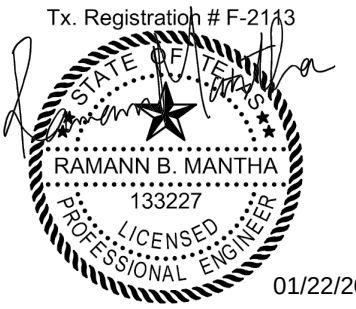
TABLE OF CONTENTS

DIVISION 26 – ELECTRICAL **Pages**

Tx. Registration # F-2113



01/22/2020

SECTION 26 00 00

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide labor, materials and equipment required for complete and functioning electrical systems as required by the contract documents.

B. New Work. The work includes, but is not limited to, the following principal systems and equipment:
1. Medium Voltage distribution (>1000V).
2. 480/277 volt distribution.
3. 208/120 volt distribution.
4. Panelboards-Distribution, Branch Circuit and Electronic Grade.
5. Luminaires, lamps and ballasts.
6. Lighting controls.
7. Digital addressable lighting control system.
8. Central dimming system.

C. Demolition. Refer to demolition Drawings and Section 26 01 00 for scope of work.

1.2 APPLICABLE PROVISIONS

A. Provisions Specified Elsewhere. Unless modified in this Section, General and Supplementary General Conditions, applicable provisions of Division 01 - General and other provisions of contract documents apply to work of Division 26 - Electrical.

B. Application. Provisions of this Section apply to every section of Division 26 - Electrical, except where specifically modified.

C. Work covered by this Section shall be accomplished in accordance with applicable provisions of the Contract Documents and addenda or directives which may be issued herewith, or otherwise.

1.3 RELATED WORK

A. Existing Conditions - Division 02.

B. Site Work – Division 02.

C. Concrete - Division 03.

D. Sealing and Firestopping – Division 07.

E. Openings - Division 08.

F. Finishes - Division 09.

G. Equipment - Division 11.

H. Furnishings – Division 12.

I. Special Construction – Division 13.

1.4 REFERENCE CODES AND STANDARDS

A. Standards of the following organizations may be referenced in the specification. Unless noted otherwise, references are to standards or codes current at the time of bidding.

B. Association of Edison Illuminating Companies (AEIC).

C. American National Standards Institute (ANSI).

D. Institute of Electrical and Electronics Engineers (IEEE).

E. Insulated Cable Engineers Association (ICEA).

F. National Electrical Code (NEC).

G. National Electrical Manufacturers Association (NEMA).

H. National Electrical Safety Code (NESC).

I. National Fire Protection Association (NFPA).

J. Underwriters' Laboratories (UL).

K. ASHRAE/IESNA 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.

1.5 REGULATIONS AND PERMITS

A. Regulations. Work, materials and equipment must comply with the latest rules and regulations of the following:
1. National Electrical Code (NEC).
2. National Electrical Safety Code (NESC).
3. Occupational Safety and Health Act (OSHA).
4. Americans with Disabilities Act (ADA).
5. Texas Department of Licensing and Regulation (TDLR).
6. Texas Occupational Code.
7. Texas Electrical Safety and Licensing Act – Title 8, Occupations Code Chapter 1305.
8. State and federal codes, ordinances and regulations.

B. Discrepancies. The drawings and specifications are intended to comply with listed codes, ordinances, regulations and standards. Where discrepancies occur, immediately notify the Owner's representative in writing, including a proposed resolution, and ask for an interpretation. Should installed materials or workmanship fail to comply, the Contractor is responsible for correcting the improper installation. Additionally, where sizes, capacities, or other such features are required in excess of minimum code or standards requirements, provide those specified or shown.

C. Permits: Obtain certificates of inspection and other permits required as a part of the work. Submit written evidence to the Owner's Representative and Architect/Engineer that the required permits and inspections have been secured.

1.6 DRAWINGS AND CONTRACT DOCUMENTS

A. Intent: The intent of the construction Drawings or contract documents, hereinafter referred to as the "Drawings", is to establish the types of systems and functions, but not to set forth each item essential to the functioning of the system. The Drawings, specifications, and related contract documents are cooperative, and work or materials called for in one and not mentioned in the other shall be provided. Electrical Drawings, are generally diagrammatic and show approximate location and extent of the work. Review pertinent Drawings and adjust the work to conditions shown. Install the work complete, including minor details necessary to perform the function indicated.

B. The Contractor shall carefully investigate structural and finish conditions, and shall coordinate the work in order to avoid interference between the various phases of work. The Contractor shall be responsible for the proper routing of raceways, subject to prior review by the Owner's Representative. Work shall be organized and laid out in finished portions of the building so that it will be concealed in furred chases, suspended ceilings, and similar elements of the building, unless specifically noted to be exposed. Work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

C. Discrepancies: In case of doubt as to work intended, or if amplification or clarification is needed, or where discrepancies occur between Drawings, specifications, and actual field conditions, immediately notify the Architect/Engineer and the Owner's Representative in writing, requesting an interpretation, and include a proposed solution.

D. Dimensions: Dimensional information related to new structures shall be taken from the appropriate Drawings. Dimensional information related to existing facilities shall be taken from actual measurements made by the Contractor on the site.

E. Outlet and Equipment Locations: Coordinate the actual locations of electrical outlets and equipment with building features and equipment as indicated on electrical Drawings.

1.7 SUBMITTALS

A. Submit the following in addition to and in accordance with the requirements of the Uniform General Conditions and in Division 01, Submittals.
   1. Include inspection and permit certificates and certificates of final inspection and acceptance from the authority having jurisdiction.
   2. Manufacturer's standardized schematic diagrams and catalog cuts shall not be acceptable unless applicable portions are clearly indicated, and non-applicable portions clearly deleted or crossed out.
   3. Schematic, connection and/or interconnection diagrams.

B. Provide the following with each submittal:
   1. Catalog cutsheets with manufacturer's name clearly indicated. Applicable portions shall be clearly indicated by arrows, circles, or similar markings and non-applicable portions shall be clearly deleted or crossed out.
   2. Line-by-line specification review by equipment manufacturer and contractor with exceptions explicitly defined.
   3. Itemize and organize equipment and material submittals by specification Section number; include manufacturer and identifying model or catalog numbers.

a. Submittal packages for product data, shop drawings, and other required submittals shall be numbered sequentially according to the applicable specification Section number. For example, the first submittal package for Energy-Efficient Dry-Type Transformers shall be identified as Submittal number 262213-01. The second submittal package for Energy-Efficient Dry-Type Transformers would be identified as Submittal number 262213-02. Re-submittal packages shall be identified by an "R" in the sequential numerical suffix.

b. Product data, shop drawings, and other submittal data shall be organized in separate tabs according to paragraph 1.07B.3a, above. That is, submittal data in individual tabs of a common submittal package shall be numbered sequentially, according to the applicable specification Section number.

4. Replace rejected items and resubmit with acceptable items in accordance with the requirements of Division One for Submittals, and with the Uniform General Conditions.

C. Within the specified time window after award of contract, submit list of equipment and materials to be furnished.
1. Itemize equipment and material by specification section number; include manufacturer and identifying model or catalog numbers.
2. Replace rejected items with an acceptable item within 2 weeks after notification of rejection.
3. If a satisfactory replacement is not submitted within a two-week period, Owner will notify contractor as to equipment manufacturer or type and make or material to be furnished. Provide designated items at no additional cost to Owner.

D. Installation: Where product data or shop drawings are required, do not install equipment or materials until submittals are accepted by the Architect/Engineer and by Owner's Representative. Use only equipment and materials accepted by the Architect/Engineer and by Owner's Representative. Equipment and materials installed prior to acceptance by the Owner/ Engineer and Owner's Representative shall be removed at no additional cost to Owner and replaced at the Contractor's expense.

E. As-Built and Record Drawings:
1. Maintain a master set of as-built drawings that show changes and other deviations from the Drawings. The markups shall be made as the changes are done. The markups shall show the actual changes and shall not reference RFI's, ASI's etc. The record drawing shall be a complete standalone document clearly showing all changes that differ from the design drawings. Any references to RFI's, ASI's etc. will result in a rejection of the record drawings.
2. At the conclusion of the project, these as-built drawings shall be transferred to AutoCAD electronic files, in a format acceptable to the Owner's Representative, and shall be complete.
3. Prior to final acceptance, deliver to the Owner's Representative the AutoCAD electronic files, the complete set of record drawings showing the as-built condition of the project, and the actual field set of as-built drawings. Also deliver one set of as-built drawings on CD-Rom or similar electronic media acceptable to the Owner. Drawing files shall be in AutoCAD (.dwg) and Adobe Acrobat (.pdf).
4. Quantity: In accordance with the requirements of Division One and the General Conditions. Where not specified elsewhere, provide 3 hard copies plus one reproducible set.

F. Operating and Maintenance Manuals: As specified in Part 3 of this Section and in Division One, as applicable.

1.8 SUBSTITUTIONS

A. Refer to requirements of Division One for substitution of Material and Equipment.

B. Product manufacturers are listed to establish a level of quality for the products. Substitutions may be allowed if the product is equal to or better than what is listed in the design guidelines, as determined by the Architect/Engineer and owner's Representative upon submittal of comparison products.

C. Samples: When requested by the Owner's Representative or the Architect/Engineer, the Contractor shall provide a sample of the proposed substitute item. When requested, provide samples of both the specified item and the proposed item for comparison purposes.

D. Timeliness: The burden of timeliness in the complete cycle of submittal data, shop drawings, and sample processing is on the Contractor. Time periods for Engineer processing and review of submittal data, shop drawings, samples, studies, and reports shall be in accordance with the applicable submittal and substitution requirements of Division One and the General Conditions. The Contractor shall allow sufficient time for review of each submission by the office of the design discipline involved after receipt of such submissions by that design discipline. The Contractor is responsible for allowing sufficient time in the construction schedule to cover the aforementioned cycles for processing of submittal data and shop drawings, including time for resubmittal cycles on unacceptable and rejected materials, equipment, components, and systems covered by the data submitted. Construction delays and lack of timeliness in the above regard are the responsibility of the Contractor and will not be considered in requests for scheduled construction time extensions and additional costs to the Owner.

E. Acceptance: Acceptance of materials and equipment will be based on manufacturer's published data and will be tentative subject to the submission of complete shop drawings indicating compliance with the Drawings, specifications, and other applicable Contract Documents, and that adequate and acceptable clearances will exist for entry, servicing, and maintenance. Acceptance of materials and equipment under this provision shall not be construed as authorizing deviations from the Specifications, unless the attention of the Owner's Representative and the Architect/Engineer has been directed in writing to the specific deviations. Data submitted shall not contain unrelated information unless pertinent information is properly identified.

F. Replacement; Should a substitution be accepted, and should the substitute material prove defective, or otherwise unsatisfactory for the service intended within the guarantee period, this material or equipment shall be replaced with the material or equipment originally specified at no additional cost to the Owner.

1.9 CONTRACTOR QUALIFICATIONS

A. An acceptable Contractor for the work under this division must have personnel with experience, training and skill to provide a practical working system.

1. The Contractor may be required to furnish acceptable evidence of having installed not less than three systems of size and type comparable to this project. The systems must have served satisfactorily for not less than 3 years. The superintendent must have had experience in installing not less than three such systems.
2. The Contractor must have personnel with the proper licenses to perform electrical work under this Contract. In accordance with the Texas Electrical Safety and Licensing Act – Title 8, Occupation Code, Chapter 1305, Subchapter D, section 1305.151: "LICENSE REQUIRED. Except as provided by Section 1305.003, a person may not perform electrical work unless the person holds an appropriate license issued or recognized under this chapter."

B. The Contractor shall follow the safety procedures in addition to, and in accordance with, the requirements of the Project Safety Manual (PSM).
1. The Contractor shall be responsible for training personnel under their employ in areas concerning safe work habits and construction safety. The Contractor shall continually inform personnel on hazards particular to this project and update the information as the project progresses.
2. The Contractor shall secure electrical rooms, to limit access, prior to energizing high voltage (1000V or higher) equipment, and shall control access during the project after energization. The Contractor shall post and maintain warning and caution signage in areas where work is ongoing near energized equipment. The Contractor shall cover energized live parts when work is not being done in the equipment. This includes lunch and breaks.
3. The Contractor shall strictly enforce OSHA lockout/tagout procedures. Initial infractions shall result in a warning. A second infraction shall result in the removal of the workman and his foreman from the site. Continued infractions shall result in removal of the Contractor from the site.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS

A. Condition. Provide new products of manufacturers regularly engaged in production of such equipment. Provide the manufacturer's latest standard design for the type of product specified.

B. NEC and UL.
1. Products must conform to requirements of the National Electrical Code. Where Underwriters' Laboratories have set standards, listed products and issued labels, products used must be listed and labeled by UL.
2. Materials and equipment shall be labeled and/or listed as acceptable to the authority having jurisdiction as suitable for the use intended. Where no specifications or specific model numbers are given, provide materials of a standard industrial quality.

C. Space Limitations: Equipment selected must conform to the building features and must be coordinated with them. Electrical installation shall comply with the requirements of Article 110.26 and Article 110.34 of the National Electrical Code (NEC) for working space, access, and dedicated equipment space. Do not provide equipment that will not suit arrangement and space limitations. Scaled drawings (1/4" = 1'-0") of electrical and telecommunication rooms shall be submitted for review by the Architect/Engineer and the Owner's Representative prior to installing equipment. See paragraph 1.07E above.

D. Factory Finish. Equipment shall be delivered with a hard surface, factory-applied finish so that no additional field painting is required except for touch-up as required.

E. Physical Size of Equipment: Equipment of larger sizes than shown, even though of specified manufacturer, will not be acceptable unless the Contractor demonstrates by product data, shop drawings, and coordination drawings that ample space exists for proper installation, operation, and maintenance.

F. Enclosure: Provide NEMA 1 enclosure for indoor installation and NEMA 3R for outdoor enclosure, unless noted or specified otherwise. The enclosure shall be suitable for the environment per NEC, NEMA and ANSI standards.

G. Conductors in Conduit: Conductors shall be installed in conduit. Exceptions are listed in individual Sections of the Division 26 and Division 28 specifications.

2.2 MANUFACTURER

A. Where two or more units of the same class of material are required, provide products of a single manufacturer. Component parts of materials or equipment need not be products of the same manufacturer, except as specifically noted in individual Sections of the specifications.

