	Building B Second Floor
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Asbestos Data Sheet

Bulk Sample (19)

Sample ID	60,61,62
Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Worm Pin CT
Sample Location	Building G
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (20)

Sample ID	63,64,65

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	Drywall and JC
Sample Location	Building G
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

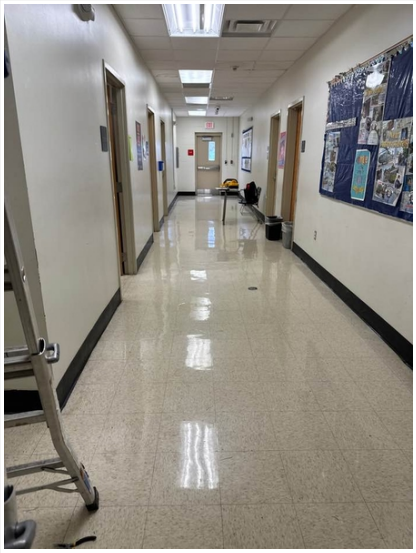
Bulk Sample (21)

Sample ID	66,67,69
Material Description (Ie. 12" White Floor Tile and Mastic)	Cove Base
Sample Location	Building G
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

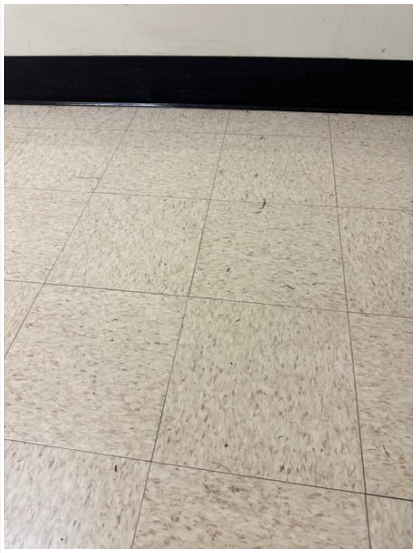
Asbestos Data Sheet

Multi Photo	

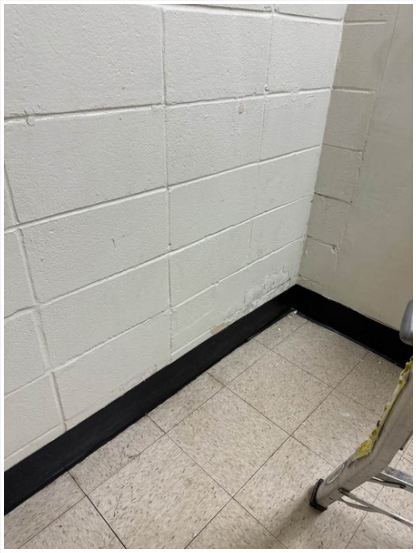
Bulk Sample (22)

Sample ID	69,701,71
Material Description (Ie. 12" White Floor Tile and Mastic)	12” Floor Tile
Sample Location	Building G
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Asbestos Data Sheet

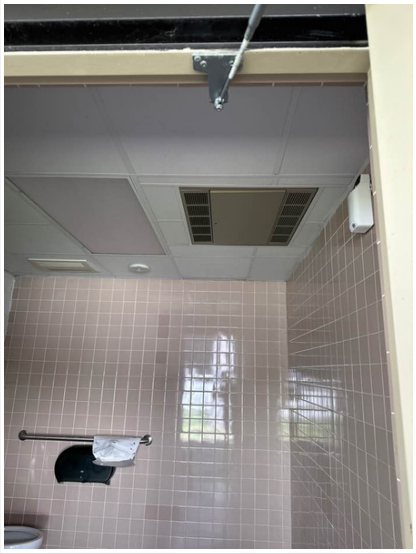
Bulk Sample (23)

Sample ID	72,73,74,75,76
Material Description (Ie. 12" White Floor Tile and Mastic)	CMU Wall Coating
Sample Location	Building G
Material Type	Surfacing
Friable?	Yes
Disturbance Potential	Mod
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (24)

Sample ID	77,78,79

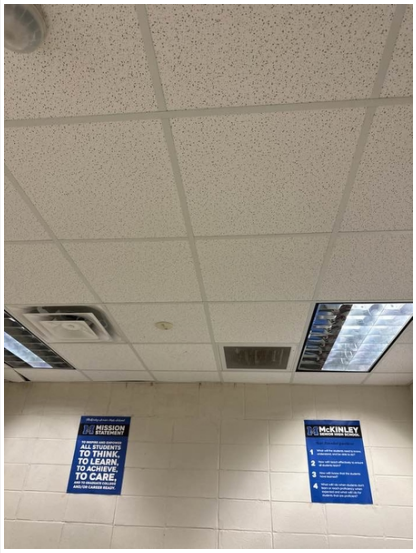
Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	Smooth Ceiling Tile
Sample Location	Building G
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	40 sqft
Multi Photo	

Bulk Sample (25)

Sample ID	80,81,82
Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Worm Pin CT
Sample Location	Building F
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

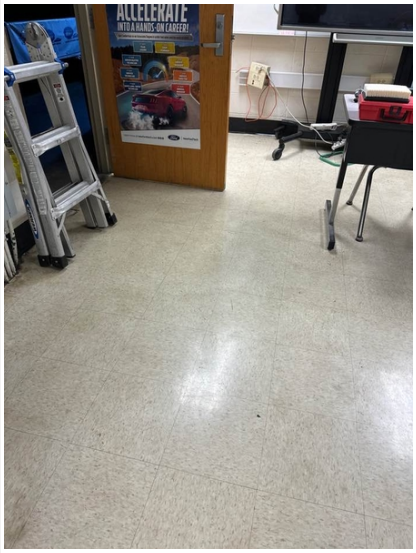
Asbestos Data Sheet

Multi Photo	
	

Bulk Sample (26)

Sample ID	83,84,85
Material Description (Ie. 12" White Floor Tile and Mastic)	Beige Floor Tile
Sample Location	Building F
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

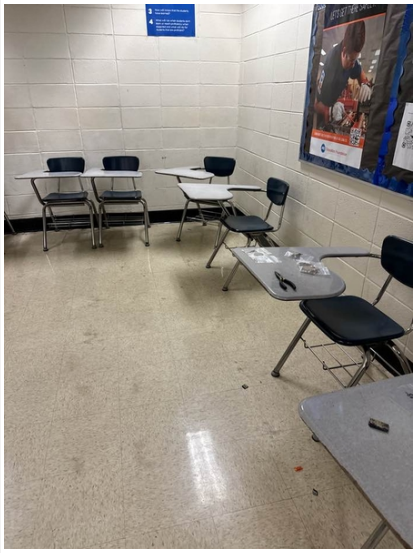
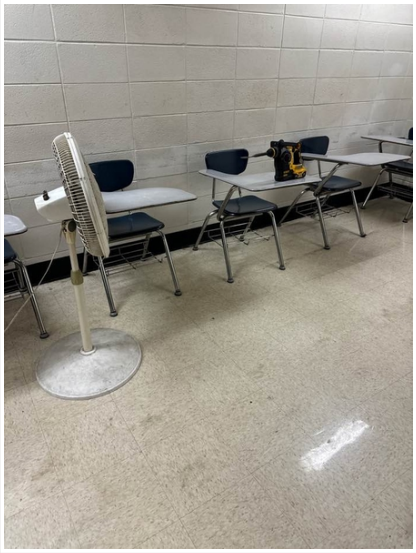
Asbestos Data Sheet

Multi Photo	

Bulk Sample (27)

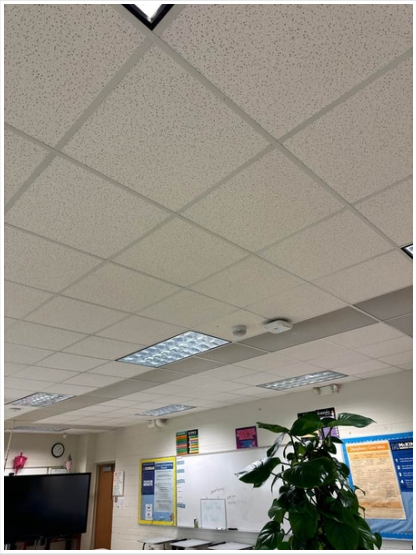
Sample ID	86,87,88
Material Description (Ie. 12" White Floor Tile and Mastic)	Cove Base
Sample Location	Building F
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	
	
	

Bulk Sample (28)

Asbestos Data Sheet

Sample ID	89,90,91
Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Worm Pin CT
Sample Location	Building C
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (29)

Sample ID	92,93,94
Material Description (Ie. 12" White Floor Tile and Mastic)	12” Floor Tile
Sample Location	Building C Rm 106
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

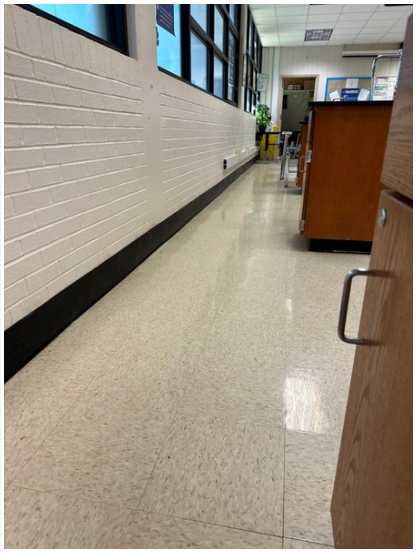
Asbestos Data Sheet

Multi Photo	

Bulk Sample (30)

Sample ID	95,96,97
Material Description (Ie. 12" White Floor Tile and Mastic)	Cove Base
Sample Location	Building C
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

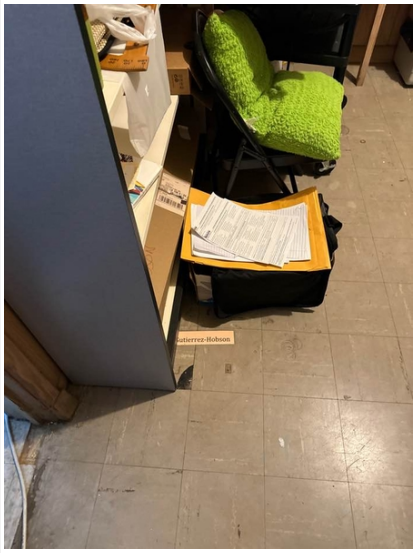
Asbestos Data Sheet

Multi Photo	
	

Bulk Sample (31)