2.3 SUBSTITUTIONS

A. Refer to Division 01 section on Material and Equipment, and to paragraph 1.08 of this Section.

2.4 AUTOMATED EQUIPMENT AND CONTROLS

A. Equipment and control systems where applicable, shall match, integrate, communicate and cooperate with new and existing systems, such as building automation, energy management, direct digital controls (DDC), fire detection and alarm, circuit breakers, transformers, etc.

PART 3 - EXECUTION

3.1 GENERAL

A. Manufacturer's Recommendations: The manufacturer's published directions shall be followed in the delivery, storage, protection, installation, wiring, and connection of equipment and material. Promptly notify the Engineer and the Owner's Representative in writing of conflicts between the requirements of the Drawings and specifications and the manufacturer's directions, in accordance with paragraphs 1.05B and 1.06C of this Section. Obtain instructions from the Owner's Representative before proceeding with the work. Should the Contractor perform work that does not comply with the manufacturer's directions or such instructions from the Owner's Representative, he shall bear costs arising in connection with the deficiencies.

B. Site Observation: Site observation by the Engineer is for the express purpose of verifying compliance by the Contractor with the Drawings, specifications, and other applicable Contract Documents. Site observation by the Engineer shall not be construed as construction supervision, or indication of approval of the manner or location in which the work is being performed, or as being a safe practice or place. Site observation by the Architect/ Engineer shall not be construed as inspection by the Authority Having Jurisdiction (AHJ) or other applicable code enforcement authority.

C. Installation: Where product data or shop drawings are required, do not install equipment or materials until submittals are accepted by the Engineer and by the Owner's Representative. Use only equipment and materials accepted by the Architect/Engineer and the Owner's Representative. Equipment and materials installed prior to acceptance by the Engineer and Owner's Representative shall be removed at no additional cost to Owner and replaced at the Contractor's expense.

D. Supervision:
1. The Contractor of the work under this Division shall keep a competent superintendent or foreman on the job throughout the period of construction. Refer to Division One requirements and the Uniform General Conditions for additional information concerning supervision.
2. It shall be the responsibility of such superintendent to study the Drawings, specifications, and other applicable Contract Documents, and familiarize himself with the work. He shall coordinate his work with other trades before material is fabricated or installed, and ensure that his work will not cause interference with another trade. Where interferences are encountered, they shall be resolved at the job site by the Contractor. Where interferences cannot be resolved without major changes to the Drawings, the matter shall be referred to the Architect/Engineer and the Owner's Representative for resolution in accordance with paragraphs 1.05B and 1.06C of this Section.

3.2 PROTECTION OF EQUIPMENT AND MATERIALS

A. General:
1. The Contractor shall follow the manufacturer's directions completely in the delivery, storage and handling of equipment and materials.
2. Equipment and materials shall be tightly covered and protected against dirt, water, chemical, physical or weather damage and theft. At the completion of the work, fixtures, equipment and materials shall be cleaned and polished thoroughly and shall be returned to "as new" condition.
3. Electrical cable, wire, and conductors shall be stored to prevent moisture and mechanical damage.

B. Moisture. During construction, protect all items from insulation moisture absorption and metallic component corrosion by appropriate use of strip heaters, lamps or other suitable means. Apply protection immediately on receiving the products and maintain continually.

C. Clean. Keep products clean by elevating above ground or floor and by using suitable coverings.

D. Damage. Take such precautions as are necessary to protect apparatus and materials from damage. Failure to protect materials is sufficient cause for rejection of the apparatus or material in question.

E. Finish. Protect factory finish from damage during construction operations and until acceptance of the project. Satisfactorily restore finishes that become stained or damaged.

F. Weather. Protect equipment and materials from weather and sunlight by use of suitable coverings and storage indoors, or in suitable weather-protected containers. Materials and equipment marked by their manufacturer as suitable for storage outdoors may be stored according to manufacturer's markings. Maintain factory-installed coverings and wrappings until material is to be installed.

3.3 PREPARATION

A.

3.4 SAFETY

A. Implement the following safety procedures in addition to, and in accordance with, the requirements of Division One and the Uniform General Conditions:
   1. The Contractor shall be responsible for training personnel under their employ in areas concerning safe work habits and construction safety. The Contractor shall continually inform personnel of hazards particular to this project and update the information as the project progresses.
   2. Prior to energizing panelboards within the scope of work, secure affected electrical rooms to limit access to line voltage. Line voltage shall be defined as above 50 volts, for the purpose of controlling access. During and after energization of panelboards, control access to electrical rooms for the duration of the project. Post and maintain warning and caution signage in areas where work is on-going near energized equipment. Cover energized live parts when work is not being done in the equipment. This includes lunch and breaks.
   3. Strictly enforce OSHA lockout/tagout procedures. Initial infractions shall result in a warning. A second infraction shall result in the removal of the workman and his foreman from the site. Continued infractions shall result in removal of the Contractor from the site.

3.5 INSPECTION

A. Examination. Examine the areas and conditions under which equipment and systems are to be installed, and notify the Owner's Representative in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Coordination. Carefully investigate structural and finish conditions and coordinate the work in order to avoid interference between the various phases of work. Work shall be organized and laid out so that it will be concealed in furred chases, suspended ceilings, and similar elements in finished portions of the building, unless specifically noted to be exposed. Work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

3.6 INSTALLATION

A. Cooperation with Other Trades. Cooperation with trades of adjacent, related or affected materials or operations, and of trades performing continuations of this work under subsequent contracts, is considered a part of this work in order to effect timely and accurate placing of work and to bring together, in proper and correct sequence, the work of such trades. Provide other trades, as required, templates, patterns, setting plans and shop details for the proper installation of the work and for purposes of coordinating adjacent work. Electrical power connections for mechanical and plumbing equipment are in this Division unless noted otherwise. Verify electrical characteristics of equipment with other Divisions before roughing in the electrical connections.

B. Workmanship. Work shall be performed by workmen skilled in their trade. The installation shall be complete and installed in a neat and workmanlike manner in accordance with NEC 110.12 and FPM accompanying, and as described in ANSI/NECA 1-2000 “Standard Practices for Good Workmanship in Electrical Contracting”, and other ANSI approved installation standards.

C. Setting of Equipment. Provide permanent and temporary shoring, anchoring, and bracing required to make parts stable and rigid; even when such shoring, anchoring, and bracing are not explicitly called for.
1. Equipment must be leveled and set plumb.
2. Sheet metal enclosures mounted against a wall shall be separated from the wall not less than 1/4 inch by means of corrosion-resistant spacers, or by 3 inches of air for freestanding units. Use corrosion-resistant bolts, nuts and washers to anchor equipment.
3. In sufficient time to be coordinated with work under other divisions, provide shop drawings and layout work showing exact size and location of sleeves, openings or inserts for electrical equipment in slabs, walls, partitions and chases.
4. Provide adequate support for freestanding all equipment. This shall include bolting to the floor, concrete equipment pad, or solid structural steel to prevent tipping. Install free-standing electrical equipment on concrete equipment pads in accordance with paragraph 3.05C, this Section, except where equipment is noted and designed for mounting directly on the concrete floor slab. Under no condition shall equipment be fastened to non-rigid building steel such as removable platform steel gratings, handrails, etc.
5. Provide racks and supports, independently mounted at structure, to support electrical equipment and systems supplied and installed under this contract. Do not mount or suspend equipment from supports provided for equipment and systems by other Divisions, except where specifically noted or indicated on Drawings.
6. Refer to Section 26 05 29, Metal Framing and supports, for additional requirements.

D. Sealing of Equipment. Seal openings into equipment to prevent entrance of animals, birds and insects, as well as to prevent ingress of moisture, dust, dirt, and similar contaminants.

E. Concealed Work. Conceal electrical work in walls, floors, chases, under floors, underground and above ceilings except:
1. Where shown or specified to be exposed. Exposed is understood to mean open to view.
2. Where exposure is necessary to the proper function.

3. Where size of materials and equipment preclude concealment. Obtain the written consent of the Owner's Representative and the Architect/Engineer to leave materials exposed in finished spaces of the building.

F. Application. Unless otherwise indicated, power will be utilized as follows:
1. 120 volts, single phase: LED lighting.
2. 277 volts, single phase: LED lighting.

G. Connections to Equipment - Other than Division 26. For equipment furnished under other Divisions, and for equipment furnished by the Owner, provide final electrical connections to such items of equipment. Obtain detailed shop drawings of equipment from the applicable Division or supplier indicating the exact number and location of rough-in points. Such final shop drawings may indicate adjustments in total number and exact location of rough-in points, and in equipment dimensions. Making adjustments to field conditions is considered a part of the work required.
1. Roughing-in: When roughing-in, provide electrical branch circuits to various items of equipment. Terminate at proper points as indicated on detailed equipment shop drawings, or as directed. Use Drawings accompanying these specifications only for general routing of circuiting. Do not use Drawings accompanying these specifications for rough-in locations.
2. Final Connections: Millwork, casework, and similar equipment will include service fittings such as switches, duplex receptacles, data/communications outlets, and luminaires on the casework or equipment. Provide branch circuit connection to match electrical connection requirements of service fittings.

H. Accessories. Offsets, fittings, expansion joints, anchors and accessories that are required for a complete system shall be provided, even if not specifically indicated on the Drawings or mentioned in the specifications. Offsets, transitions and changes in direction of conduit, cable trays, raceways and busways shall be made to maintain proper headroom. Provide pullboxes, fittings, etc., required as a result of these transitions and changes in direction.

I. Observation prior to cover-up or seal-in of walls and ceilings. Perform the following in accordance with the applicable requirements of Division One and the General Conditions:
1. Prior to the installation of ceiling material, gypsum, plaster, or acoustical board, the Contractor shall notify the Owner's Representative so that arrangement can be made for observation or inspection of the above-ceiling area about to be "sealed" off. The Contractor shall provide advance notice in accordance with the applicable requirements of Division One and the General Conditions. Where not specified, required, or directed elsewhere, provide not less than 10 working days' advance notice.
2. Above-ceiling areas will be subject to a formal inspection before ceiling panels are installed, or installation is otherwise concealed from view. Electrical work at and above the ceiling, including items supported by the ceiling grid, shall be complete and installed in accordance with contract requirements, including power to luminaires, fans, and other powered items. The purpose of this inspection is to verify the completeness and quality of the installation of the electrical systems and other above ceiling special systems such as cable tray systems. The ceiling supports shall be in place so that access panel and luminaire locations are identifiable, and so that clearances and access provisions may be evaluated.
3. No ceiling materials may be installed until the resulting deficiency list from this inspection is completed and approved by the Owner's Representative.

J. Finish. Coordinate with Division 9 to paint exposed conduit to match adjacent walls, unless otherwise directed.

3.7 EXISTING FACILITIES

A. Responsibility. The Contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and maintenance of electrical services for new and existing facilities. The Contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing such temporary protection upon completion of the work.

B. Services. The Contractor shall provide temporary or new services to existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.

C. Access. Where existing construction is removed to provide working and extension access to existing utilities, Contractor shall remove doors, piping, conduit, outlet boxes, wiring, luminaries, air conditioning ductwork and equipment, etc., to provide this access, and shall reinstall same upon completion of work in the areas affected.

D. Existing Devices. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed, remove and reinstall in locations approved by the Architect/Engineer devices required for the operation of the various systems installed in the existing construction. This is to include, but is not limited to, temperature controls, system devices, electrical switches, relays, luminaires, fixtures, piping, conduit, etc.

E. Outages. Outages of services as required by the new installation will be permitted, but only at a time approved by the Owner. The Contractor shall coordinate with the Owner's Representative to arrange for service outages. The Contractor shall allow the Owner sufficient time to schedule for required outages, in accordance with the applicable requirements of Division One and the General Conditions. Where not specified, required or directed elsewhere, allow a minimum of 21 working days for the Owner to schedule for required outages. The time allowed for outages will not be during normal working hours or during hours of research and instruction, unless otherwise approved by the Owner's Representative. Costs of outages, including overtime charges, shall be included in the contract amount.

F. Adjacent Facilities. Coordinate work among the various trades to minimize disruption to existing processes, procedures, and equipment in spaces adjacent to areas of demolition and renovation work. Coordinate with Owner's Representative to schedule work producing noise or structure-born vibrations, including but not limited to cutting, drilling, coring, and use of impact tools.

G. Refer to Section, Demolition, for additional requirements.

3.8 EQUIPMENT AND DEVICE MARKING

A. Designations. Identify equipment, devices, feeders, branch circuits and similar items with the same designations as indicated on the Drawings.

B. Nameplates. Externally mark electrical equipment with nameplates identifying each and the equipment served. Supply blank nameplates for spare units and spaces.

C. Refer to Section 26 05 53 for additional requirements.

3.9 SLEEVES, PENETRATION, CUTTING AND PATCHING

A. General. Cut and patch walls, floors, etc., resulting from work in existing construction. Provide for the timely placing of sleeves for raceway and exposed cabling passing through walls, partitions, beams, floors and roof while same are under construction. If openings, sleeves, and recesses are not properly installed and cutting and patching become necessary, it shall be done at no expense to the Owner. Secure permission from the Owner's Representative before cutting or patching a constructed or existing wall. Where roofs or walls are fire rated, penetrations shall be completely sealed using UL-listed materials and procedures sufficient to preserve the fire rating. Comply with special requirements of local authorities.

B. Structure. Do not cut or core through structural beams, joists, load-bearing walls, grade beams, or similar load-bearing structure. Where limited space is available above the ceilings below concrete beams or other deep projections, notify the Owner's Representative in writing, including a proposed solution, and request a resolution. Approval shall be obtained from the Owner's Representative and the Architect/Engineer for each penetration.

C. Penetrations.
1. This contract requires core drilling of floor or wall penetrations as indicated on Drawings. Core drilling shall be in accordance with structural specifications. Floor penetrations shall include a sleeve that extends above the floor 2 inches, except where plugs and caps are specified or indicated flush with floor or foundation pad. Electrical penetrations shall be coordinated with structure during design, and shall be made in compliance with structural requirements specified in the structural Drawings and specifications. Field modifications are required to be reviewed and approved by structural engineer prior to installation.
2. Penetrations shall be sealed in accordance with the requirements of Division 7, Firestopping. Coordinate with Division 7 to provide firestopping systems and materials that are compatible with the penetrations for systems and equipment furnished and installed under Division 26.
3. Provide sleeves for conduit penetrations of smoke, fire, and sound rated partitions. Install sleeve with a minimum of 1 inch diameter where penetrating the exterior drywall.
4. Provide proper sizing of sleeves or core-drilled holes to accommodate their through-penetrating items. In general, provide conduit sleeves two standard sizes larger than their through-penetrating items. Provide larger sleeves as required to allow passage of couplings for through-penetrating items.