Sample ID	98,99,100
Material Description (Ie. 12" White Floor Tile and Mastic)	Double Layered Floor Tile
Sample Location	Building C
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Bulk Sample (32)

Sample ID	101,102,103
Material Description (Ie. 12" White Floor Tile and Mastic)	Drywall and JC
Sample Location	Building C
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Bulk Sample (33)

Sample ID	104,105,106
Material Description (Ie. 12" White Floor Tile and Mastic)	Carpet Overlaying 9” FT and MT
Sample Location	Building C Library
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Project Notes

Date/Time	03-23-2024

Asbestos Data Sheet

Notes	9:00 Steve and Trent at office loading equipment into vehicle 9:15 Steve and Trent leaving office to pick up keys from Sharp Station 9:30 At Sharp Station checked out keys and heading to McKinley High for sampling 10:00 Steve and Trent on site beginning sampling 16:00 Steve and Trent off site, bringing keys back to Sharp Station 16:30 At Sharp Station, keys dropped off, Steve and Trent leaving Sharp Station for office. 17:00 Steve and Trent at office unloading equipment

Inspector Signature

Signature	

Date Submitted: 03-24-2024 04:09 PM
Submitted By: myenvironmental@gmail.com

Asbestos Data Sheet

General Information

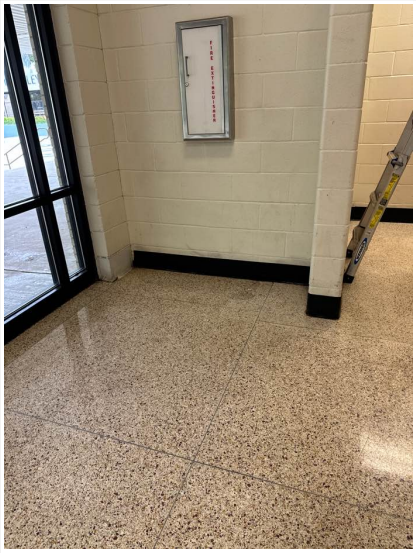
Project Number	24-088
Inspector	William S. Knight
Inspector AI Number	240959
Date/Time	03-24-2024
Client	EBRPSS
Location	McKinley High

Bulk Sample

Sample ID	EBR032424SK-107,108,109
Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Smooth CT
Sample Location	Building A Restrooms
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Asbestos Data Sheet

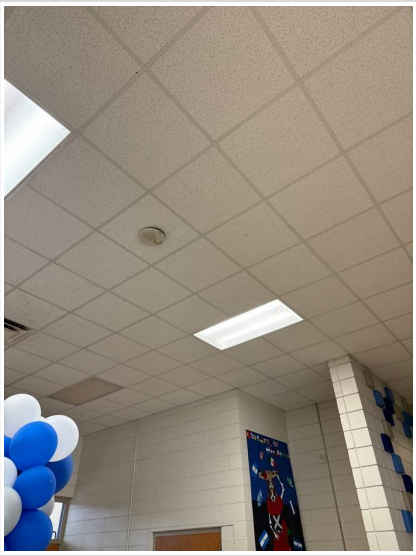
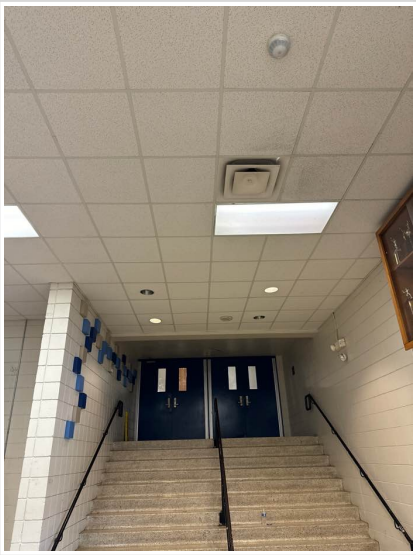
Bulk Sample (1)

Sample ID	110,111,112
Material Description (Ie. 12" White Floor Tile and Mastic)	Cove Base
Sample Location	Building A
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (2)

Sample ID	113,114,115

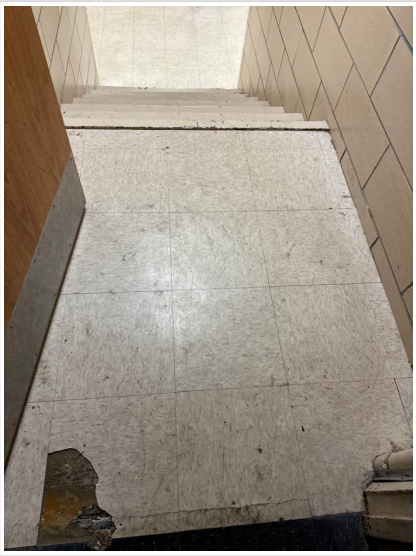
Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Worm Pin CT
Sample Location	Building A
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	
	

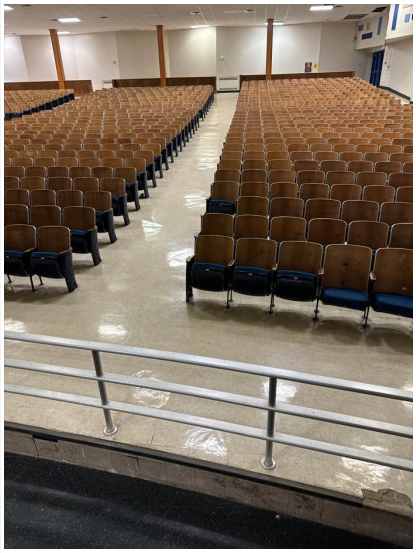
Bulk Sample (3)

Sample ID	116,117,118
Material Description (Ie. 12" White Floor Tile and Mastic)	Floor Tile on Floor Float
Sample Location	Building A

Asbestos Data Sheet

Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	
	

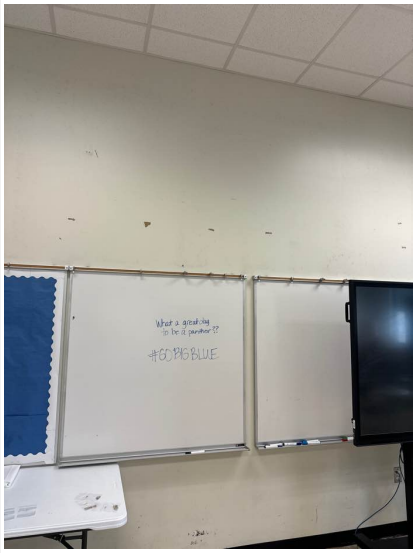
Asbestos Data Sheet

Bulk Sample (4)

Sample ID	119,120,121
Material Description (Ie. 12" White Floor Tile and Mastic)	Drywall and JC
Sample Location	Building A
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Bulk Sample (5)

Sample ID	122,123,124,125,126
Material Description (Ie. 12" White Floor Tile and Mastic)	Spray on Wall Texture
Sample Location	Building A
Material Type	Surfacing
Friable?	Yes
Disturbance Potential	Mod
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (6)

Sample ID	127,128,129

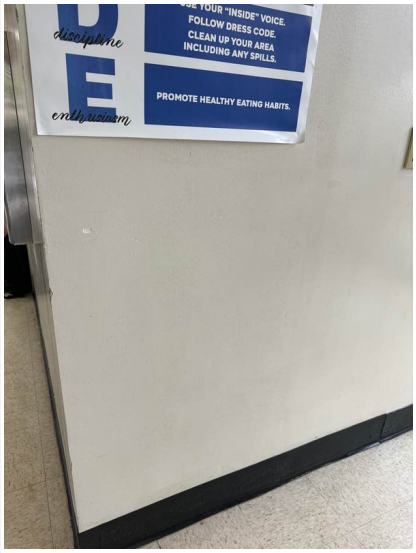
Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	Carpet
Sample Location	Building A
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

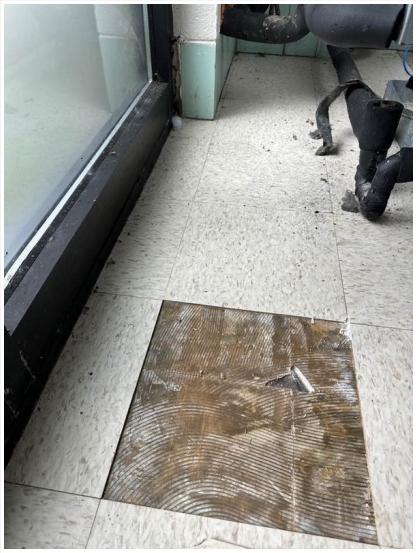
Bulk Sample (7)

Sample ID	130,131,132
Material Description (Ie. 12" White Floor Tile and Mastic)	Drywall and JC
Sample Location	Building D
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Bulk Sample (8)

Sample ID	133,134,135
Material Description (Ie. 12" White Floor Tile and Mastic)	Double Layered Floor Tile
Sample Location	Building D
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (9)

Sample ID	136,137,138

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	Cove Base
Sample Location	Building D
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (10)

Sample ID	139,140,141
Material Description (Ie. 12" White Floor Tile and Mastic)	Smooth CT
Sample Location	Building D
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