D. Sealing and Firestopping.
1. Voids between sleeves or core-drilled holes and pipe passing through fire-rated assemblies shall be firestopped to meet the requirements of ASTM E 814, in accordance with Division 7 requirements for Firestopping.
2. Where the routing of cable tray passes through fire-rated walls, floors or other fire-rated boundaries, coordinate with Division 7 to provide removable firestopping system.
3. Furnish and install UL Systems Classified, intumescent material capable of expanding up to 8 to 10 times when exposed to temperatures beginning at 250° F, for the sealing of holes or voids created to extend electrical systems through fire rated floors and walls, in order to prevent the spread of smoke, fire, toxic gas or water.

4. Fire barrier products shall be used to create through-penetration firestop systems as required. Firestop systems shall be listed in the Underwriter's Laboratories Building Materials Discovery, Through Penetration Firestop Systems (XHEZ).
5. Install firestop materials and systems according to their UL Systems Classifications, manufacturer instructions, manufacturer recommendations, and the requirements of applicable Division 7 specifications.

E. Conduit Sleeves. Conduit sleeve shall be two standard sizes larger than the size of conduit it serves, except where "Link Seal" casing seals are used in sleeves through walls below grade. Sleeves in floor shall extend a minimum of two inches above the finished floor. Conduit passing through concrete masonry walls above grade shall have 18-gauge galvanized steel sleeves. Sleeves set in concrete floor construction shall be at least 16-gauge galvanized steel. Sleeves set in concrete floor construction supporting conduit risers shall be standard weight galvanized steel. Sleeves supporting conduit risers 3 inches and larger shall have three 6 inch long reinforcing rods welded at 120 degree spacing to the sleeve, and shall be installed embedded in the concrete or grouted to existing concrete. Where the conduit passes through a sleeve, no point of the conduit shall touch the sleeve. Seal around penetrations through sleeving as indicated under firestopping as specified herein, and in compliance with the requirements of Division 7 specifications. Galvanized steel requirements can be omitted where not supporting conduits.

F. Penetrations Below Grade. Sleeves penetrating walls below grade shall be standard weight black steel pipe with 1/4-inch thick steel plate secured to the pipe with continuous fillet weld. The plate shall be located in the middle of the wall and shall be two inches wider in radius than the sleeve it encircles. The entire assembly shall be hot-dipped galvanized after fabrication. Seal off annular opening between conduit and sleeve with "Link Seal" casing seal as manufactured by Thunderline Corporation of Wayne, Michigan. Size conduit sleeve to accommodate the casing seal. Use Series 300 casing seals for pipe 3/4-inch through 4-inch and Series 400 casing seals for pipe sized 5-inch and larger.

G. Methods of Cutting: Openings cut through concrete and masonry shall be made with masonry saws and core drills, and at such locations acceptable to the Owner's Representative. Impact type equipment shall not be used except where specifically accepted by the Owner's Representative. Openings in precast concrete slabs for conduits, outlet boxes, etc., shall be core drilled to exact size.

H. Restoration. Restore openings to "as new" condition under the appropriate specification Section for the materials involved, and match remaining surrounding materials and/or finishes.

I. Masonry. Where openings are cut through masonry walls, provide and install lintels or other structural supports to protect the remaining masonry. Provide adequate supports during the cutting operation to prevent damage to the masonry caused by the cutting operation. Structural members, supports, etc., shall be of the proper size and shape, and shall be installed in a manner acceptable to the Owner's Representative.

J. Structure. No cutting, boring, or excavating which will weaken the structure shall be undertaken. Coordinate with structure for placement of conduit, sleeves, and the like through beams, joists, slabs, mats, and other structural components and systems prior to forming of those structural components and systems.

K. Watertight. Where sleeves pass through roof or floors requiring waterproof membrane, lead flashing with a density of at least three pounds per square foot shall be built into the membrane a minimum of six inches to provide a watertight installation. Provide other watertight installation materials as detailed on the Drawings and as specified under Division 7 – Roofing.

L. Escutcheons. Provide heavy chrome-plated or nickel-plated plates on conduit passing through walls and ceilings in finished areas. Escutcheons shall be B&C No. 10, or accepted substitution, chrome-plated steel plates with concealed hinges.

M. Roof Penetrations and Flashings. Furnish and install pipe, conduit and duct sleeves, and flashing compatible with the roofing installation for roof penetrations. Coordinate with Division 7.

3.10 CLEANING, ADJUSTING AND START-UP

A. Cleaning. Clean electrical equipment, components, and devices prior to installation of final finish or covers, prior to startup and testing, prior to final observation by Architect/Engineer and Owner's Representative, and as required under individual Sections of the Division 26 specifications.

B. Adjusting. Adjust equipment, devices, and systems as specified under individual Sections of these Specifications and in accordance with manufacturer's instructions for proper functioning during modes of operation, including emergency and shutdown conditions.

3.11 OPERATING AND MAINTENANCE MANUALS

A. General. The Contractor shall provide, in loose-leaf binders, complete operating and maintenance data of each manufactured item of equipment used in the electrical work at least four weeks before Architect/Engineer's final review and observation of the project. Descriptive data and printed installation, operating and maintenance instructions for each item of equipment will be included. A complete double index will be provided as follows.

B. Format and content. The Operating and Maintenance Manual will be submitted in quantities and format as specified under Division One for Submittals. Provide quadruplicate where quantity is not specified. Operating and Maintenance Manual shall include:

1. Descriptive data of each system and piece of equipment, including ratings, capacity, performance data, operating curves and characteristics, and wiring diagrams.
2. Full detailed spare parts list, including source of supply for each piece of equipment.
3. Printed instructions describing installation, operation, service, maintenance, and repair of each piece of equipment.
4. Typewritten test reports of tests made of materials, equipment and systems under this Division. Test reports will include the dates of the tests, name of person conducting and witnessing the tests, and record of conditions relative to the tests.
5. Copies of "Reviewed" shop drawings and submittals.
6. Print copies of the record Drawings. Refer to paragraph 1.07I of this Section.

END OF SECTION

SECTION 26 05 19

INSULATED CONDUCTORS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the furnishing and installation of insulated conductors.

1.2 REFERENCE STANDARDS

A. AEIC No. 6 - Specifications for Ethylene-Propylene-Rubber-Insulated Power Cables 5,000 to 35,000 Volts.

B. ANSI/IEEE 386 - Separable Insulated Connectors for Power Distribution Systems Above 600 Volts.

C. ANSI/UL 83 - Thermoplastic-Insulated Wires and Cables.

D. ANSI/UL 1072 - Medium-Voltage Power Cables.

E. IEEE No. 48 - Standard Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations.

F. ICEA S-61-402 (NEMA WC 5) - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

G. ICEA S-68-516 (NEMA WC 8) - Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

H. ANSI/UL 2196 ”Tests for Fire Resistive Cables”

I. CSA C22.2 #124

J. UL Fire Resistance Directory

1.3 SUBMITTALS

A. Provide product data on the following:
1. 600-volt conductor, splicing and terminating materials.
2.

B. Provide cable high voltage factory test reports.

PART 2 - PRODUCTS

2.1 IDENTIFICATION

A. Provide new insulated conductors marked according to NEC Article 310.

2.2 600-VOLT INSULATED CONDUCTORS

A. Size. As shown on the drawings.

B. Construction.
1. Conductor. Soft-drawn, annealed copper. Solid for #12 and #10 and Stranded for all other sizes.
2. Insulation. Unless otherwise noted on the drawings, use THHN/THWN-2 for general wiring. Use XHHW/XHHW-2 for conductors installed below grade.

C. Use. For general wiring use No. 12 minimum. For field-installed control wiring use No. 14 or larger stranded conductors.

D. Listing. Single Conductor. UL 83.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Protection. Unless otherwise indicated, mechanically protect conductors for systems by installing in raceways. Do not install the conductors until raceway system is complete and properly cleaned. Use Polywater J cable lubricant when pulling conductors. Do not bend any conductor either permanently or temporarily during installation to radii less than four times the outer diameter of 600-volt insulated conductors, or less than twelve times the outer diameter of the completed 15 kV cable. Do not exceed manufacturer's recommended values for maximum pulling tension.

B. Splices and Terminations. Use pressure-type lugs or connectors for terminations or splices of all stranded conductors. Use ring-tongue type terminators on all control wiring. Below grade terminations shall be waterproof.

C. Appearance. Neatly and securely bundle or cable all conductors in an enclosure using nylon straps with a locking hub or head on one end and a taper on the other.

3.2 600-VOLT INSULATED CONDUCTORS

A. Size. Install conductor sizes as indicated.

B. Home Runs. Provide branch circuit homeruns as indicated on plans. Homerun designations are indicated on Sheet E-001. Provide the number of homeruns as indicated on plans. A maximum of 6 phase conductors may be installed in one conduit. Include a separate neutral conductor with each phase conductor for all 120V and 277V circuits. Common neutrals are not permitted. Use home run circuit numbers as indicated for panelboard connections. For isolated ground circuits provide an additional ground conductor as indicated on the panel schedules. Provide No. 10 AWG conductor for the entire circuit length for single-phase, 20 ampere circuits for which the distance from panelboard to the last outlet is more than 100 feet for 120 volt circuits and 200 feet for 277 volt circuits.

C. Color Code. Use factory-colored insulated conductors for No. 10 and smaller conductors and color code larger insulated conductors with an approved field-applied tape. Use different colors for control wiring. Follow the color scheme below.

Line	208/120	480/277
A or L1	Black	Brown
B or L2	Red	Purple
C or L3	Blue	Yellow
Neutral	White	Gray
Ground	Green	Green
Switch Leg	Pink	Pink

Where more than one conductor of the same phase or more than one neutral conductor occur at the same outlet or junction box, these conductors shall be identifiable from each other by use of stripes or distinguishing markings. All wiring associated with isolated ground receptacles (line, neutral, ground) shall have a yellow tracer on each conductor.

D. Field Testing. Insulation resistance of all conductors shall be tested. Each conductor shall have its insulation resistance tested after the installation is completed and all splices, taps and connections are made except connection to or into its source and point (or points) of termination. Insulation resistance of conductors which are to operate at 600 volts or less shall be tested by using a Biddle Megger of not less than 1000 volts d-c. Insulation resistance of conductors rated at 600 volts shall be free of shorts and grounds and have a minimum resistance phase-to-phase and phase-to-ground of at least 10 megohms. Conductors that do not exceed insulation resistance values listed above shall be removed at Contractor's expense and replaced and test repeated. The Contractor shall furnish all instruments and personnel required for tests, shall tabulate readings observed, and shall forward copies of the test readings to the Owner in accordance with Section 26 05 00. These test reports shall identify each conductor tested, date and time of test and weather conditions. Each test shall be signed by the party making the test.

END OF SECTION

SECTION 26 05 33

RACEWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the furnishing and installation of electrical raceway systems.

1.2 REFERENCE STANDARDS

A. ANSI/ANSI C80.1 - Rigid Steel Conduit - Zinc-Coated.

B. ANSI/ANSI C80.3 - Electrical Metallic Tubing - Zinc-Coated.

C. ANSI/UL 1 - Flexible Metal Conduit.

D. ANSI/UL 5 - Surface Metal Raceways and Fittings.

E. ANSI/UL 360 - Liquid-tight Flexible Steel Conduit.

F. ANSI/UL 467 - Electrical Grounding and Bonding Equipment.

G. ANSI/UL 651 - Schedule 40 and 80 Rigid PVC Conduit.

H. ANSI/UL 797 - Electrical Metallic Tubing.

I. ANSI/UL 870 - Wireways, Auxiliary Gutters and Associated Fittings.

J. NEMA VE 1 - Metallic Cable Tray Systems.

K. NEMA TC-6 and 8 – EB Underground Conduit

L. UL 6 - Rigid Metal Conduit.

1.3 SUBMITTALS

A. Surface metal raceways and fittings.

B. Provide product data on cable tray and fittings.

PART 2 - PRODUCTS

2.1 CONDUIT AND FITTINGS

A. Rigid Metal Conduit.
   1. Conduit. Rigid hot-dipped galvanized steel (RGS) conduit with zinc-coated threads and an outer coating of zinc chromate.
   2. Fittings. Threaded steel or malleable iron, either cadmium plated or hot-dipped galvanized.

B. Electrical Metallic Tubing (EMT).
   1. Conduit. Galvanized electrical steel tubing.
   2. Fittings. Steel compression type or steel set screw fittings, either cadmium plated or hot-dipped galvanized. Connectors shall have insulated throat bushings.

C. Rigid Nonmetallic Conduit.
   1. Conduit. Schedule 40 polyvinyl chloride (PVC).
   2. Fittings. Solvent weld socket type.

D. Flexible Metal Conduit.
   1. Conduit. Spiral-wound, square-locked, hot-dipped galvanized steel strip.
   2. Fittings. One-screw and two-screw for 1-1/2 inches and larger, double-clamp steel or malleable iron, either cadmium plated or hot-dipped galvanized.

E. Liquid-tight Flexible Steel Conduit.
   1. Conduit. Spiral-wound, square-locked, hot-dipped galvanized steel strip plus a bonded outer jacket of PVC.
   2. Fittings. Compression type, malleable iron, with insulated throat, either cadmium plated or hot-dipped galvanized.

F. Elbows.
   1. Provide large radius elbows.

2.2 WIREWAYS

A. Material. Not less than 16-gage sheet steel.

B. Dimensions. Cross section dimensions not less than 4 inches by 4 inches.

C. Finish. Not less than two coats of enamel over a rust-inhibiting prime coat.

D. Type.
   1. Indoors. NEMA 1.
   2. Outdoors. NEMA 4X.

2.3 SURFACE RACEWAYS AND FITTINGS

A. Provide two compartment aluminum raceway for power and data. See plans for specifications.

2.4 CABLE TRAY AND FITTINGS

A. Cable tray shall be 18” wide by 6” deep, B-Line series WB618 or equal.

B. Tray: NEMA VE 1/CSA E22.2 No. 126.1.

C. Material and Finish of Tray, Fittings, and Accessories: Electroplated yellow zinc dichromate per ASTM B633 SC2.

D. Inside radii of fittings: as indicated on Telecom Drawings

E. Accessories and Fittings: Manufacturer's standard clamps, tees, hangers, brackets, splice plates, reducer plates, blind ends, barrier strips, connectors, and grounding straps.

F. Warning signs for cable trays:
1/2-inch high black letters on yellow plastic with the following wording: “WARNING! DO NOT USE CABLE TRAY AS WALKWAY, LADDER, OR SUPPORT. USE ONLY AS MECHANICAL SUPPORT FOR CABLES AND TUBING!”

PART 3 - EXECUTION

3.1 CONDUIT AND FITTINGS

A. Minimum Trade Size. 3/4 inch, except that 1/2-inch flexible metal conduit may be used in lengths not exceeding 72 inches for tap conductors supplying lighting fixtures.

B. Types According to Use.
1. Use hot dipped galvanized rigid steel conduit (RGS) outside above ground where exposed to weather.
2. Use EMT in interior walls or ceiling spaces and where exposed in open work areas, mechanical rooms or electrical rooms. Conduit that enters or leaves the top of panelboards or enclosures may be EMT, provided such panelboards and enclosures are located in mechanical or electrical rooms.
3. Conduits may not be embedded in slabs without approval of the owner and the structural engineer.
4. Use rigid nonmetallic conduit (Type EB) encased in concrete with minimum 3-inch-thick walls, where installed below grade. Concrete encasement may be omitted when conduit is used for site lighting circuits. In these cases use Schedule 40 PVC. All horizontal to vertical transitions shall be made using RGS elbows RGS conduit stub-ups. Seal all conduits weather tight.
5. Connect all indoor electrical equipment subject to vibration or movement with flexible metal conduit 24 inches minimum length. Where the equipment is located in a duct or plenum used for environmental air, the length of conduit shall not exceed 4 feet and the conduit shall be flexible metal conduit. Where the equipment is located outdoors or exposed to water, liquid-tight flexible metal conduit shall be used.
6. Transitions.
   a. Continue the heavier, more protective type conduit application not less than 4 inches into the area where lighter, less protective type conduit is permitted.
   b. For below-grade to above-grade outdoor locations, extend concrete encasement around conduit 4 inches above finished grade and slope top away from conduit with a 6-inch-per-foot slope.
   c. For below-grade to above-grade locations using PVC to metal conduit, make the transition from PVC to metal conduit before turning up with RGS elbow.

C. Preparation. Place sleeves in walls and floor slabs for the free passage of cables or conduits. Set sleeves in place a sufficient time ahead of concrete placement so as not to delay the work. Seal all openings and voids around sleeves through floors and walls. Be sure that plugs or caps are installed before concrete placement begins.

D. Installation Requirements.

1. Metallic conduits must be continuous between enclosures such as outlet, junction and pull boxes, panels, cabinets, motor control centers, etc. The conduit must enter and be secured to enclosures so that each system is electrically continuous throughout. Where knockouts are used, provide double locknuts, one on each side. For EMT terminations, provide insulated throat bushings and on rigid metallic conduits, provide nonmetallic insulating bushings for conductor protection. Where feeder conduits, 1-1/2 inches and larger, terminate in equipment having a ground bus, such as in switchgear, motor control centers and panelboards, provide conduit with an insulated grounding bushing and extend a suitable grounding wire to the ground bus.
2. Have rigid nonmetallic conduit adequately solvent welded at joints to form a tight, waterproof connection.
3. Run concealed conduit as directly and with the largest radius bends as possible. Run exposed conduit parallel or at right angles to building or other construction lines in a neat and orderly manner. Conceal conduit in finished areas. Unless otherwise shown, remaining conduit may be exposed. Provide chrome-plated floor and ceiling plates around conduits exposed to view and passing through walls, floors, partitions, or ceilings in finished areas. Select properly sized plates to fit the conduit when securely locked in place.

E. Installation Methods.

1. Install each entire conduit system complete before pulling in any conductors. Clean the interior of every run of conduit before pulling in conductors to guard against obstructions and conduit omissions.
2. Cut all joints square, then thread and ream smooth. Coat cuts, threads or scratches on steel conduit with an approved zinc chromate or with a 90 percent based zinc paint. When dry, draw up tight.
3. Make bends with minimum 24” radius. Make field bends using equipment designed for the particular conduit material and size involved. Bends must be free from dents or flattening. Use no more than the equivalent of four 90-degree bends in any run between terminals and cabinets, or between outlets and junction boxes or pull boxes.
4. Conduit bodies may be used in lieu of conduit ells where ease of installation and appearance warrants their use. Conduit bodies larger than 1 inch may be used only where approved.
5. Securely fasten and support conduit to structure or metal framing using hot-dipped galvanized, malleable iron pipe straps or other approved means. Wires of any type may not be used for securing conduits. Branch circuit raceways which are 1 inch or smaller may be attached to wall studs by use of manufactured clips.
6. Provide a No. 30 nylon pulling line in conduits in which wiring is not installed under this work. Identify both ends of the line by means of labels or tags reading "Pulling Line - Telephone," etc.
7. Suitably cap conduit during construction to avoid water, dirt and trash entrance.
8. Use expansion-deflection fittings on conduit crossing structural expansion joints and on exposed conduit runs where necessary. Provide bonding jumpers across fittings in metal raceway systems.
9. Use expansion fittings in conduit that terminates at sensitive equipment.
10. With a coupling, terminate concealed conduit for future use at structural surfaces. Install a pipe plug flush with the surface.
11. Openings around electrical penetrations of fire-resistance rated walls, partitions, floors or ceilings shall be firestopped to maintain the fire resistance rating using approved methods.
12. ~~**DELETE THIS PARAGRAPH IF THERE IS NO BSL-3 IN BUILDING**~~

~~For biosafety level 3 (BL-3) vivarium facilities: All device boxes shall be cast type. Where device boxes and conduits are recessed mounted, the box to the adjacent wall, ceiling or floor surface shall be sealed. All wiring shall be provided in threaded rigid galvanized steel (RGS) or intermediate metal conduits (IMC)(only when recessed). All device boxes shall be cast type. Once wiring is installed, the wiring shall be surrounded by a one inch barrier of silicone caulking around the conductors within the device box hub. Gasketed device cover plates shall be used, with an additional continuous bead of silicone caulk between the device plate and the adjacent wall, ceiling, or floor surface. Where device boxes and conduits are surface mounted, and where the device box meets the wall, ceiling, or floor surface, a continuous bead of silicone caulk shall be provided. Non-recessed conduits are then required to be on minimum ¾" standoffs, or if also surface mounted, both sides of the conduit shall be sealed to adjacent surfaces with silicone caulk. This provides for a gas tight electrical installation allowing decontamination of the BL-3 space, and prevents vermin harborage in and transmission through the electrical distribution systems.~~

~~13.~~ ~~**DELETE THIS PARAGRAPH IF THERE IS NO BSL-2 IN BUILDING**~~

~~For biosafety level 2 (BL-2) vivarium facilities: All device boxes shall be cast type. Where device boxes and conduits are recessed mounted, the box to the adjacent wall, ceiling or floor surface shall be sealed. All wiring shall be provided in either threaded RGS, IMC (when recessed), or electrical metallic tubing (only when recessed and with compression fittings). Once wiring is installed, the wiring shall be surrounded by a one inch barrier of silicone caulking around the conductors within the device box hub. Gasketed device cover plates shall be used, with an additional continuous bead of silicone caulk between the device plate and the adjacent wall, ceiling, or floor surface. Where device boxes and conduits are surface mounted, and where the device box meets the wall, ceiling, or floor surface, a continuous bead of silicone caulk shall be provided. Non-recessed conduits are then required to be threaded RGS on minimum ¾" standoffs, or if also surface mounted, both sides of the conduit shall be sealed to adjacent surfaces with silicone caulk. This prevents vermin harborage in and transmission through the electrical distribution systems.~~

3.2 WIREWAYS

A. Install wireways, where shown, according to NEC Article 376. Field apply a 90 percent zinc paint coating over cuts or scratches before any other finish is applied.

3.3 SURFACE RACEWAYS

A. Install surface raceways, where shown, according to NEC Article 300. Securely ground raceway and fittings. Provide bushings at raceway entrances. Raceways shall be two compartment, top for receptacles and bottom for data. Provide power conduit and wiring as shown on plans. Provide 1-1 ¼" conduit from data compartment to cable tray. Conduit shall terminate in a flush mounted box at surface raceway location. Provide a 2" nipple between the box and the back of the surface raceway.

3.4 CABLE TRAY

A. Install in conformance with NEC and NEMA requirements and in accordance with manufacturer's instructions. Arrange cable tray to maintain headroom and present neat appearance. Cables shall be arranged in cable trays in a neat, workmanlike manner.

B. All cable tray cuts/modifications shall be done with manufacturer approved cutters.

C. Support cable tray a minimum of every 5’ on center with manufacturer provided trapeze support kit. Kit shall be a B-Line Model WB5518 for use with 3/8” all thread rod. Provide all accessories necessary for a complete installation. Support cable tray at each connection point, at the end of each run, and at other points to maintain spacing between supports of 5 feet maximum. Trays shall be level.

D. Contactor shall utilize manufacturer’s standard components. Where standard components are not available, modifications shall be per manufacturers instructions/specifications.

E. Provide a continuous solid barrier that is electrically continuous installed in all sections of the cable tray. The purpose of the barrier is to separate AV cables from telecom cables. Place the barrier such that ¼ of the tray will be for AC cabling and ¾ of the tray will be for telecom cables.

F. Where it is necessary to make field changes in the tray system, all changes shall be made per manufacturers recommendations.

G. Maintain twelve-inch clearance between cable tray and surfaces with temperatures exceeding 104 degrees F, such as flues, steam pipes, and heating appliances. Maintain at least 4-inch clearance between cable tray and piping, ductwork or other interference. Any deviation from this must be approved by the Owner. It shall be the Contractor's responsibility to protect existing cable tray in the area of construction against damage throughout the construction period. Any damaged cable tray shall be replaced by the Contractor at no additional cost prior to final acceptance by the Owner.

H. All communication cable trays shall have a continuous, No. 6, green insulated copper grounding conductor run inside the tray. Connect to tray at each fitting or tray section. Connect the tray at each end to the ground bar in the telecom room with #4 AWG. All bonds shall be via exothermic weld. The direction of the welded bond shall be oriented in the correct direction along bonding backbone.

I. Maintain electrical continuity between sections of cable tray using manufacturer provided splice plates and bond cable trays at the both ends to building ground plates to provide a continuous grounding path. Install copper braided bonding jumpers around expansion joints and hinged adjustable splice plates where electrical discontinuity occurs. Install cable trays, where shown, according to NEC Article 392. Install cable trays in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 26 51 00

INTERIOR AND EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the furnishing and installation of luminaires complete with lamps, ballasts, and other accessories.

1.2 REFERENCE STANDARDS

A. ANSI C78 Series - Lamps.

B. ANSI C82 Series - Ballasts.

C. ANSI/UL 844 - Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.

D. ANSI/UL 935 - Fluorescent-Lamp Ballasts.

E. ANSI/UL 1029 - High-Intensity-Discharge Lamp Ballasts.

F. ANSI/UL 1570 - Fluorescent Lighting Fixtures.

G. ANSI/UL 1571 - Incandescent Lighting Fixtures.

H. ANSI/UL 1572 - High-Intensity-Discharge Lighting Fixtures.

I. ANSI/UL 1574 - Track Lighting Systems.

J. EPA SW 846 - Test Methods for Evaluating Solid Waste.

K. NFPA 70 - National Electrical Code (NEC).

L. NFPA 101 - Life Safety Code.

M. UL 924 - Emergency Lighting and Power Equipment.

1.3 RELATED WORK

A. Section 26 00 00, Electrical General Provisions.

B. Section 26 05 33, Raceways.

1.4 SUBMITTALS

A. Submit product data on each luminaire, emergency lighting unit, exit sign, with separate sheet for each luminaire, assembled by luminaire "type" in alphabetical order, with the proposed luminaire, ballast or Driver, lamps, and accessories clearly labeled.
   1. Include with submittal data dimensioned drawings and performance data including coefficients of utilization, candela distribution, spacing to mounting height ratio, efficiency, efficacy, and visual comfort probability.

B. LED: Provide documentation for performance of LED luminaires including LM 79, LM 80 reports and L70, L80 or L85 test results. Provide documentation for listed tolerances for variation in temperature color, or “binning”. Binning documentation shall include MacAdam steps diagram with range of binning clearly indicated. Provide testing data that clearly indicates listed environmental conditions for installation of luminaire including ambient temperature.
   1. LED luminaires with remote drivers shall clearly indicate required wattage and voltage tolerance of driver and maximum range for which driver can be installed remote to LED luminaire.
   2. Provide power requirements for complete LED fixture package clearly indicating the lumen package and power consumption of the entire fixture package.
      a. Data indicating only lumen package and power requirements for individual LED modules incorporated into the complete fixture package is not acceptable.

C. Samples.
   1. When requested in writing by the Owner’s Representative or the Engineer, furnish samples of luminaire types.
   2. Deliver samples for luminaire types as requested, at a time and place designated by the requestor (Owner’s Representative or the Engineer).
   3. Samples shall be complete product models as proposed for use on the project.
   4. Furnish samples to the Owner at no additional cost.
      a. Samples shall not be installed on the project without the written consent of the Owner’s Representative and the Architect/Engineer.
      b. Upon written concurrence from the Owner’s Representative, samples furnished for the project may be retained by the Contractor for delivery as “spares” following Owner’s acceptance of the completed project.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A.

B. Frames.
   1. Frames shall be flush steel, hinged and equipped with rotary-action cam latches. Alternate materials are indicated in Luminaire Schedules on Drawings.
   2.

C. Manufacturer. Luminaires are specified by type and manufacturer in the Luminaire Schedule on the Drawings. Equivalent products of manufacturers listed below will be considered upon submission of product data in accordance with paragraph 1.7 of Section 26 00 00 and with paragraph 1.4 of this Section.
   1. LED. Acuity/Lithonia, Cooper, ILEX, Hubbell, Ledos.
   2. Emergency Lighting Units. Refer to paragraph 2.4, this Section.