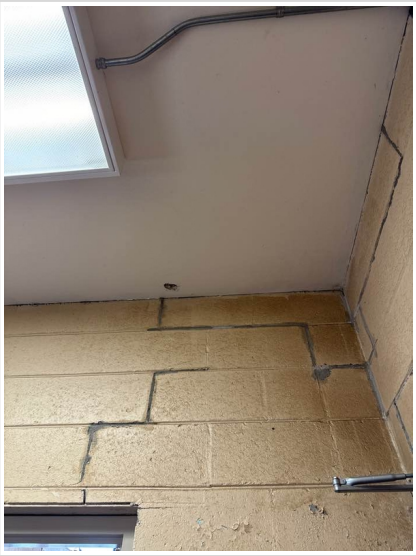
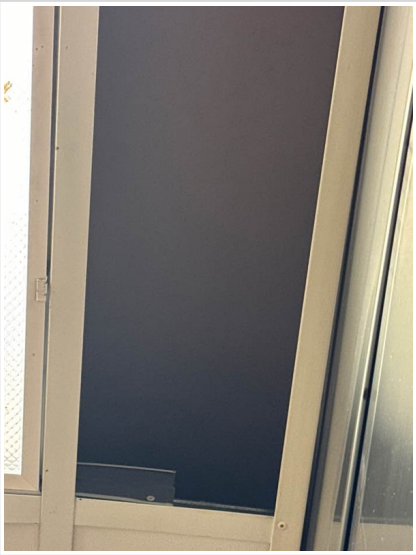
Bulk Sample (11)

Sample ID	142,143,144
Material Description (Ie. 12" White Floor Tile and Mastic)	Ceramic Wall Tile and Grout
Sample Location	Building D
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (12)

Sample ID	145,146,147,148,149

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	Plaster Ceiling
Sample Location	Building D
Material Type	Surfacing
Friable?	Yes
Disturbance Potential	Low
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	
	

Bulk Sample (13)

Sample ID	150,151,152
Material Description (Ie. 12" White Floor Tile and Mastic)	Ceramic Floor Tile and Grout
Sample Location	Building D

Asbestos Data Sheet

Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	

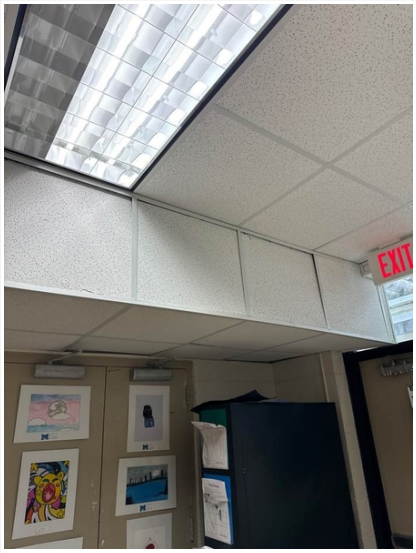
Bulk Sample (14)

Sample ID	153,154,155
Material Description (Ie. 12" White Floor Tile and Mastic)	Sink Coating
Sample Location	Building D
Material Type	Surfacing
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Bulk Sample (15)

Sample ID	156,157,158
Material Description (Ie. 12" White Floor Tile and Mastic)	2x2 Worm Pin CT
Sample Location	Building D
Material Type	Miscellaneous
Friable?	No
Disturbance Potential	Low
Condition	Good
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (16)

Sample ID	159, 160, 161

Asbestos Data Sheet

Material Description (Ie. 12" White Floor Tile and Mastic)	TSI Elbow
Sample Location	Building D
Material Type	TSI
Friable?	Yes
Disturbance Potential	Mod
Condition	Damaged
Quantity: (sf/lf)	T/o
Multi Photo	

Bulk Sample (17)

Sample ID	162,163,164
Material Description (Ie. 12" White Floor Tile and Mastic)	TSI Straight
Sample Location	Building D
Material Type	TSI
Friable?	Yes
Disturbance Potential	Mod
Condition	Damaged
Quantity: (sf/lf)	T/o

Asbestos Data Sheet

Multi Photo	

Project Notes

Date/Time	03-24-2024
Notes	8:30 Steve and Trent at office loading equipment into vehicle and reviewing notes 9:15 Steve and Trent leaving office to pick up keys from Sharp Station 9:30 Steve and Trent at Sharp Station, keys checked out. Heading to McKinley High 9:45 Steve and Trent at McKinley High unloading equipment from vehicle and continuing sampling 14:45 Sampling finished Steve and Trent leaving McKinley High and bringing samples to the lab 15:15 At lab samples dropped off, heading to Sharp Station to drop off keys. 15:30 At Sharp Station keys dropped off. Leaving Sharp Station for office 16:00 Steve and Trent at office unloading equipment

Inspector Signature

Signature	

Appendix 3:
Accreditation Certificate

STATE OF LOUISIANA

DEPARTMENT OF ENVIRONMENTAL QUALITY

certifies that

Trenton T Knight

Has complied with all requirements of the Louisiana Department of Environmental Quality and is authorized to perform the duties of

Asbestos Inspector

Accreditation No. MI207108

AI No. 207108

Date of Issuance May 31, 2023

Expiration May 22, 2024

Failure to comply with all applicable provisions of La. R.S. 2025.E. (1)(a) and La. R.S. 2025.F. (2)(a) may result in civil and/or criminal enforcement actions by the State.

Charles Finley

Permit Support Services Division
Office of Environmental Services

STATE OF LOUISIANA

DEPARTMENT OF ENVIRONMENTAL QUALITY

certifies that

William S Knight

Has complied with all requirements of the Louisiana Department of Environmental Quality and is authorized to perform the duties of

Asbestos Inspector

Accreditation No. **OI240959**

AI No. **240959**

Date of Issuance **October 20, 2023**

Expiration **October 18, 2024**

Failure to comply with all applicable provisions of La. R.S. 2025.E. (1)(a) and La. R.S. 2025.F. (2)(a) may result in civil and/or criminal enforcement actions by the State.

Charles Finley

Permit Support Services Division
Office of Environmental Services

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Is hereby granting a Louisiana Environmental Laboratory Accreditation to

CA Laboratories LLC
12232 Industriplex Blvd Ste 32
Baton Rouge, Louisiana 70809

Agency Interest No. 165918
Activity No. ACC20230001

According to the Louisiana Administrative Code, Title 33, Part I, Subpart 3, LABORATORY ACCREDITATION, the State of Louisiana formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed in the attachment.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part I, Subpart 3 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part I. Please contact the Department of Environmental Quality, Louisiana Environmental Laboratory Accreditation Program (LELAP) to verify the laboratory's scope of accreditation and accreditation status.

Accreditation by the State of Louisiana is not an endorsement or a guarantee of validity of the data generated by the laboratory. Accreditation of the environmental laboratory does not imply that a product, process, system, or person is approved by LELAP. To be accredited initially and maintain accreditation, the laboratory agrees to participate in two single-blind, single-concentration PT studies, where available, per year for each field of testing for which it seeks accreditation or maintains accreditation as required in LAC 33:I.4711.

Tonya Landry
Administrator
Public Participation and Permit Support Division

Issued Date: 6/28/2023

Effective Date: July 1, 2023
Expiration Date: June 30, 2024
Certificate Number: 03069

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY

CA Laboratories LLC
AI Number: 165918
Activity No. ACC20230001
Expiration Date: June 30, 2024

Effective Date: July 1, 2023

12232 Industriplex Blvd Ste 32, Baton Rouge, Louisiana 70809

Certificate Number: 03069

Air Emissions

Analyte	Method Name	Method Code	Matrix	Fields of Accreditation
100173 - Asbestos by Phase Contrast Microscopy	NIOSH 7400 (A Rules)	899	State	LA
100171 - Asbestos by Transmission Electron Microscopy	EPA Level II Contract #68-02-3266	2020	ISO 17025	NVLAP
100131 - Airborne Asbestos	40 CFR Part 763, Subpart E, Appendix A (Mandatory TEM)	2062	ISO 17025	NVLAP
100172 - Asbestos by Polarized Light Microscopy	EPA 600/R-93/116	10294583	ISO 17025	NVLAP
100230 - Lead in Airborne Dust	NIOSH 7082, Rev.2	90012230	State	LA

Non Potable Water

Analyte	Method Name	Method Code	Matrix	Fields of Accreditation
NONE	NONE	NONE	NONE	NONE

Solid Chemical Materials

Analyte	Method Name	Method Code	Matrix	Fields of Accreditation
100095 - Asbestos in Bulk Insulation	40 CFR 763, Subpart E, Appendix E (Section 1.PLM)	2004	ISO 17025	NVLAP
1466 - Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311	10118806	State	LA
1075 - Lead	EPA 7000B	10157707	State	LA
100231 - Lead in Paint	EPA 7000B	10157707	State	LA
100233 - Lead in Soil	EPA 7000B	10157707	State	LA
100232 - Lead in Wipes	EPA 7000B	10157707	State	LA
100172 - Asbestos by Polarized Light Microscopy	EPA 600/R-93/116	10294583	ISO 17025	NVLAP
100171 - Asbestos by Transmission Electron Microscopy	EPA 600/R-93/116	10294583	ISO 17025	NVLAP

Biological Tissue

Analyte	Method Name	Method Code	Matrix	Fields of Accreditation
NONE	NONE	NONE	NONE	NONE

Clients and Customers are urged to verify the laboratory's current certification status with the Louisiana Environmental Laboratory Accreditation Program.

GEOTECHNICAL EXPLORATION REPORT

MCKINLEY HIGH SCHOOL
VARIOUS IMPROVEMENTS
BATON ROUGE, LA

FOR

DOMAIN ARCHITECTS
BATON ROUGE, LA

GULF SOUTH ENGINEERING AND TESTING FILE NO. 25-021

April 21, 2025

GULF SOUTH
ENGINEERING AND TESTING, INC.

ESTABLISHED 2011
GEOTECHNICAL ENGINEERING AND CONSTRUCTION MATERIALS TESTING

GULF SOUTH
ENGINEERING AND TESTING INC
Corporate Office | 15 Veterans Memorial Blvd | Kenner LA 70062
Ascension Parish | 3121 S. Darla Ave | Gonzales LA 70737
North LA Office | 440 E. Washington St | Shreveport LA 71104
Mississippi Office | 1437 Old Square Rd Unit F | Jackson MS 39236
www.gulfsoutheng.com

April 21, 2025

Domian Architects
11130 Industriplex Blvd.
Baton Rouge, LA 70809

Attn: Ms. Ingrid Williams
E-mail: iwilliams@domainbr.com

Re: Geotechnical Exploration Report
McKinley High School
Various Improvements
Baton Rouge, LA
Gulf South Engineering & Testing File No. 25-021

Dear Ingrid,

Please find attached our geotechnical exploration report that was completed for the referenced project. We appreciate the opportunity to serve your geotechnical needs. Please contact us should you have any questions.