2.2 LAMPS

A. General. Provide lamps for luminaires. Types are specified in the Luminaire Schedule on the Drawings.

B. Light Emitting Diodes (LED) or Solid State Lighting
1. Provide luminaire package with temperature variance limited to three MacAdam steps as defined in ANSI C78.377.
2. Provide luminaire that is factory tested as a complete package with a LM-79 and LM-80 report.
3. Provide luminaire with individual LED boards. Replacement of individual LED boards shall be capable to be performed in the field and shall not require replacement of the entire unit or fixture.
4. Provide fixture with minimum 5 year warranty covering complete luminaire package.
5. Provide LEDs with phosphorous coating, for creation of white LEDs, at the individual LEDs and not at the luminaire lens or housing.
6. Provide luminaire with quick disconnect for LED drivers and individual LED boards.
7. Provide LED fixtures compatible with 0-10V or DALI non-proprietary controls.
8. Provide LED luminaires with appropriately sized heat sink.

2.3 BALLASTS

A. General. Provide ballasts for luminaires as required and as scheduled.

B. Light Emitting Diode (LED) Drivers
1. UL Listed as a complete assembly with luminaire,
2. RoHS and FCC compliant.
3. Minimum 5 year warranty.
4. Comply with NEMA 410 for in-rush current limits.
5. UL Class 2 power limited per UL1310.
6. UL dry and damp location listed.
7. Power factor greater than 0.90 and <20% THD.
8. Driver shall operate at specified input voltage with sustained variation of +/- 10% with no damage to the driver.
9. Integral surge protective device.
10. Driver shall tolerate sustained open circuit and short circuit output conditions without fail and auto-resetting without need for external fuses or trip devices.
11. Minimum operating temperature -20C.
12. Driver output regulated +/- 5% over published load range. Output shall be compatible with LED board in specified luminaire.
13. Output current controls local to the driver (trimpot or programmable).
14. If specified on the Drawings, the driver shall dim within the range specified on the fixture schedule with no flicker.
15. Driver shall have integral thermal foldback to reduce driver power above rated case temperature to protect the driver if temperatures reach unacceptable levels.

C. Listings.
1. LED - UL1310 - Class 2 power supplies

2.4 EMERGENCY BATTERY PACK/BALLAST

A. Where indicated on luminaire schedule or plans, provide luminaires with emergency ballasts. Emergency ballasts shall automatically provide for a minimum of 90 minutes of illumination in the event of loss of normal power to the building. Where larger capacity is indicated on plans or schedules, provide unit with larger capacity.

B. Emergency battery packs/ballasts shall comply with the following requirements:
1. Exceed the NEC, LSC, and UL 90-minute requirements, and carry the UL label.
2. Contain high-temperatures nickel cadmium batteries that are maintenance free and fully recharge within 24 hours.
3. Are backed by full (non pro-rata) warranties, 5-year for linear fluorescent lamps and 2-year for compact fluorescent lamps.
4. Capable of operating one or two lamps, with minimum lumen output as indicated on the Drawings.
5. Provide self-diagnostics/self-testing with the lighting unit.

C. Manufacturer. Bodine, and the scheduled luminaire manufacturers.

2.5 EMERGENCY LIGHTING UNITS

A. See plans.

B. Where batteries are provided, refer to section 2.4.

PART 3 - EXECUTION

3.1 DELIVERY, STORAGE AND HANDLING

A. Deliver luminaires, exit signs, emergency lighting units, and accessories individually wrapped in factory-fabricated fiberboard type containers.

B. Handle luminaires, exit signs, emergency lighting units, and accessories carefully to prevent breakage, denting and scoring the luminaire finish. Do not install damaged units.

C. Store luminaires, exit signs, emergency lighting units, and accessories in a clean, dry space, elevated above grade, and protected from the weather and sunlight.

D. Refer to paragraph 3.2 of Section 26 00 00, Electrical General Provisions.

3.2 COORDINATION

A. Prior to ordering luminaires, check the type of ceilings to be installed in each room and verify that the luminaires are proper and compatible for the type of ceiling as specified and as indicated on the architectural Drawings. Provide a frame compatible with the type of ceiling in which the luminaire is installed. Refer to the Drawings and the Architectural Room Finish Schedule for the specified ceiling type. Advise the Owner's Representative of discrepancies before placing the luminaire order.

B. Check the building electrical system requirements and architectural finishes, and regardless of the catalog number prefixes and suffixes shown, furnish luminaires with the proper trim, frames, plaster rings, supports, hangers, stems, mounting brackets, ballasts, voltage rating, and other miscellaneous appurtenances to properly coordinate with said conditions. Verify with Owner's Representative prior to ordering.

C. If a luminaire type designation is omitted, furnish luminaire of the same type as shown for rooms of similar usage. Verify with Owner's Representative before purchase and installation.

D. Examine the areas and conditions which luminaires are to be installed and notify the Owner's Representative and the Architect/Engineer in writing of conditions detrimental to the proper and timely completion of the work. Include written plan for correction of deficiencies and conditions noted. Do not proceed with the work until unsatisfactory conditions have been corrected.

E. Verify that the occupancy sensors are compatible with the specified ceiling systems as indicated on the Drawings. Advise the Architect/Engineer of discrepancies before placing the device order.

F. Verify that the fluorescent dimmers are compatible with the specified dimming ballasts, as indicated on Drawings.

G. Coordinate luminaire installation with lighting controls per Section 26 09 23, with architectural dimming system per Section 26 09 33, and with digital network addressable lighting controls per Section 26 09 43.

3.3 INSTALLATION

A. Install luminaires in accordance with the manufacturer's written instructions, Owner's requirements, the applicable requirements of NEC and local and national Codes, Standards, and regulations.

B. Install luminaires at locations as shown on the Drawings, install aligned, aimed, and leveled. Install luminaires in accordance with manufacturer's installation instructions complete with mounting accessories, trim and support materials.

C. Support.
1. Provide hangers and support members for luminaires as required for proper installation. Provide appurtenances which include stud supports, stems, mounting brackets, frames and plaster rings.
2. Support luminaires from the building structure or from furring channels. Furring channels must be a minimum size of 1-1/2 inches. Luminaires in suspended ceilings shall be supported in accordance with NEC 410.
3. Fasten luminaires securely to structural support members of the building. Support grid-type lay-in luminaires from the structure above at each corner of luminaire. 1/4 inch expansion slip ring anchorage with eye and ceiling-type support wire is permitted. Two wires may be supported by one anchorage if required by construction conditions, such as obstructions by other system. Solid pendant luminaires shall be plumb.

4. Provide support for 1/2 inch pre-manufactured flexible metal conduit (FMC) whips from structure above. Whips shall not touch ceiling system as finally installed. Whips shall be kept 12 inches clear of ceiling except where required for termination at luminaires. Use of “fixture support wire installation” with caddy clip is permitted.
5. Flexible metal conduit from junction box to luminaire shall not touch the ceiling as finally installed.

D. Coordinate with other crafts to avoid conflicts between luminaires, supports, fittings and mechanical equipment.

E. Surface Mounted Luminaires.
1. Mount with support rails attached to ceiling suspension support system, provided ceiling system has been certified to be suitable to support weight of luminaires.
2. Where ceiling system has not been certified to support weight of luminaires, luminaires shall be supported at four points near each corner of luminaires.
3. Provide a minimum 5/8" air space between the luminaires and the ceiling.

F. Recessed Luminaires.
1. Handle specular/semi-specular louvers and down light cones using only new clean white cotton or silk gloves. Do not touch louvers or cones with bare hands. Leave luminaires clean and free of visible dust, debris, or fingerprints with lamps operational at time of acceptance of work.
2. Recessed fluorescent luminaires in lay-in grid shall be supported independently from building structure above ceiling with galvanized steel wire at not less than 4 points near corners of luminaires. Size of wire shall be capable of supporting weight of luminaires. This requirement is separate and apart from hanger wire requirements of the ceiling grid.
3. Recessed luminaire trims shall fit snugly to the mounting surface and shall not exhibit light leaks or gaps. Provide feed-through junction boxes or provide separate junction boxes. Components shall be accessible through the ceiling opening.

G. Protect installed luminaires from damage during the remainder of the construction period.

H. Luminaires must be completely wired and lamps installed. Luminaires must be operating properly at final completion.

I. Adjustment.
1. Adjust luminaires to illuminate intended areas as directed.
2. Adjust exterior luminaires during hours of darkness. Where acceptable to the Owner’s Representative, exterior luminaires may be adjusted during daylight hours; verification of adjustments shall be conducted during hours of darkness.

J. Upon completion of installation of interior luminaires, and after circuitry has been energized, apply electrical energy to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at the site, then retest to demonstrate compliance; otherwise, remove and replace with new units, and proceed with retesting.

K. Immediately before final observation, clean luminaires, inside and out, including plastics and glassware, and adjust trim to properly fit adjacent surface, replace broken or damaged parts and lamp, and test luminaires for electrical as well as mechanical operation.

L. Fluorescent lamps may be used in the final finishing of the building. Those lamps that have exceeded more than 10% of their rated life (as established by construction records), or that have darkened ends shall be replaced with new lamps before final acceptance.

M. Linear and compact fluorescent lamps installed in luminaires with fluorescent dimming ballasts shall be "burned-in" at full brightness for 100 hours prior to dimming operation of lamps, and prior to final acceptance by Owner.

N. Lamp Disposal. The procedure for disposal of lamps that contain mercury shall follow the guideline set by EPA (definitions in Title 40 Code of Federal Regulations 261 Subpart C, January 2000).

O. At Owner's option, up to 30% of the fluorescent luminaires shall be opened by the Contractor for inspection. The luminaires may be inspected prior to or after installation. If instant-start ballasts are found, luminaires shall be opened, inspected and the instant start ballasts replaced with approved programmed rapid start ballasts at Contractor's expense.

3.4 TESTING

A. The Contractor shall demonstrate to the Owner the proper operation of luminaires, systems and equipment specified in this Section and related Sections. The Contractor shall adjust, repair or replace as necessary components that do not perform as specified, until able to demonstrate proper operation of equipment in normal, automatic, manual, emergency, power-loss, and power-restored modes of operation, as applicable.

END OF SECTION

ELECTRICAL ONE-LINE AND CONTROL SYMBOLS

- SURGE SUPRESSOR, METAL OXIDE VARISTOR (MOV) MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV) AS NOTED
- POWER TRANSFORMER
- MOLDED OR INSULATED CASE CIRCUIT BREAKER
- CIRCUIT BREAKER WITH SHUNT TRIP COIL (ST)
- DISCONNECT SWITCH, NON-FUSIBLE
- DISCONNECT SWITCH, FUSIBLE
- FUSE
- TRANSFER SWITCH
- CURRENT TRANSFORMER
- CURRENT TRANSFORMER, ZERO SEQUENCE
- VOLTAGE OR POWER TRANSFORMER
- DELTA CONNECTED
- OPEN DELTA CONNECTED
- WYE CONNECTED
- GROUND
- GROUNDED WYE
- PROTECTIVE RELAY FUNCTION, ANSI DESIGNATION AS NOTED
- KEY INTERLOCK (K)
- SURGE PROTECTIVE DEVICE (SPD)
- SPACE HEATER
- DIGITAL MULTI-METER (DM)
- METER (M)
- GENERATOR THREE PHASE SIZE AS NOTED
- MOTOR, THREE-PHASE, HP AS NOTED
- TWO SPEED MOTOR - HP AS NOTED
- MOTOR, SINGLE PHASE, HP AS NOTED (M 1/4)
- VARIABLE FREQUENCY DRIVE (VFD)
- MAGNETIC MOTOR STARTER
- OVERLOAD
- CONTACTOR COIL
- CONTROL RELAY
- CONTACT, NORMALLY OPEN
- CONTACT, NORMALLY CLOSED
- INDICATING LAMP, COLOR AS NOTED, R RED, G GREEN, A AMBER, W WHITE (R)
- SELECTOR SWITCH
- SELECTOR SWITCH, HAND-OFF-AUTOMATIC (OFF; HAND AUTO)
- SELECTOR SWITCH, ON-OFF (ON OFF)
- NORMALLY OPEN PUSHBUTTON, MOMENTARY CONTACT
- NORMALLY CLOSED PUSHBUTTON, MAINTAINED CONTACT
- PUSHBUTTON, MAINTAINED CONTACT
- PANELBOARD
- CONTROL PANEL (CP)
- CONNECTION POINT
- EQUIPMENT ENCLOSURE
- VIBRATION SWITCH (VS)

FIRE ALARM SYMBOLS

- MFAP — MAIN FIRE ALARM PANEL
- FAAP — FIRE ALARM ANNUNCIATOR PANEL
- FACP — FIRE ALARM CONTROL PANEL
- F — MANUAL FIRE ALARM PULL STATION
- DH — FIRE ALARM DOOR HOLD OPEN
- IM — FIRE ALARM INPUT MODULE
- FSD — FIRE/SMOKE DAMPER
- FS — FIRE ALARM FLOW SWITCH
- TS — FIRE ALARM TAMPER SWITCH
- S — SMOKE DETECTOR
- H — HEAT DETECTOR
- D — DUCT MOUNTED SMOKE DETECTOR
- RM — FIRE ALARM RELAY MODULE
- F — FIRE ALARM SPEAKER STROBE
- V — FIRE ALARM VISUAL NOTIFICATION DEVICE
- F — FIRE ALARM SPEAKER STROBE - CEILING MOUNTED
- S — FIRE ALARM VISUAL NOTIFICATION DEVICE - CEILING MOUNTED

KEYED NOTES SYMBOL (#)

ABBREVIATIONS

A,AMP	AMPERES	LCP	LIGHTING CONTROL PANEL
AC	ALTERNATING CURRENT, AIR COMPRESSOR	LED	LIGHT EMITTING DIODE
ACC	AIR COOLED CHILLER	LP	LIGHTNING PROTECTION
AD	AIR DRYER	LR	LOCAL-REMOTE
AF	AMPERE FRAME	LRA	LOCKED ROTOR AMPERES
AFF	ABOVE FINISHED FLOOR	LS	LONG TIME, SHORT TIME
AFG	ABOVE FINISHED GRADE	LSI	LONG TIME, SHORT TIME, INSTANTANEOUS
AHU	AIR HANDLING UNIT	LSG	LONG TIME, SHORT TIME, GROUND
AIC	AMPERES INTERRUPTING CAPACITY	LSIG	LONG TIME, SHORT TIME, INSTANTANEOUS, GROUND
AL	ALUMINUM		
ARCH	ARCHITECT, ARCHITECTURAL	LI	LONG TIME, INSTANTANEOUS
AT	AMPERE TRIP	LIG	LONG TIME, INSTANTANEOUS, GROUND
ATS	AUTOMATIC TRANSFER SWITCH		
AUX	AUXILIARY	mA	MILLIAMPS
AV	AUDIO VISUAL	MAX	MAXIMUM
AWG	AMERICAN WIRE GAUGE	MCB	MAIN CIRCUIT BREAKER
		MCC	MOTOR CONTROL CENTER
B	BOILER	MCP	MOTOR CIRCUIT PROTECTOR
BF	BALLAST FACTOR	MECH	MECHANICAL
BAS	BUILDING AUTOMATION SYSTEM	MFAP	MAIN FIRE DETECTION & ALARM PANEL
BCP	BOILER CONTROL PANEL	MFR	MANUFACTURER
BFP	BOILER FEEDWATER PUMP	MH	METAL HALIDE
BKR	BREAKER	MLO	MAIN LUGS ONLY
BLDG	BUILDING	MOV	METAL OXIDE VARISTOR
BFDF	BOILER FORCED DRAFT FAN	MTD	MOUNTED
BIDF	BOILER INDUCED DRAFT FAN	MV-90, 105	MEDIUM VOLTAGE CABLE 90C, 105C
		MVA	MEGA VOLT AMPERES
CL	CENTERLINE	MW	MEGA WATTS
C	CONDUIT		
CAFSS	CLEAN AGENT FIRE SUPPRESSION SYSTEM	N, NEU	NEUTRAL
CAOP	CHILLER AUXILIARY OIL PUMP	NC	NORMALLY CLOSED
CATV	CABLE TELEVISION SYSTEM	NEC	NATIONAL ELECTRICAL CODE
CB	CIRCUIT BREAKER	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
CCP	CHILLER CONTROL PANEL		
CCTV	CLOSED CIRCUIT TELEVISION SYSTEM	NIC	NOT IN CONTRACT
CDP	CONDENSATE PUMP	NO	NORMALLY OPEN
CH	CHILLER	#	NUMBER
CHP	CHILLED WATER PUMP	NTS	NOT TO SCALE
CKT	CIRCUIT		
CLG	CEILING	OAS	OR APPROVED SUBSTITUTION
CMH	COMMUNICATIONS MANHOLE	OCPD	OVERCURRENT PROTECTIVE DEVICE
COAX	COAXIAL CABLE	OC	ON CENTER
CONT	CONTINUATION	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
COORD	COORDINATION, COORDINATE	OFOI	OWNER FURNISHED, OWNER INSTALLED
CP	CONTROL PANEL	OH	OVERHEAD
CPT	CONTROL POWER TRANSFORMER	OL	OVERLOAD
CSU	COLLEGE STATION UTILITIES		
CT	CURRENT TRANSFORMER, COOLING TOWER	P	POLE
CTF	COOLING TOWER FAN	PA	PUBLIC ADDRESS
CTR	CONTROLLER, CENTER	PB	PULL BOX
CU	COPPER, CONDENSING UNIT	PCHP	PRIMARY CHILLED WATER PUMP
CV	CONSTANT VOLUME TERMINAL UNIT	PDU	POWER DISTRIBUTION UNIT
CWP	CONDENSER WATER PUMP	PF	POWER FACTOR
		PFCC	POWER FACTOR CORRECTION CAPACITOR
DA	DEAERATOR	PH	PHASE
DATACOM	DATA AND/OR COMMUNICATION	PIR	PASSIVE INFRARED
DB	DUCT BANK	PLC	PROGRAMMABLE LOGIC CONTROLLER
DC	DIRECT CURRENT	PMH	POWER MANHOLE
DCS	DISTRIBUTED CONTROL SYSTEM	PMT	PAD MOUNT
DDC	DIRECT DIGITAL CONTROL	PNL	PANELBOARD
DEMO	DEMOLITION	PS	PROGRAMMED START
DIP	DEIONIZED WATER PUMP	PVC	POLYVINYL CHLORIDE
DIV	DIVISION	PVC-RGS	PVC COATED RIGID GALVANIZED STEEL CONDUIT
DPDT	DOUBLE POLE, DOUBLE THROW		
DPST	DOUBLE POLE, SINGLE THROW	RAC	RIGID ALUMINUM CONDUIT
DWG	DRAWING	RCPT	RECEPTACLE
DWP	DOMESTIC WATER PUMP	RE	REFER TO, REGARDING, REFERENCE
		RFAP	REMOTE FIRE DETECTION & ALARM PANEL
E, EM	EMERGENCY	RGS	RIGID GALVANIZED STEEL CONDUIT
EA	EACH	RL	RAISE-LOWER
EC	EMPTY CONDUIT	RMS	ROOT MEAN SQUARE
EDF	ELECTRIC DRINKING FOUNTAIN	ROP	REVERSE OSMOSIS PUMP
EF	EXHAUST FAN	RS	RAPID START
EG	EQUIPMENT GROUND	RTD	RESISTANCE TEMPERATURE DETECTOR
EGP	ELECTRONIC GRADE PANEL	RVAT	REDUCED-VOLTAGE AUTO TRANSFORMER
ELS	EMERGENCY LIFE SAFETY		
EMS	ENERGY MANAGEMENT SYSTEM	SCADA	SUPERVISORY CONTROL & DATA ACQUISITION
EMT	ELECTRIC METALLIC TUBING	SCH	SCHEDULE
EPR	ETHYLENE-PROPYLENE RUBBER	SCHP	SECONDARY CHILLED WATER PUMP
EIWH	ELECTRIC INSTANT WATER HEATER	SEP	SEWAGE EJECTOR PUMP
EXIST	EXISTING	SF	SUPPLY FAN
		SHLD	SHIELDED
FA	FIRE DETECTION AND ALARM SYSTEM	SP	SUMP PUMP
FCU	FAN COIL UNIT	SPD	SURGE PROTECTION DEVICE
FCV	FAN-CONSTANT VOLUME TERMINAL UNIT	SPDT	SINGLE POLE, DOUBLE THROW
FLA	FULL LOAD AMPS	SPST	SINGLE POLE, SINGLE THROW
FO	FIBER OPTIC(S)	SPF	STAIRWELL PRESSURIZATION FAN
FP	FIRE PUMP	SS	STAINLESS STEEL
FSD	FIRE SMOKE DAMPER	SSOL	SOLID STATE OVER LOAD
FUT	FUTURE	STD	STANDARD
FVNR	FULL VOLTAGE NON-REVERSING	STP	SHIELDED TWISTED PAIR
FVV	FAN-VARIABLE VOLUME TERMINAL UNIT	SW	SWITCH
		SWBD	SWITCHBOARD
GAOP	GEAR AUXILIARY OIL PUMP	SWGR	SWITCHGEAR
GEN	GENERATOR	SYML	SYMMETRICAL
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	SYNCH	SYNCHRONOUS
GFEP	GROUND FAULT EQUIPMENT PROTECTION		
G, GND	GROUND	TELECOM	TELECOMMUNICATIONS
GRAP	GENERATOR REMOTE ANNUNCIATOR PANEL	TOP	TURBINE OIL PUMP
GWH	GAS-FIRED WATER HEATER	TSP	TWISTED SHIELDED PAIR
		TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
H	HOT	TYP	TYPICAL
HID	HIGH INTENSITY DISCHARGE		
HMT	HARMONIC MITIGATING TRANSFORMER	UG	UNDERGROUND
HOA	HAND OFF AUTOMATIC	UH	UNIT HEATER
HP	HORSEPOWER	UL	UNDERWRITER'S LABORATORY
HPS	HIGH PRESSURE SODIUM	UON	UNLESS OTHERWISE NOTED
HRG	HIGH RESISTANCE GROUND	UPS	UNINTERRUPTIBLE POWER SUPPLY
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING	UTP	UNSHIELDED TWISTED PAIR
HWC	HOT WATER CIRCULATING PUMP		
HWP	HEATING WATER PUMP	V	VOLTS
		VA	VOLT AMPERES
I/O	INPUT/OUTPUT	VAC	VOLTS ALTERNATING CURRECT
IG	ISOLATED GROUND	VAR	VOLT AMPERES REACTIVE
IR	INFRARED	VDC	VOLTS DIRECT CURRENT
IRR	IRRIGATION	VFD	VARIABLE FREQUENCY DRIVE
IS	INSTANT START	VP	VACUUM PUMP
		VT	VOLTAGE TRANSFORMER
J, JB	JUNCTION BOX	VV	VARIABLE VOLTAGE TERMINAL UNIT
JP	JOCKEY PUMP		
		W	WIRE
K	KILO, THOUSAND	W/	WITH
KA	KILOAMPERES	WG	WIRE GUARD
KAIC	THOUSAND AMPERES INTERRUPTING CAPACITY	WH	WATER HEATER
		WP	WEATHERPROOF
KCMIL	THOUSAND CIRCULAR MILS		
KV	KILOVOLT	XFMR	TRANSFORMER
KVA	KILOVOLT AMPERES		
KW	KILOWATT	Y	WYE
KWH	KILOWATT-HOUR		
		Z	IMPEDANCE
LTG	LIGHTING		
LC	LIGHTING CONTACTOR		

00-DRAWING LIST - ELECTRICAL

HALF SHADE CRITICAL POWER — FULL SHADE LIFE SAFETY POWER

ELECTRICAL PLAN SYMBOLS

- LUMINAIRE
- LUMINAIRE
- LUMINAIRE - EMERGENCY POWER
- LUMINAIRE - WALL WASH
- TRACK LIGHTING SYSTEM
- 2'X4' LUMINAIRE
- 2'X4' LUMINAIRE - EMERGENCY POWER
- 1'X4' LUMINAIRE - NORMAL POWER
- 1'X4' LUMINAIRE - EMERGENCY POWER
- LUMINAIRE WALL MOUNTED - NORMAL POWER
- LUMINAIRE WALL MOUNTED - EMERGENCY POWER
- STRIP LUMINAIRE
- STRIP LUMINAIRE - EMERGENCY POWER
- 2'X2' LUMINAIRE
- 2'X2' LUMINAIRE - EMERGENCY POWER
- TWIN HEAD WALL MOUNTED EMERGENCY LUMINAIRE - BATTERY OPERATED
- POLE MOUNTED LUMINAIRE
- LUMINAIRE FLUSH MOUNTED
- LUMINAIRE FLUSH MOUNTED - EMERGENCY POWER
- EXIT SIGN WITH DIRECTIONAL ARROWS AS INDICATED SHADING INDICATES NUMBER OF FACES & CONFIGURATION
- EXIT SIGN WALL MOUNTED

SUBSCRIPT DENOTES
X LETTER DENOTES TYPE

- DIRECTION ARROW FOR EXIT SIGN
- DIRECTION ARROW FOR EXIT SIGN
- S — SINGLE POLE SNAP SWITCH
- S_3 — THREE WAY SNAP SWITCH
- S_4 — FOUR WAY SNAP SWITCH
- S_K — KEY OPERATED SNAP SWITCH
- S_D — MANUAL DIMMER SWITCH
- S_M — SINGLE POLE HP RATED MOTOR DISCONNECT SWITCH
- S_{RL} — RAISE/LOWER SWITCH
- S_{LC} — LOCAL ROOM CONTROL FOR DIMMING AND/OR LIGHTING CONTROL SYSTEM.
- S_T — MANUAL TIMER SWITCH - O - 2 HOUR
- S_{WP} — SINGLE POLE SNAP SWITCH WITH WEATHERPROOF COVER

- Φ_a — SINGLE RECEPTACLE, SUBSCRIPT IS DEFINED AS FOLLOWS: a = NEMA 6-30R; b = 480V, 3-PHASE PLUS GND, 50A, HUBBELL #CS8165C, OAS; c = NEMA 15-30R
- Φ_Y — DUPLEX RECEPTACLE
- Φ_Y — SWITCHED RECEPTACLE
- Φ_Y — QUADRUPLEX RECEPTACLE
- Φ_Y — SINGLE RECEPTACLE MOUNTED FLUSH IN FLOOR BOX
- Φ_Y — SINGLE RECEPTACLE, SPECIAL PURPOSE MOUNTED FLUSH IN FLOOR BOX
- Φ_Y — DUPLEX RECEPTACLE MOUNTED FLUSH IN FLOOR BOX
- Φ_Y — QUADRUPLEX RECEPTACLE MOUNTED FLUSH IN FLOOR BOX

Y SUBSCRIPT DENOTES

WP	WEATHERPROOF
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
IG	ISOLATED GROUND
E	EMERGENCY
CM	MOUNTED FLUSH IN CEILING OR SURFACE OF STRUCTURE ABOVE

- OS — OCCUPANCY SENSOR WALL MOUNTED - DUAL TECHNOLOGY
- OS — OCCUPANCY SENSOR CEILING MOUNTED -360° COVERAGE - DUAL TECHNOLOGY
- PE — PHOTO ELECTRIC SWITCH
- LC — LIGHTING CONTACTOR
- LCP — LIGHTING CONTROL PANEL
- JUNCTION OR PULLBOX, WALL MOUNTED
- J — JUNCTION OR PULLBOX, CEILING MOUNTED
- J — JUNCTION OR PULLBOX, FLUSH MOUNTED IN FLOOR OR FLOORBOX AS NOTED ON PLANS
- DISCONNECT SWITCH, NON FUSIBLE, 30A, 3P UON
- DISCONNECT SWITCH, FUSIBLE, 30A, 3P UON
- STARTER, NEMA SIZE '1' UON
- COMBINATION SWITCH STARTER, NEMA SIZE '1' UON
- CB — ENCLOSED CIRCUIT BREAKER TYPE AND SIZE AS NOTED
- R — RELAY
- PUSH BUTTON
- K — KIRK KEY INTERLOCK
- BUZZER
- BELL