Sincerely,
GULF SOUTH ENGINEERING AND TESTING, INC.

CHAD M. POCHE, P.E.
Executive Vice President

BRYSON S. BEARD, E.I.
Geotechnical Engineer

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GEOTECHNICAL EXPLORATION REPORT

MCKINLEY HIGH SCHOOL
VARIOUS IMPROVEMENTS
BATON ROUGE, LA

GULF SOUTH ENGINEERING AND TESTING FILE NO. 25-021

1.0 INTRODUCTION & LIMITATIONS

This report contains the results of a geotechnical exploration made at the subject site. Instructions to proceed with the exploration were received from Domain Architects (Client) via approval of our proposal dated February 18, 2025.

The study included drilling soil test borings and the performance of soil mechanics laboratory tests to evaluate the soil's physical characteristics. Engineering analyses were made and based on the field and laboratory test data to develop recommendations for the project.

The analyses and recommendations presented in this report are based on the provided project information and the results of the exploration. While it is not likely that conditions will differ significantly from those observed during the field exploration it is always possible that variations can occur away from the borehole location(s).

If it becomes apparent during construction that subsurface conditions differing significantly from those observed in our boring(s) are encountered, Gulf South should be notified. Also, should the nature of the project change or should any of the stated assumptions be inaccurate, the recommendations provided in this report should be re-evaluated.

This report has been prepared for the exclusive use of our client. The recommendations provided in this report are site specific and are not intended for use at any other site or for any other project. This report provides recommendations for design and construction and should not be used as construction specifications.

Gulf South considers the materials testing and onsite inspection during construction an extension of our geotechnical exploration and a key component to ensuring the recommendations provided in this report are followed. For this type of project, these services may consist of earthwork testing and monitoring, vibration monitoring, concrete testing and inspection, and steel inspection. Gulf South should be retained to provide the construction inspection services for this project.

2.0 SOIL BORINGS

Six (6) undisturbed soil borings were drilled to depths of 40 feet (Boring B-1), 30 feet (Boring B-2) and 20 feet (Borings B-3 through B-6) below the pavement/ground surface on March 11 and 12, 2025. The borings were drilled with a truck mounted drilling rig at the designated locations as approximately shown on Figure No. 1.

Undisturbed sampling was performed continuously to the approximate 12 foot depth and then on approximate 5 foot centers in all cohesive or semi-cohesive materials with a three inch diameter thin wall tube sampler. The samples were extruded in the field, representative portions of each sample were trimmed and placed in moisture proof containers, the samples were properly labeled, and secured for transport to the laboratory.

When cohesionless material was encountered or when soils could not be adequately sampled by undisturbed methods, the Standard Penetration Test was performed. This test consists of driving a two-inch diameter split spoon sampler a total of approximately 18 inches with a 140 lb. hammer falling 30 inches. The number of blows required to drive the sampler per 6 inch increment is recorded and gives an indication of the density of the material. The blows per foot shown on the boring log are the total of the blow counts for the final 12 inches of penetration.

3.0 LABORATORY TESTING

Soil mechanics laboratory tests were performed on samples obtained from the borings. The testing consisted of natural moisture content, unit weight, Atterberg limits, and unconfined/tri-axial compression strength testing. The results of the laboratory tests are shown on the soil boring logs provided in the Appendix of this report.

4.0 SUBSOIL CONDITIONS

4.1 Subsoil Description

Reference to the borings shows there is approximately 4-inches of concrete over a clay and silty clay base from the ground surface to the approximate 4 foot depth. Medium stiff to stiff clay follows to the deepest boring's termination depth of 40 feet. A soil design profile is provided on Figure No. 2

4.2 Groundwater

At the time of making the borings, groundwater was not encountered before wet rotary methods were implored at the approximate 12 foot depth or before borehole abandonment at the approximate 20 foot depth below the ground/pavement surface.

These observations were made during a short period of time and groundwater may not have become fully realized at the time of observation. Groundwater should be expected within the upper 15 to 20 feet and can fluctuate with seasonal precipitation, drainage, and prolonged drought. If the depth to groundwater is important to construction, it should be measured at that time.

5.0 FURNISHED INFORMATION AND FOUNDATION RECOMMENDATIONS

Furnished information indicates various improvements at McKinley High School are planned in Baton Rouge, LA. We understand the improvements will consist of a new 2-story arts and media center, 2-story connector walkway, and a cafeteria addition. The arts media center will be approximately 11,200 square feet in plan dimensions, the connector will be approximately 2,000 square feet, and the cafeteria expansion will be approximately 1,200 square feet. We understand that up to 2 feet of fill may be placed to raise the site.

In general, the near surface silty clay and clay soils encountered in the borings are borderline for support of the proposed structure using conventional shallow foundations. If shallow foundations are used, footings should be placed to bear at least 2 feet below the ground surface. Should the values provided in this report for bearing and settlement not be tolerable, deep foundations should be used for support. If any of the proposed structures are to be

connected structurally to any existing buildings, they should be supported by a deep foundation system to mitigate differential settlement.

Alternatively, ground improvement methods (e.g. GeoPiers, rigid inclusions, etc.) may be a feasible, cost-effective option to support the proposed structures. Experienced contractors should be consulted for design and feasibility of ground improvement methods.

Structural analyses and the structural adequacy of the foundations are outside our scope of work for the project. Utilities to and from the structure should be attached to the slab using suitable hangers and flexible connections.

Preliminary laboratory test results indicate the near surface soils appear to have a slight shrink/swell potential. Care should be taken during and after construction to limit activities that could affect moisture within the soils below and around the foundations. By precluding surface waters from saturating the soils, the resulting volumetric movements will be minimized. In this regard, good roof and surface drainage should be assured with positive collection and runoff of these waters away from the foundations.

6.0 SHALLOW FOUNDATIONS

6.1 Allowable Soil Bearing Capacity

We estimate an allowable soil bearing capacities of 1,000 lbs. per sq. ft. (psf) and 1,300 psf are available for design of shallow strip and square footings, respectively. These allowable soil bearing capacities assume the footings are seated in firm soils as described and encountered in our borings.

Foundation excavations should be thoroughly inspected to assure that the footings are seated in firm and well drained soil. The allowable soil bearing capacities contain a factor of safety of at least 3.0 against failure but do not preclude settlements, as will be discussed.

6.2 Estimated Settlement

Fill. We have calculated the estimated long-term settlement of the ground surface due to the placement of an average of 2 feet of fill above the current ground surface over an approximate 105 ft. by 105 ft. area to be on the order of 1 ½ to 2 inches. Our analyses are based on a unit weight of 110 pounds per cubic foot (pcf) for the fill material. Due to the magnitude of estimated settlement, we recommend the fill be placed onsite as far in advance

as possible so that the majority of settlement of the subsurface soils can occur prior to construction. Settlement due to fill placement should be quick (within 3 months of placement). Additional fill will induce further settlement.

Footings. Settlement analyses were made using applied pressures equal to 100% of the allowable soil bearing values. Long-term settlement of square footings no larger than 6 feet in width and strip footings no wider than 3 feet in width is estimated to be on the order of 1 inch (or less). Settlement will increase with the size of the footing and/or loading and if larger footings are needed for support, revised settlement analyses should be made. Footing settlement values should be added to the fill and slab settlement values to calculate total settlement.

Slab. Long term consolidation settlement at the center of an approximate 105 ft. by 105 ft. flexible slab is estimated to be on the order of 1 inch (or less) using a uniform loading of up to 150 psf. The estimated settlement should occur over most of the loaded area while the edge settlements should be approximately one–half (1/2) of the center settlement and may only occur over a limited range near the perimeter. Slab settlement values should be added to the fill and footing settlement values to calculate total settlement.

In view of the magnitude of the estimated settlement and to bridge any undetected soft or loose areas, good rigidity should be assured in the foundations to minimize the effects of differential settlements.

Adequate steel reinforcement should be designed and included within the foundations. If the estimated settlements for shallow footings are considered prohibitive, deep foundations should be used to support the structures.

6.3 Site Preparation and Fill Materials

Prior to construction and subsequent to clearing the site, the foundation areas should be proof rolled using a heavy wheeled vehicle. Any “soft” soils noted during the proof rolling or observed within excavations should be removed to a depth where stiffer soils are encountered or to a minimum depth of 2 feet. Excavated soils and organic matter should be replaced with controlled-compacted structural fill. If fill is needed, the area should be brought to grade using a clean, select, fill material free from debris or organic matter.

A cohesionless soil described as clean sand with less than 10% passing the U.S. No. 200 Sieve may be used for fill. Alternatively, a lean, silty or sandy clay (CL - USCS Classification) may be used for fill. The clay fill should have a Liquid Limit of less than 40 and a Plasticity Index (PI) of less than 20.

6.4 Fill Placement and Compaction

Fill should be placed in 10 to 12 inch loose lifts. Minimum compaction criteria of a dry density at least equal to 95% of its maximum, as determined by the Standard Proctor compaction test (ASTM D698), should be used for fill that will support foundations.

6.5 Vibrations

Vibrations due to construction activities should be expected and they should be monitored during all construction activities. In general, vibrations should be limited to 0.25 inch/sec. (average peak particle velocity) at all existing nearby sensitive structures. Construction should be stopped if peak values exceed 0.5 in./sec, and construction methods be re-evaluated.

7.0 DEEP FOUNDATIONS

If shallow foundations are not feasible, a deep foundation system consisting of driven, treated, timber piles (Class 5 or Class B) or drilled, cast-in-place, concrete shafts should be used to support the structure. All loads (e.g. column, wall, and slab) from the structure should be supported on piles/shafts if deep foundations are selected.

7.1 Pile/Shaft Load Capacities

Analyses were made to estimate the load carrying capacity of several types and lengths of treated timber piles (ASTM D-25; Class 5 and Class B) and drilled, cast-in-place, concrete shafts. Piles/shafts installed for this project will receive their support primarily through skin friction.

Estimated pile/shaft load capacities are provided on Figure Nos. 3 through 6. The given pile/shaft lengths are as measured from the existing ground surface and contain factors of safety of 2.0 and 3.0 against failure in compression and tension, respectively. Pile/shaft lengths above the ground surface should be added to the lengths provided on Figure Nos. 3 through 6 to obtain a total pile/shaft length.

7.2 Shaft Installation

Based on the soil and groundwater observations made during the field exploration, casing or slurry displacement techniques do not appear necessary during the installation of drilled shafts at the site. However, we recommend an experienced drilled shaft contractor should be contacted to determine the proper installation techniques in this area.

Slurry, if used, should be introduced within 5 feet of starting the shaft, regardless if casing is used in conjunction with the slurry installation. The contractor performing the slurry displacement method should be qualified and experienced in this method of installing shafts.

The concrete for the shafts should be placed as soon as possible after the excavations are completed. No excavation should be allowed to remain open for more than 1 hour. The concrete should be tremied into place by pumping.

The concrete mix (water to cement ratio) should be proportioned to achieve the necessary design strength while allowing a slump of 6 to 8 inches (or approved mix design) during concrete placement. There have been problems with both casing withdrawal and shaft integrity and capacity when concrete with a slump of less than 6 inches was used. A program of on-site quality control by a qualified geotechnical technician is strongly recommended during shaft installation.

7.3 Drag Load (Downdrag)

We understand that up to 2 feet of fill may be placed over approximately 11,000 sq. ft. to raise the site. When fill is placed on the site, the underlying compressible soils consolidate, resulting in surface settlement. As the compressible soils consolidate, “negative skin friction” or downdrag can be imparted on piles. This can result in a load that is additive to structural loads on the piles/shafts and will increase settlement of the piles and structure. Drag load is dependent on the thickness of fill, compressibility of the soils, time-rate of consolidation, and pile/shaft size and length.

The provided pile/shaft capacities on Figure 4 and 6 account for down drag forces for up to 2 feet of fill. We recommend fill be placed onsite as far in advance of construction as possible. If the fill can sit onsite for a minimum of 6 months, the majority of downdrag forces will be mitigated and the capacities provided on Figures 3 and 5 may be used. Gulf South should be notified if

more than 2 feet of fill is to be placed to raise the site for the provided pile/shaft capacities may need to be re-evaluated.

7.4 Group Effect

The effects of pile/shaft grouping on single pile/shaft load capacities is dependent on pile/shaft spacing, pile/shaft lengths, and soil characteristics throughout the pile/shaft length and below the pile/shaft tip. Assuming a minimum center to center spacing of 3 ft., group effect should be unimportant for pile/shaft clusters of up to 6 piles. Group effect may become important for larger clusters and should be evaluated when actual pile/shaft layouts are known using the criteria provided on Figure No. 7.

7.5 Estimated Settlement

Settlement of pile/shaft supported footings and slabs constructed in single, widely, spaced rows, or in clusters of up to 4 to 6 piles/shafts is estimated to be 1 inch or less for the provided capacities and tip depths. These values assume piles/shafts are driven to the specified tip depths and not loaded greater than the stated allowable carrying capacities.

7.6 Pile Driving

In general, driving of treated timber piles having 6 to 7 inch diameter tips and 8 to 12 inch diameter butts (Class 5 and Class B piles) should be limited to the rate of 25 blows per foot using a hammer energy rating of 15,000 ft-lbs. (e.g. Vulcan No. 01 hammer or equivalent).

Predrilling for pile installation does not appear to be necessary. If necessary, predrilling should be made with a bit that is no larger than 85% of the pile's tip diameter and should not penetrate to within 10 feet of the pile's design tip depth. An experienced pile driving contractor should be consulted. Predrilling may also be used to reduce vibrations.

7.7 Probe Piles/Shafts and Pile/Shaft Load Tests

It is recommended that probe type piles/shafts be installed at the site to establish installation characteristics and pile/shaft lengths. The probe piles/shafts should be of the same type and size as the job piles and should be installed with the same equipment and techniques that will be used to install the job piles.

We recommend the probe piles/shafts be allowed to set for a period of 14 days and at least one of the probe piles/shafts be tested to failure in

accordance with ASTM D 1143. Gulf South should be retained to evaluate and verify the estimated pile/shaft load capacities.

8.0 PAVEMENTS

Flexible (asphalt) or rigid (concrete) surface paving for parking areas will be constructed at the site. Based upon our understanding of the proposed facility usage, we anticipate that the paved areas will be used primarily by automobiles and light trucks with an occasional passage of a delivery type vehicle and/or garbage collection vehicle. The recommendations provided are for a 20 year design E18 value of 275,000. Our design does not account for construction traffic. Concrete paving should be used at any dumpster pads.

The subgrade should first be prepared in accordance with the recommendations of this report. Base course and pavement materials should conform to the requirements of LA DOTD Standard Specifications, latest edition.

8.1 Flexible Pavement

For flexible pavements, an asphalt surface thickness of at least three (3) inches is recommended for parking areas. The thickness should be increased to at least three (5) inches for driveways. The base course beneath the asphalt surface should consist of at least twelve (12) inches of crushed stone. A geotextile paving fabric is recommended between base materials and the natural subgrade.

We recommend the asphalt courses be placed as late as possible in the project so that the effects of settlement can be reduced. Proper drainage during and after construction is essential to the success of flexible asphaltic pavement systems.

Flexible pavements are susceptible to failures due to poor surface and subsurface drainage. Asphalt pavement generally requires surface sealing with a thin (½ inch) hot mix asphaltic concrete or an asphalt slurry seal at a 4 to 5 year interval to maintain a good pavement system because the local climate tends to weaken and oxidize the surface.

8.2 Rigid Pavement

For rigid pavements, the pavement surface for parking areas should consist of at least five (5) inches of concrete. The pavement surface for driveways, including dumpster pads, should consist of at least seven (7) inches of concrete.

Upon completion of subgrade preparation, a minimum six (6) inch thick layer of sand is recommended for the base course. A geotextile fabric should be placed beneath the pavement joints, at a minimum.

The provided concrete thickness assumes an ultimate flexural strength for the concrete of at least 600 psi or 4,000 psi compressive strength. Expansion and construction joints should be doweled or keyed for good transfer of load and should be well sealed to prevent the intrusion or surface waters into the pavement base and natural subgrade. The use of wire mesh is left up to the designer.

8.3 Pavement Materials and Construction

Poor site conditions will develop unless good drainage is provided throughout the project duration. Proper site drainage should be maintained prior to, during, and after construction. Providing drainage during the construction process will facilitate construction by reducing the potential for compaction problems. Maintaining the drainage after construction will improve the life of the pavement by avoiding water softening of the foundation soils.

Prior to pavement construction, the site should be stripped of all debris, vegetation, etc., and proof rolled with a heavy wheeled vehicle to detect any "soft" spots. Any soft spots should be undercut at least 1 foot and backfilled with a structural fill. The geotextile fabric should be a nonwoven fabric with an apparent opening size (AOS) smaller than a U.S. No. 70 sieve.

The sand or stone should be compacted to a dry density at least equal to 95 percent of its maximum as determined by the Modified Proctor compaction test (ASTM D1557), or to a minimum relative density of 75 percent in accordance with ASTM D4253 and D4254. In-place density measurements should be taken to assure that this degree of compaction is achieved. The base may be placed and compacted in maximum 8 inch loose lifts and it should meet LA DOTD specifications for base course.

The methods, means, and sequence of construction are the responsibility of the contractor. It should be noted that our recommendations regarding concrete and material thicknesses are based on the assumed traffic loading conditions. Appropriate measures should be taken by the contractor to assure the integrity and performance of the pavements during and after construction.

9.0 CLOSING

Gulf South is available to answer any questions you may have concerning this report. Should additional analyses be required or requested, additional fees may be necessary.

As previously discussed, Gulf South considers the materials testing and onsite inspection during construction an extension of our geotechnical exploration. Gulf South should be retained to provide the construction inspection services.

The issuance of this report completes the geotechnical exploration scope and Gulf South's involvement on the project. Retaining Gulf South as a vital member of the design team can add considerable value. Over the next few months, the project will incur many changes, challenges, and opportunities – all of which will occur without our knowledge and in some cases render our recommendations compromised or irrelevant. Gulf South's additional involvement will be a small price to pay for the peace of mind that any foundation, earthwork, and paving components of the project are fully integrated during design, resulting in potential cost savings and efficient construction. Please consider including Gulf South as a full member of your design team and throughout the project duration.

We appreciate the opportunity to provide this report and look forward to working with you again in the future.