- EXISTING PANELBOARD SURFACE MOUNTED
- EXISTING PANELBOARD FLUSH MOUNTED
- LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARD - SURFACE MOUNTED
- LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARD - FLUSH MOUNTED
- POWER/DISTRIBUTION PANELBOARD - SURFACE MOUNTED
- POWER/DISTRIBUTION PANELBOARD - FLUSH MOUNTED
- EMERGENCY PANELBOARD-SURFACE MOUNTED
- EMERGENCY PANELBOARD-FLUSH MOUNTED
- T — TRANSFORMER
- GROUND ROD
- GROUNDING SYSTEM TEST WELL
- LIGHTNING PROTECTION AIR TERMINAL
- DM — DIGITAL MULTI-METER
- CONTINUATION
- CONDUIT EXPOSED
- EMERGENCY PANELBOARD-SURFACE MOUNTED
- CONDUIT CAPPED
- CONDUIT TURNED DOWN
- CONDUIT TURNED UP
- HOMERUN - ONE PHASE - ONE NEUTRAL, ONE GROUNDING CONDUCTOR
- HOMERUN - TWO PHASE, ZERO, ONE OR TWO NEUTRAL AS SCHEDULED BY TICK MARKS, ONE GROUNDING CONDUCTOR
- HOMERUN - THREE PHASE, ZERO, ONE OR THREE NEUTRAL AS SCHEDULED BY TICK MARKS, ONE GROUNDING CONDUCTOR
- M 1/6 — MOTOR SINGLE PHASE - HP AS NOTED
- 20 — MOTOR THREE PHASE - HP AS NOTED
- TWO SPEED MOTOR - HP AS NOTED
- GENERATOR THREE PHASE SIZE AS NOTED
- LP — LIGHTNING PROTECTION CONDUCTOR
- G — GROUNDING CONDUCTOR

LUMINAIRE SCHEDULE

TYPE	MANUFACTURER AND CATALOG NUMBER	DESCRIPTION	VOLTAGE	LAMPS	MOUNTING	MAX WATTS	REMARKS
LS	COLUMBIA #RLW-4-40-VL-FA-W-E-U-NXOS	4' HIGH LUMEN OUTPUT FOR STAIRWELLS AND EGRESS LIGHTING WITH INTEGRAL OCCUPANCY SENSOR	277	LED, 4000K, MIN 8000 LUMENS	WALL SURFACE	80	ELECTRONIC DRIVER, MOUNT 8' AFF
	METALUX #4SWLED-80HL-LW-UNV-L840-CD1-SVPD1-U						
	LITHONIA #BLWP4-85L-ADP-277V-EZ1-LP840-NES7						
LS2	COLUMBIA #RLW-2-40-ML-FA-W-E-U-NXOS	2' HIGH LUMEN OUTPUT FOR STAIRWELLS AND EGRESS LIGHTING WITH INTEGRAL OCCUPANCY SENSOR	277	LED, 4000K, MIN 3300 LUMENS	WALL SURFACE	30	ELECTRONIC DRIVER, MOUNT 8' AFF
	METALUX #2SWLED-28HL-LW-UNV-L840-CD1-SVPD1-U						
	LITHONIA #BLWP2-33L-ADP-277V-EZ1-LP840-NES7						

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA 133227 LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

ELECTRICAL LEGEND SYMBOLS AND ABBREVIATIONS

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E001
Scale	No Scale

1/6/2020 2:23:51 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

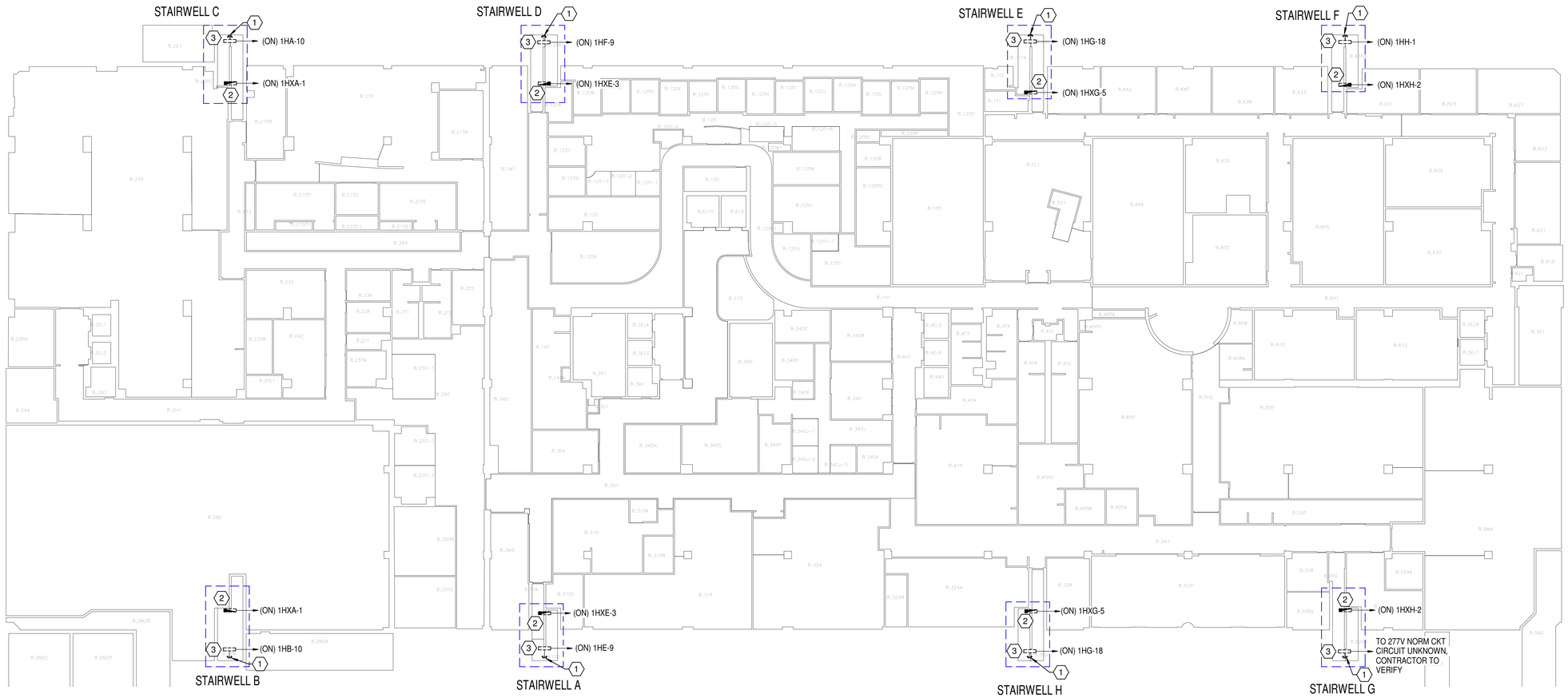
A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED100B

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.



1 BASEMENT DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH / Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
193207
LICENSED
PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

BASEMENT DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED100B
Scale	1/16" = 1'-0"

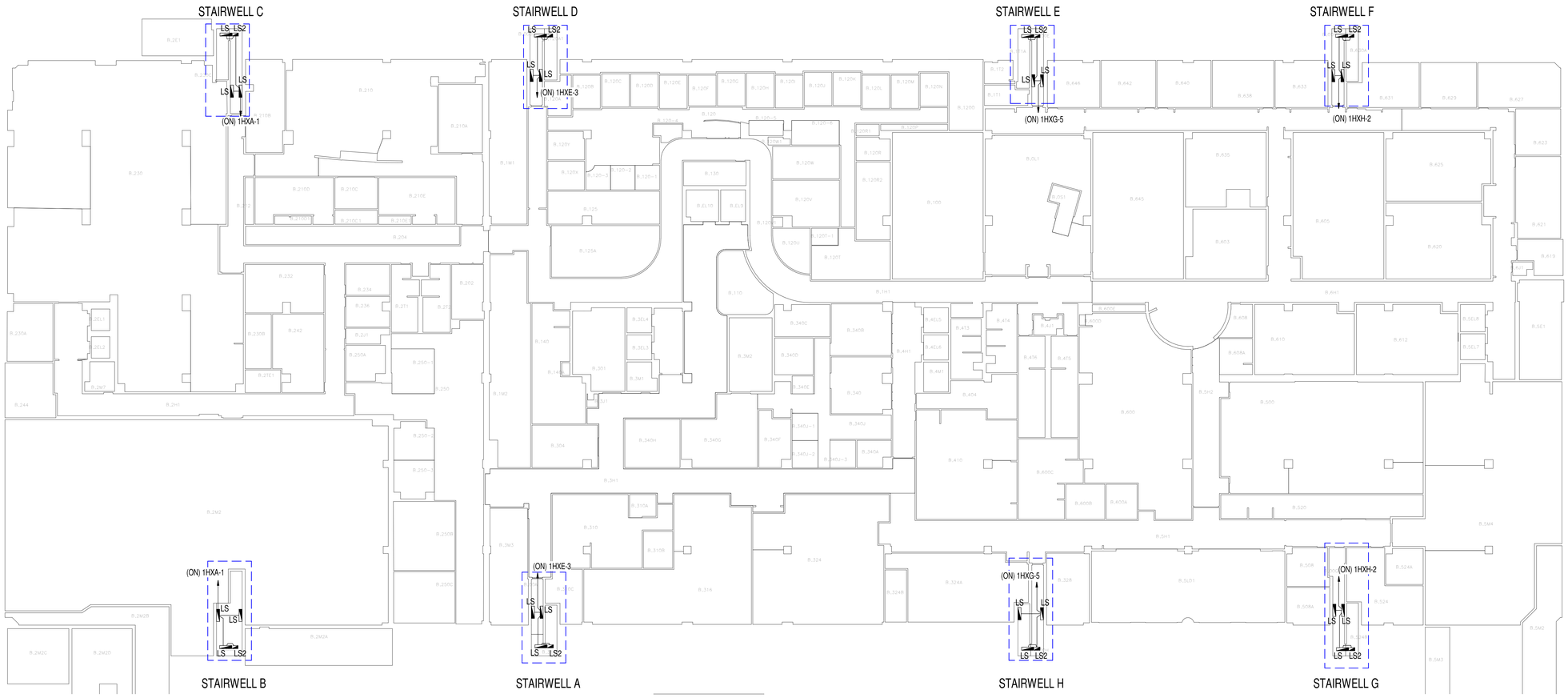
1/6/2020 2:25:01 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 BASEMENT RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209

Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133221
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

BASEMENT RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E100B
Scale	1/16" = 1'-0"

1/6/2020 2:23:56 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

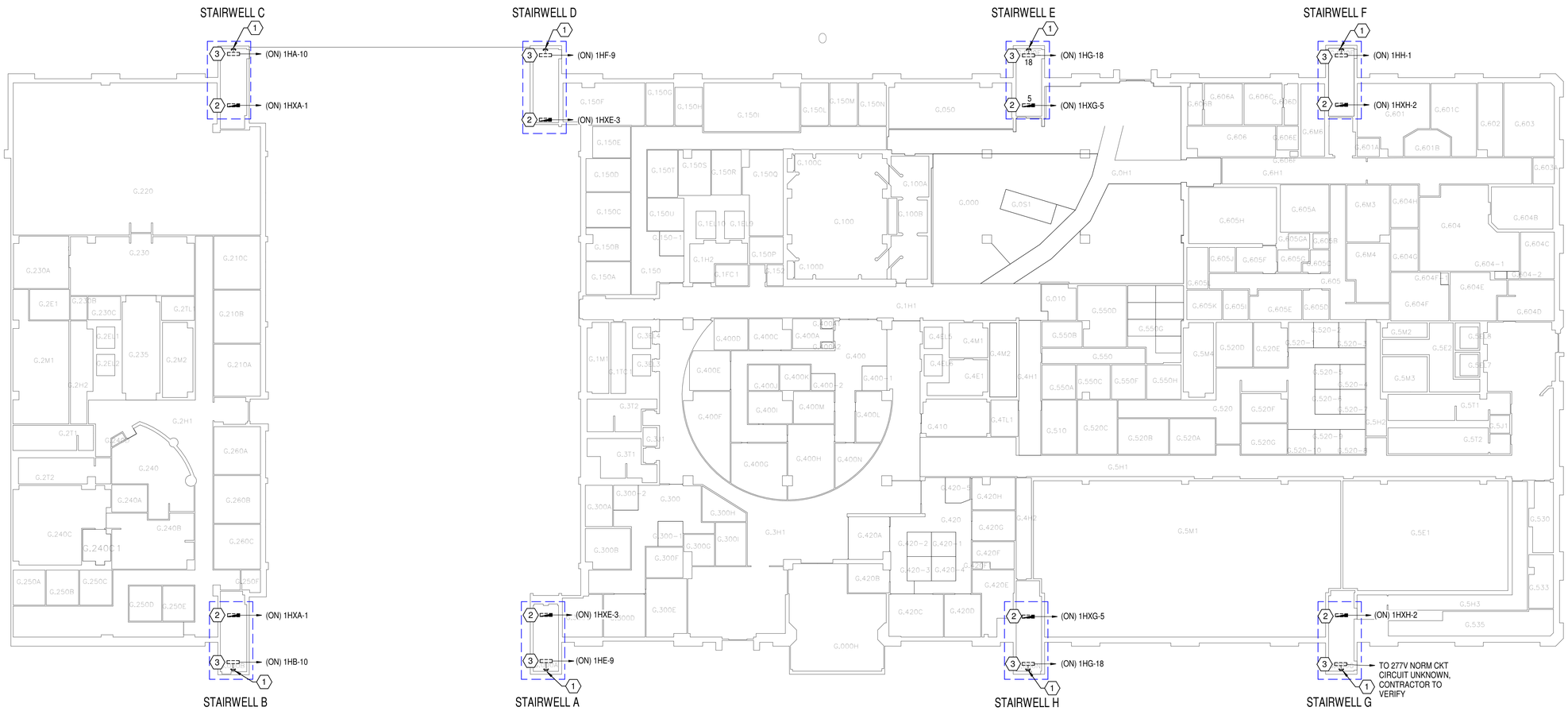
A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED100G

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.



1 GROUND DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND
- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH / Plan NORTH

1/16" = 1'-0" (0' 16' 32')

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

GROUND DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED100G
Scale	1/16" = 1'-0"

1/6/2020 2:25:06 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.