Sincerely,

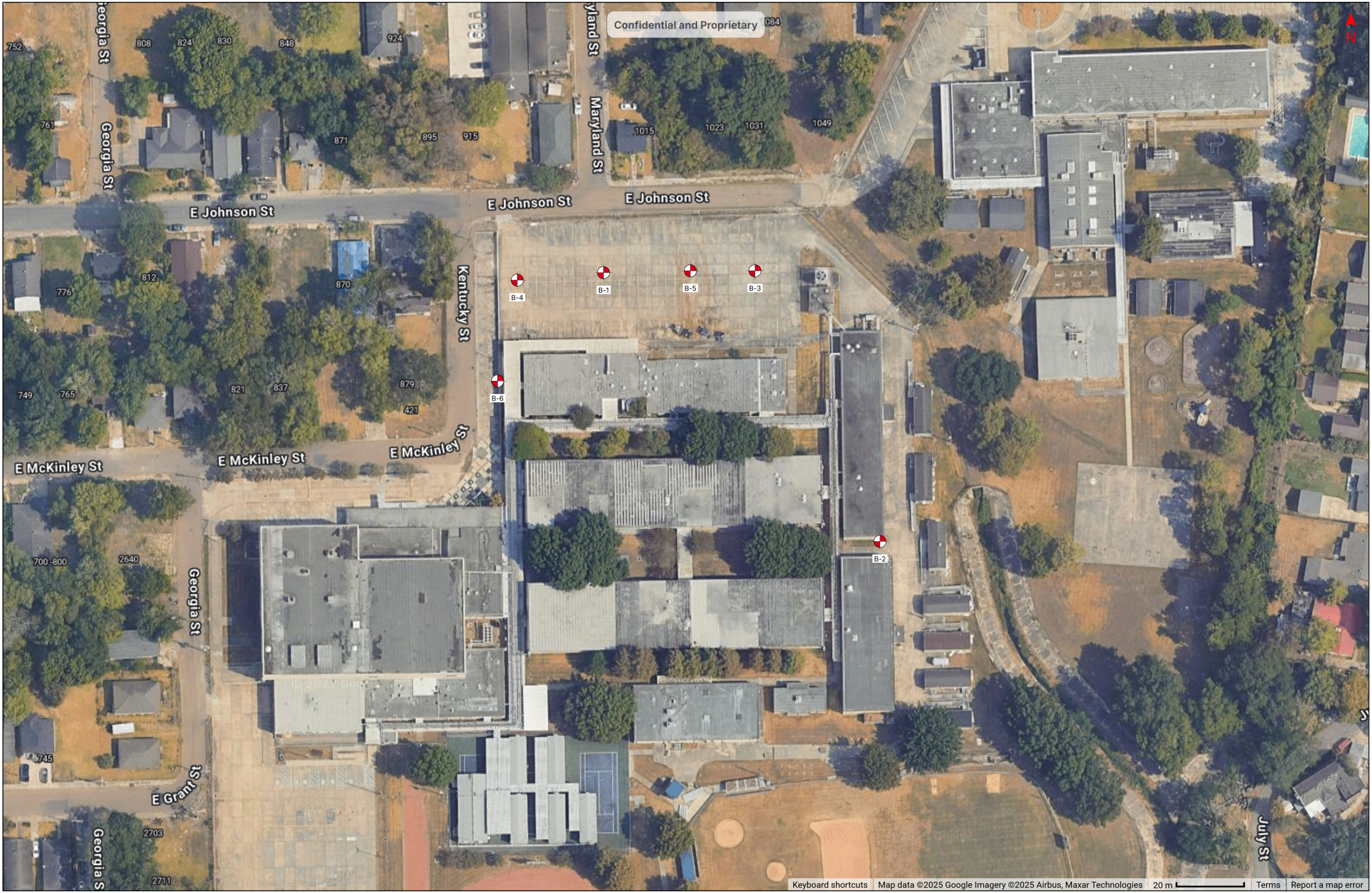
GULF SOUTH ENGINEERING AND TESTING, INC.

CHAD M. POCHE, P.E.
Executive Vice President

STATE OF LOUISIANA
CHAD M. POCHE
License No. 27667
PROFESSIONAL ENGINEER

BRYSON S. BEARD, E.I.
Geotechnical Engineer

FIGURES



GULF SOUTH
ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

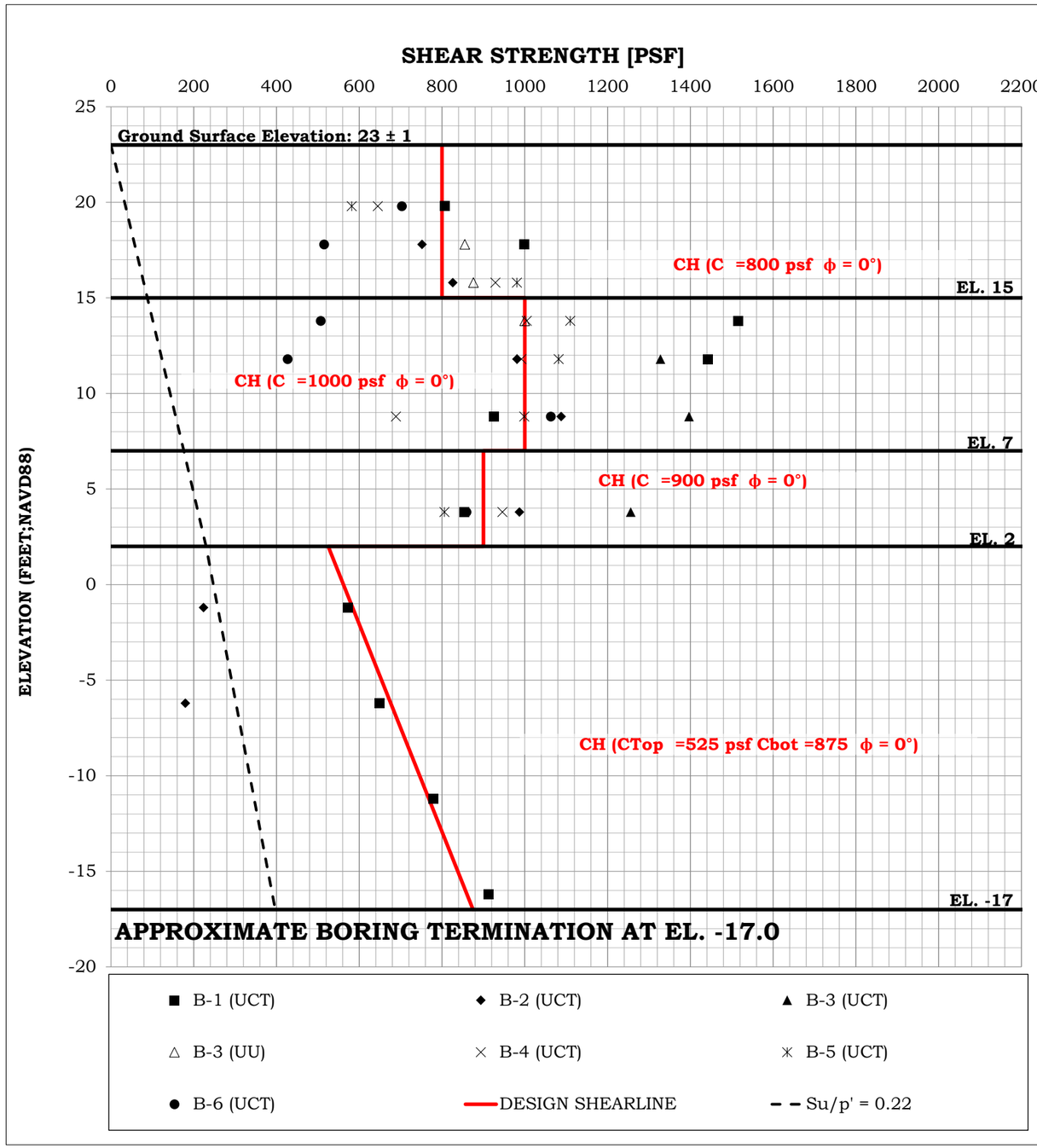
FIGURE NO. 1

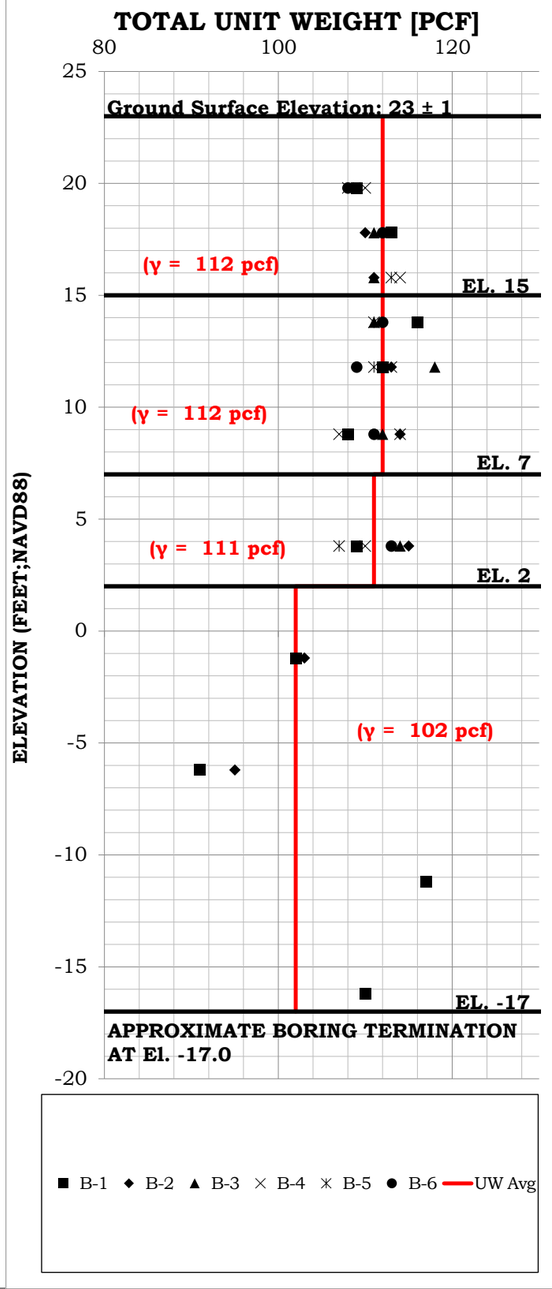
PROJECT
Name: McKinley High School - Various Improvements
Number: 25-021

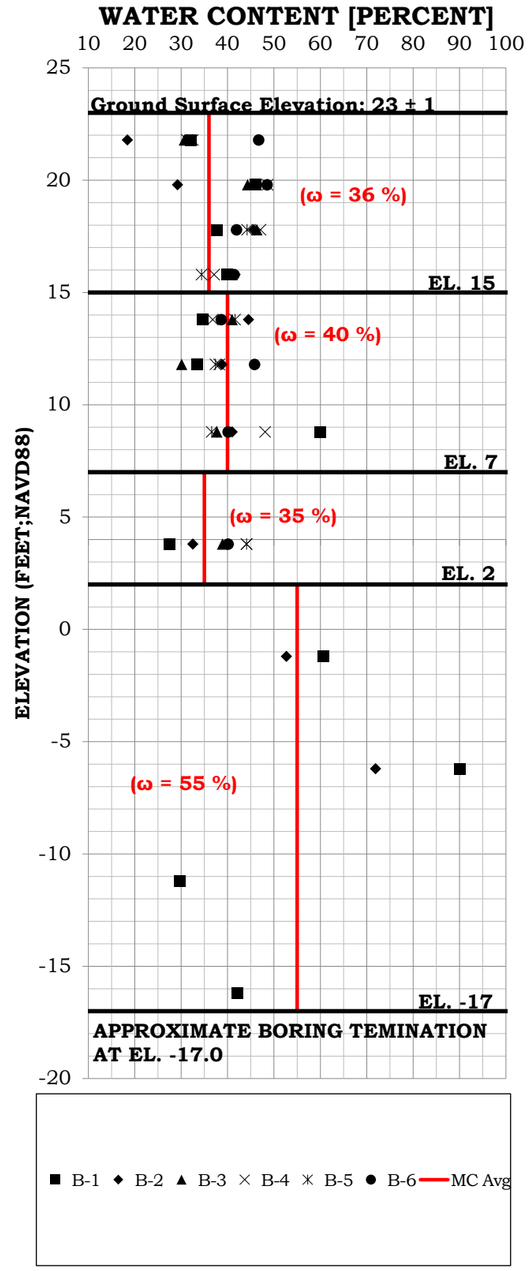
LOCATION
30.424194, -91.173811
Baton Rouge, LA

SYMBOL KEY
Soil Boring

DESIGN SHEARLINE FOR MCKINLEY HIGH SCHOOL - VARIOUS IMPROVEMENTS
(BORINGS B-1 THROUGH B-6)







Gulf South File 25-021	GULF SOUTH ENGINEERING AND TESTING, INC. Geotechnical & Materials Consultants	**McKinley High School Various Improvements Baton Rouge, LA**	**For Domain Architects Baton Rouge, LA**	**Soil Design Parameters**
				FIGURE NO. 2

GEOTECHNICAL EXPLORATION

MCKINLEY HIGH SCHOOL
VARIOUS IMPROVEMENTS
BATON ROUGE, LA

GULF SOUTH ENGINEERING AND TESTING PROJECT NO. 25-021

ALLOWABLE PILE LOAD CAPACITIES
(FOR UP TO 2 FEET OF FILL AND ASSUMES NO DOWNDRAG FORCES)

DRIVEN, TREATED, TIMBER PILES

PILE TYPE AND SIZE (ASTM D25)	PILE TIP EMBEDMENT BELOW GROUND SURFACE IN FEET	ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES IN TONS COMPRESSION FACTOR OF SAFETY = 2 TENSION FACTOR OF SAFETY = 3	
		COMPRESSION	TENSION
6-Inch Tip Diameter (8-inch Butt Diameter) Class 5 Timber Pile	20 25 30 35 40	8 10 12 14 16	5 7 8 9 10
7-Inch Tip Diameter (12-inch Butt Diameter) Class B Timber Pile	20 25 30 35 40	10 12 14 16 18	7 8 9 10 12

GULF SOUTH ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

FIGURE NO. 3

GEOTECHNICAL EXPLORATION

MCKINLEY HIGH SCHOOL
VARIOUS IMPROVEMENTS
BATON ROUGE, LA

GULF SOUTH ENGINEERING AND TESTING PROJECT NO. 25-021

ALLOWABLE PILE LOAD CAPACITIES
(FOR UP TO 2 FEET OF FILL AND INCLUDES DOWNDRAG FORCES)

DRIVEN, TREATED, TIMBER PILES

PILE TYPE AND SIZE (ASTM D25)	PILE TIP EMBEDMENT BELOW GROUND SURFACE IN FEET	ESTIMATED ALLOWABLE SINGLE PILE LOAD CAPACITIES IN TONS COMPRESSION FACTOR OF SAFETY = 2 TENSION FACTOR OF SAFETY = 3	
		COMPRESSION	TENSION
6-Inch Tip Diameter (8-inch Butt Diameter) Class 5 Timber Pile	35 40 45	6 8 10*	4 5 7
7-Inch Tip Diameter (12-inch Butt Diameter) Class B Timber Pile	35 40 45	7 9 11*	5 6 8

* - Pile capacity assumes soil conditions deeper than soil boring depth.

GEOTECHNICAL EXPLORATION

MCKINLEY HIGH SCHOOL
VARIOUS IMPROVEMENTS
BATON ROUGE, LA

GULF SOUTH ENGINEERING AND TESTING PROJECT NO. 25-021

ALLOWABLE SHAFT LOAD CAPACITIES
(FOR UP TO 2 FEET OF FILL AND ASSUMES NO DOWNDRAG FORCES)

DRILLED, CAST IN PLACE, CONCRETE SHAFTS

SHAFT SIZE	SHAFT TIP EMBEDMENT BELOW GROUND SURFACE IN FEET	ESTIMATED ALLOWABLE SINGLE SHAFT LOAD CAPACITIES IN TONS COMPRESSION FACTOR OF SAFETY = 2 TENSION FACTOR OF SAFETY = 3	
		COMPRESSION	TENSION
12-inch Diameter	10 15 20 25 30	6 10 14 18 22	4 7 9 12 15
18-inch Diameter	10 15 20 25 30	9 15 21 27 33	6 10 14 18 22
24-Inch Diameter	10 15 20 25 30	12 20 28 36 44	8 14 19 24 29

GEOTECHNICAL EXPLORATION

MCKINLEY HIGH SCHOOL
VARIOUS IMPROVEMENTS
BATON ROUGE, LA

GULF SOUTH ENGINEERING AND TESTING PROJECT NO. 25-021

ALLOWABLE SHAFT LOAD CAPACITIES
(FOR UP TO 2 FEET OF FILL AND INCLUDES DOWNDRAG FORCES)

DRILLED, CAST IN PLACE, CONCRETE SHAFTS

SHAFT SIZE	SHAFT TIP EMBEDMENT BELOW GROUND SURFACE IN FEET	ESTIMATED ALLOWABLE SINGLE SHAFT LOAD CAPACITIES IN TONS COMPRESSION FACTOR OF SAFETY = 2 TENSION FACTOR OF SAFETY = 3	
		COMPRESSION	TENSION
12-inch Diameter	30 35 40	8 12 16	6 8 10
18-inch Diameter	30 35 40	12 18 24	8 12 16
24-Inch Diameter	30 35 40	16 24 32	10 16 22

GULF SOUTH
ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

FIGURE NO. 6

Minimum Pile/Shaft Spacing

$SP = 0.05\ L_1 + 0.025\ L_2 + 0.0125\ L_3$

SP (ft.) = Center to center spacing of piles/shafts = (Min. 3.0 ft.)

L_1 = Pile/Shaft penetration in ft. up to 100 ft.

L_2 = Pile/Shaft penetration in ft. from 101 to 200 ft.

L_3 = Pile/Shaft penetration in ft. from 201 to 300 ft.

Allowable Group Capacity*

$$Q_a = \frac{P * L * c}{FSF} + \frac{2.6 * q_u * (1 + 0.2\ {}^{w}/_{b}) * A}{FSB}$$

P = Average perimeter of pile/shaft group (ft.)

L = Length of piles/shafts in group (ft.)

c = Average (weighted) shear strength (½ q_u) of soil throughout pile/shaft length (lbs./sq. ft.)

q_u = Unconfined compressive strength of soils below pile tips (lbs./sq.ft.)

w = Width of pile/shaft group at tip (ft.)

b = Length of pile/shaft group at tip (ft.)

A = Area of pile/shaft group at tip (sq. ft.)

FSF = Factor of safety for friction area = 2

FSB = Factor of safety for tip area = 3

*In no case should the cumulative single pile/shaft load capacity of the group be exceeded.

APPENDIX

BORING LOGS

GULF SOUTH ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

Soil Boring

Project: McKinley High School - Various Improvements
Client: Domain Architects
Location: 2510 Kentucky St, Baton Rouge, LA

LOG ID: **B-1**
Project Number: 25-021

Drilling Firm: Gulf South Engineering and Testing
Driller: Terry Turner
Logged By: John Duncan
Hammer Type: Auto
Method: Mud Rotary

Date Started: 03/11/2025 **Date Ended:** 03/11/2025
Location Accuracy: Tablet GPS
Latitude: 30.42424 **Longitude:** -91.17362
Boring Depth: 40' **Boring Diameter:** 4"

Ground Water Levels

	None to 12 ft.	
	None to 12 ft.	

Drill Rig: Truck
Drill bit size/Type: Rotary Drill
Surface Elevation: ~22.8'

Depth (ft)	Sample Graphic	Lab: Pocket Penetrometer (tsf)	Lab: Blow Counts (N/Refusal)	Lab: Compressive Strength (tsf)	Lab: Confining Pressure	Lab: Moisture Content (%)	Lab: Wet Density (PCF)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Fines	Graphic Log	Soil Description and Remarks
		N/A									**CONCRETE**, 4-in. of Concrete over Clay Base 1.0
			4-4-4 (8)			32.1					Medium Stiff to Stiff , gray and tan, **FAT CLAY** (**CH**)
		1.00		0.806		46.0	109	98-30-68			
5		1.00		0.998		37.7	113	103-30-73			
		1.50				39.9		98-27-71			
		2.25		1.515		34.6	116	87-27-60			
10		1.50		1.442		33.4	112				
											12.0
		1.00		0.926		59.9	108				Medium Stiff, gray, **FAT CLAY** (**CH**)
15											
		0.50		0.854		27.4	109				
20											
		0.50		0.573		60.6	102				
25											
		0.50		0.649		90.0	91				
30											
		0.75		0.779		29.7	117				
35											-with silt
		1.75		0.912		42.1	110				Soil boring completed 40 feet below the ground surface. 40.0

Graphics Legend

- Concrete
- CH
- SPT
- ST
- Core - Core Sample

REMARKS

Soil boring was backfilled per LA DOTD/DEQ requirements upon completion.
-Auger Depth: 0-12 feet
-Wet Rotary Depth: 12-40 feet

GULF SOUTH ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

Soil Boring

Project: McKinley High School - Various Improvements
Client: Domain Architects
Location: 2510 Kentucky St, Baton Rouge, LA

LOG ID: **B-2**
Project Number: 25-021

Drilling Firm: Gulf South Engineering and Testing
Driller: Country Hebert
Logged By: John Duncan
Hammer Type: Auto
Method: Mud Rotary

Date Started: 03/12/2025 **Date Ended:** 03/12/2025
Location Accuracy: Tablet GPS
Latitude: 30.42353 **Longitude:** -91.17277
Boring Depth: 30' **Boring Diameter:** 4"

Ground Water Levels

	None to 12 ft.	
	None to 12 ft.	

Drill Rig: Truck
Drill bit size/Type: 4" Solid Stem Auger
Surface Elevation: ~24.8'

Depth (ft)	Sample Graphic	Lab: Pocket Penetrometer (tsf)	Lab: Blow Counts (N/Refusal)	Lab: Compressive Strength (tsf)	Lab: Confining Pressure	Lab: Moisture Content (%)	Lab: Wet Density (PCF)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Fines	Graphic Log	Soil Description and Remarks
		N/A									**CONCRETE**, 4-in. of Concrete over Silty Clay Base 1.0
			4-5-7 (12)			18.4					**FILL**, Stiff, gray and tan, **SILTY LEAN CLAY** (**CL**)
			1-4-4 (8)			29.2			92.3		4.0
5		1.00		0.752		45.6	110	97-36-61			Medium Stiff to Stiff , gray, **FAT CLAY** (**CH**)
		1.00		0.826		41.6	111	108-31-77			
		1.25				44.5		110-28-82			
10		1.00		0.981		38.8	113				
		1.75		1.088		41.0	114				
15											
		1.00		0.987		32.5	115				
20											23.0
		0.25		0.224		52.7	103				Very Soft, gray, **FAT CLAY** (**CH**)
25											
		0.25		0.180		71.9	95				
30											30.0

Soil boring completed 30 feet below the ground surface.

Graphics Legend

- CL
- CH
- Concrete
- SPT
- ST
- Core - Core Sample

REMARKS

Soil boring was backfilled per LA DOTD/DEQ requirements upon completion.
-Auger Depth: 0-12 feet
-Wet Rotary Depth: 12-30 feet

GULF SOUTH ENGINEERING AND TESTING, INC.
Geotechnical & Materials Consultants

Soil Boring

Project: McKinley High School - Various Improvements
Client: Domain Architects
Location: 2510 Kentucky St, Baton Rouge, LA

LOG ID: **B-3**
Project Number: 25-021

Drilling Firm: Gulf South Engineering and Testing
Driller: Terry Turner
Logged By: John Duncan
Hammer Type: Auto
Method: Mud Rotary

Date Started: 03/11/2025 **Date Ended:** 03/11/2025
Location Accuracy: Tablet GPS
Latitude: 30.42425 **Longitude:** -91.17316
Boring Depth: 20' **Boring Diameter:** 4"

Ground Water Levels

	None to 20 ft.	
	None to 20 ft.	

Drill Rig: Truck
Drill bit size/Type: 4" Solid Stem Auger
Surface Elevation: ~22.8'

Depth (ft)	Sample Graphic	Lab: Pocket Penetrometer (tsf)	Lab: Blow Counts (N/Refusal)	Lab: Compressive Strength (tsf)	Lab: Confining Pressure	Lab: Moisture Content (%)	Lab: Wet Density (PCF)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Fines	Graphic Log	Soil Description and Remarks
		N/A									**CONCRETE**, 4-in. of Concrete over Clay Base 1.0
			3-4-3 (7)			30.7					Medium Stiff to Stiff , gray, **FAT CLAY** (**CH**)
			5-5-4 (9)			44.3		84-26-58			
5		0.75		0.855	2.00	46.3	111	102-33-69			
		0.50		0.876	2.70	41.0	111	100-27-73			
		1.00		1.000	3.30	41.0	111				
10		2.00		1.328		30.1	118				
		2.00		1.397		37.7	112				
15											
		1.50		1.256		38.9	114				
20											20.0

Soil boring completed 20 feet below the ground surface.

Graphics Legend

- Concrete
- CH
- SPT
- ST
- Core - Core Sample

REMARKS

Soil boring was backfilled per LA DOTD/DEQ requirements upon completion.
-Auger Depth: 0-20 feet
-Wet Rotary Depth: N/A

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Soil Boring

Project: McKinley High School - Various Improvements
Client: Domain Architects
Location: 2510 Kentucky St, Baton Rouge, LA

LOG ID: **B-4**
Project Number: 25-021

Drilling Firm: Gulf South Engineering and Testing
Driller: Country Hebert
Logged By: John Duncan
Hammer Type: Auto
Method: Mud Rotary

Date Started: 03/11/2025 **Date Ended:** 03/11/2025
Location Accuracy: Tablet GPS
Latitude: 30.42422 **Longitude:** -91.17389
Boring Depth: 20' **Boring Diameter:** 4"

Ground Water Levels

	None to 20 ft.	
	None to 20 ft.	

Drill Rig: Truck
Drill bit size/Type: 4" Solid Stem Auger
Surface Elevation: ~22.6'

Depth (ft)	Sample Graphic	Lab: Pocket Penetrometer (tsf)	Lab: Blow Counts (N/Refusal)	Lab: Compressive Strength (tsf)	Lab: Confining Pressure	Lab: Moisture Content (%)	Lab: Wet Density (PCF)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Fines	Graphic Log	Soil Description and Remarks
		N/A									**CONCRETE**, 4-in. of Concrete over Clay Base 1.0
			2-2-3 (5)			32.5					Medium Stiff to Stiff , gray, **FAT CLAY** (**CH**)
		1.00		0.645		46.0	110	104-34-70			
5		1.25				47.1		121-29-92			
		1.00		0.929		37.1	114	93-29-64			
		2.00		1.005		36.8	116				
10		1.00		0.992		38.2	113				
		1.50		0.689		48.1	107				
15											
		1.00		0.946		44.1	110				
20											20.0

Soil boring completed 20 feet below the ground surface.

Graphics Legend

- CH
- Concrete
- SPT
- ST
- Core - Core Sample

REMARKS

Soil boring was backfilled per LA DOTD/DEQ requirements upon completion.
-Dry Auger: 0-20 feet
-Wet Rotary Depth: N/A

GULF SOUTH ENGINEERING AND TESTING, INC.
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Soil Boring

Project: McKinley High School - Various Improvements
Client: Domain Architects
Location: 2510 Kentucky St, Baton Rouge, LA

LOG ID: **B-5**
Project Number: 25-021

Drilling Firm: Gulf South Engineering and Testing
Driller: Terry Turner
Logged By: John Duncan
Hammer Type: Auto
Method: Mud Rotary

Date Started: 03/11/2025 **Date Ended:** 03/11/2025
Location Accuracy: Tablet GPS
Latitude: 30.42425 **Longitude:** -91.17336
Boring Depth: 20' **Boring Diameter:** 4"

Ground Water Levels

	None to 20 ft.	
	None to 20 ft.	

Drill Rig: Truck
Drill bit size/Type: 4" Solid Stem Auger
Surface Elevation: ~22.7'

Depth (ft)	Sample Graphic	Lab: Pocket Penetrometer (tsf)	Lab: Blow Counts (N/Refusal)	Lab: Compressive Strength (tsf)	Lab: Confining Pressure	Lab: Moisture Content (%)	Lab: Wet Density (PCF)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Fines	Graphic Log	Soil Description and Remarks
		N/A									**CONCRETE**, 4-in. of Concrete over Clay Base 1.0
			1-x-x (0)			31.2					Very Soft, blue-gray, **FAT CLAY** (**CH**) 2.0
		1.00		0.582		48.6	108	106-32-74			Medium Stiff to Stiff , blue-gray, **FAT CLAY** (**CH**)
5		1.5				44.2		109-30-79			
		1.00		0.981		34.4	113	87-27-60			
		2.00		1.110		41.6	111				
10		1.50		1.082		37.4	111				
		1.00		0.999		36.6	114	100-27-73			
15											
		.75		0.806		44.1	107				
20											20.0

Soil boring completed 20 feet below the ground surface.

Graphics Legend

- CH
- Concrete
- SPT
- ST
- Core - Core Sample

REMARKS

Soil boring was backfilled per LA DOTD/DEQ requirements upon completion.
-Dry Auger: 0-20 feet
-Wet Rotary Depth: N/A

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Soil Boring

Project: McKinley High School - Various Improvements
Client: Domain Architects
Location: 2510 Kentucky St, Baton Rouge, LA

LOG ID: **B-6**
Project Number: 25-021

Drilling Firm: Gulf South Engineering and Testing
Driller: Country Hebert
Logged By: John Duncan
Hammer Type: Auto
Method: Mud Rotary

Date Started: 03/11/2025 **Date Ended:** 03/11/2025
Location Accuracy: Tablet GPS
Latitude: 30.42395 **Longitude:** -91.17395
Boring Depth: 20' **Boring Diameter:** 4"

Ground Water Levels

	None to 20 ft.	
	None to 20 ft.	

Drill Rig: Truck
Drill bit size/Type: 4" Solid Stem Auger
Surface Elevation: ~21.9'

Depth (ft)	Sample Graphic	Lab: Pocket Penetrometer (tsf)	Lab: Blow Counts (N/Refusal)	Lab: Compressive Strength (tsf)	Lab: Confining Pressure	Lab: Moisture Content (%)	Lab: Wet Density (PCF)	Lab: Atterberg Limits (LL-PL-PI)	Lab: % Fines	Graphic Log	Soil Description and Remarks
		N/A									**CONCRETE**, 4-in. of Concrete over Clay Base 1.0
			1-3-x (3)			46.7					Soft to Medium Stiff, gray, **FAT CLAY** (**CH**)
		1.00		0.703		48.5	108	102-32-70			
5		1.00		0.515		41.9	112				
		1.25				41.4		101-29-72			
		1.00		0.507		38.6	112				
10		0.50		0.427		45.8	109	95-31-64			
											13.0
		1.00		1.063		40.1	111				Medium Stiff to Stiff , gray, **FAT CLAY** (**CH**)
15											
		0.75		0.859		40.1	113				
20											20.0

Soil boring completed 20 feet below the ground surface.

Graphics Legend

- CH
- Concrete
- SPT
- ST
- Core - Core Sample

REMARKS

Soil boring was backfilled per LA DOTD/DEQ requirements upon completion.
-Dry Auger: 0-20 feet
-Wet Rotary Depth: N/A

GULF SOUTH

ENGINEERING AND TESTING, INC.

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