1 GROUND RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

GROUND RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E100G
Scale	1/16" = 1'-0"

1/6/2020 2:24:02 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

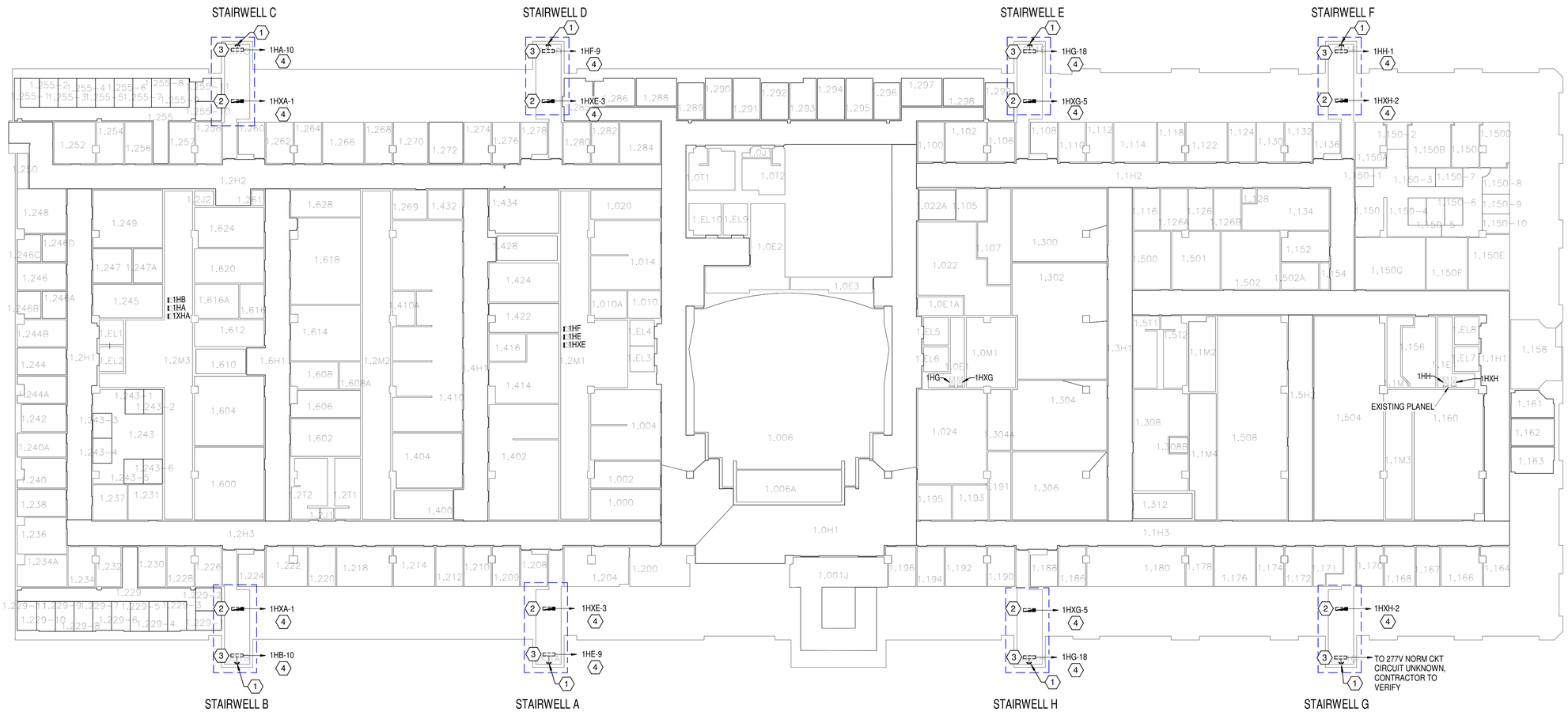
KEYED NOTES - ED101

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.

4 CIRCUIT FEEDS LIGHTS FROM FIRST FLOOR DOWN THROUGH TO THE BASEMENT.



1 LEVEL 01 DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA 133227 LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 01 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED101
Scale	1/16" = 1'-0"

1/6/2020 2:25:12 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

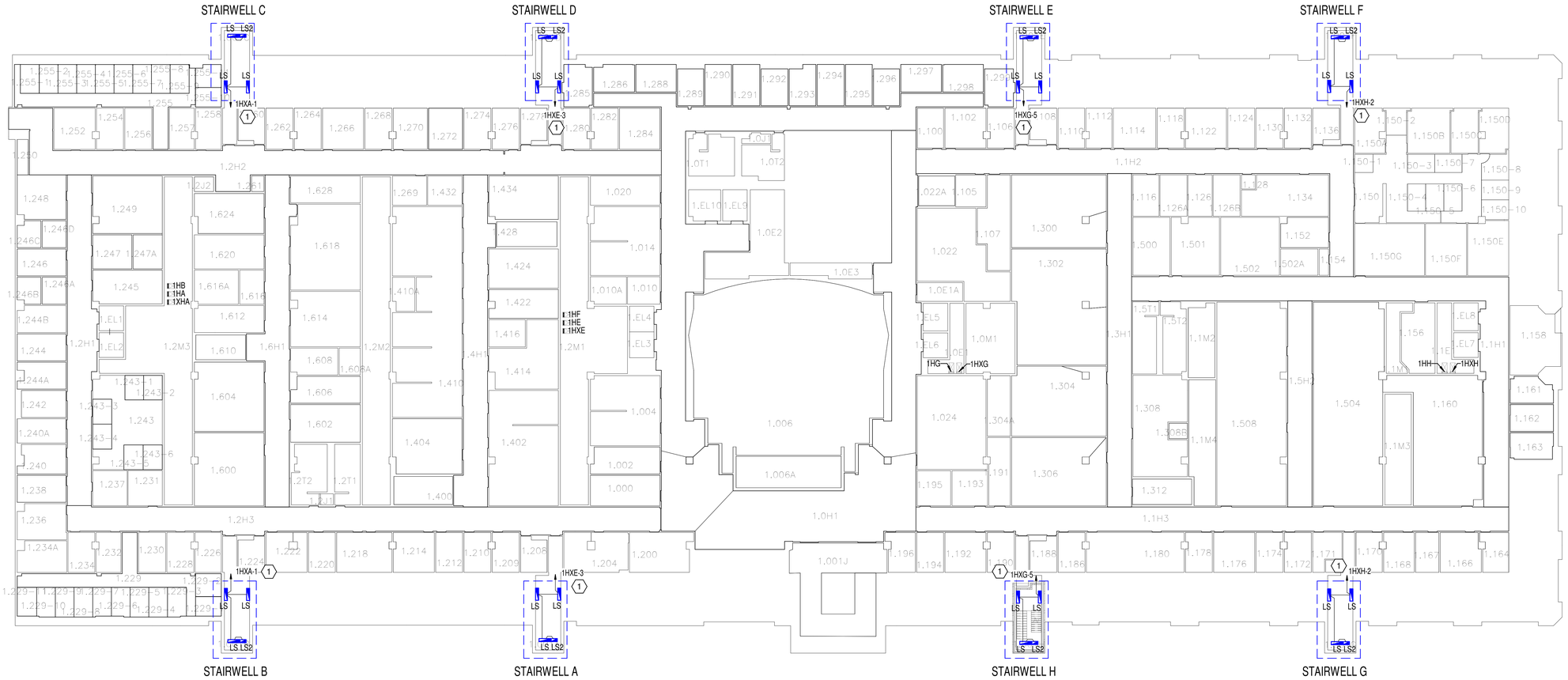
A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.

KEYED NOTES - E101

1 CIRCUIT FEEDS LIGHTS FROM FIRST FLOOR DOWN TO THE BASEMENT.



1 LEVEL 01 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND
NEW WORK SHOWN BOLD
EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 01 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E101
Scale	1/16" = 1'-0"

1/6/2020 2:24:08 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

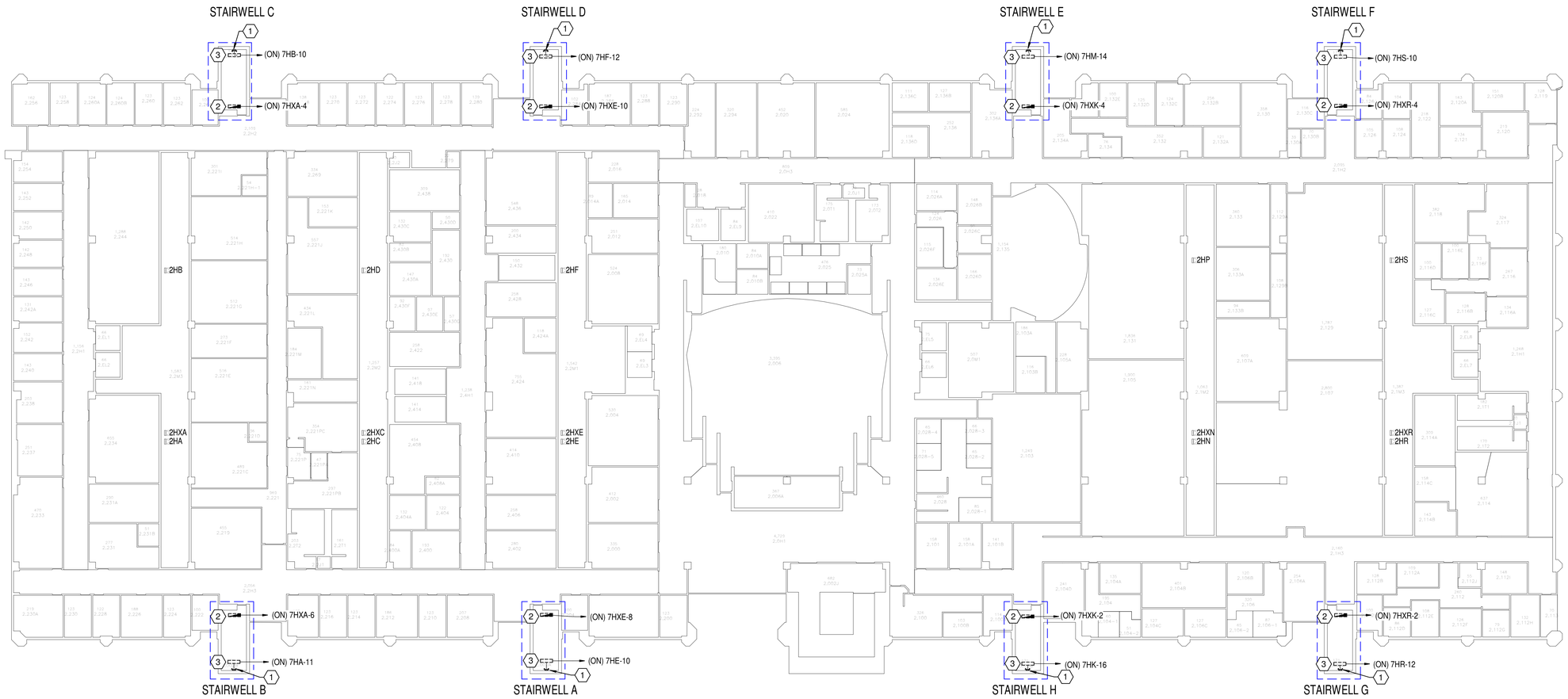
A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED102

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.



1 LEVEL 02 DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209

Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 02 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED102
Scale	1/16" = 1'-0"

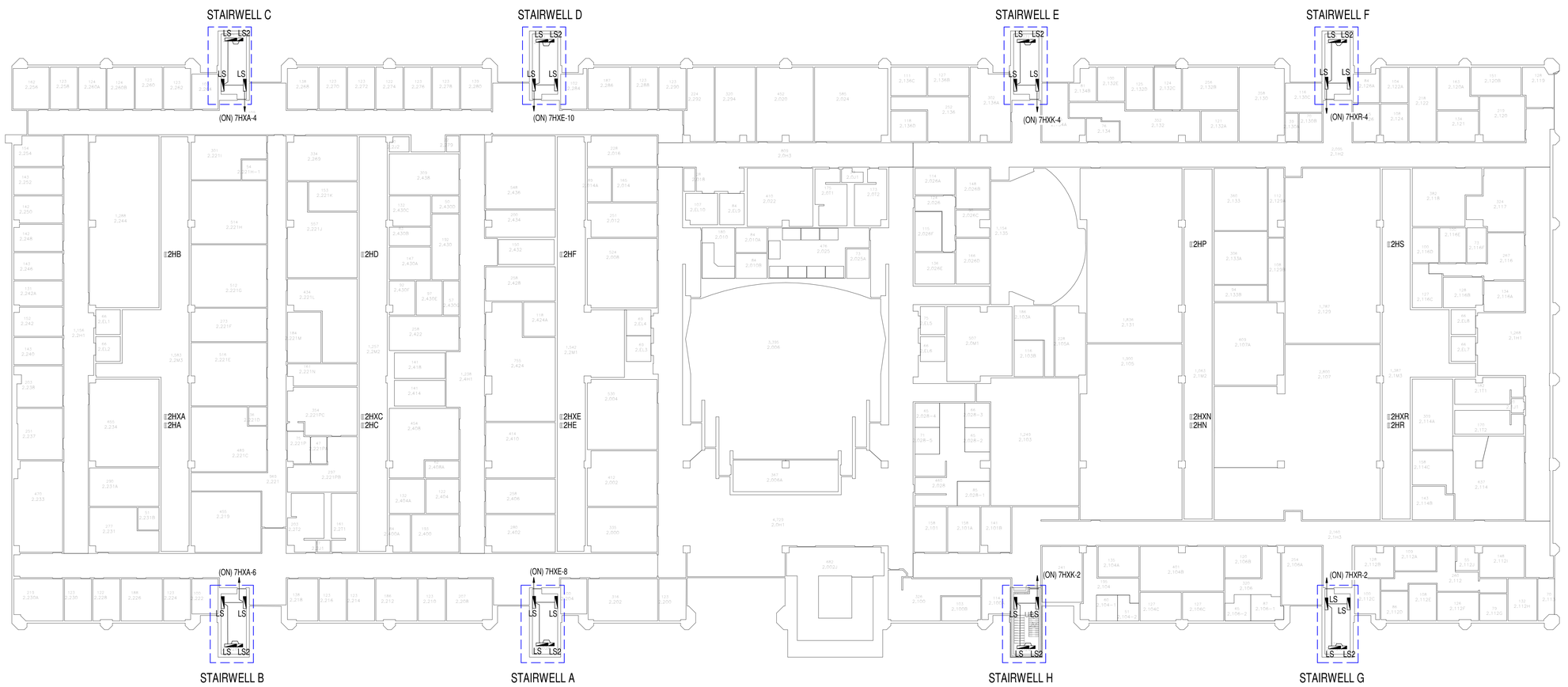
1/6/2020 2:25:18 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 LEVEL 02 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209

Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED
PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 02 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E102
Scale	1/16" = 1'-0"

1/6/2020 2:24:14 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED103

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.

1 LEVEL 03 DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209

Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 03 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED103
Scale	1/16" = 1'-0"

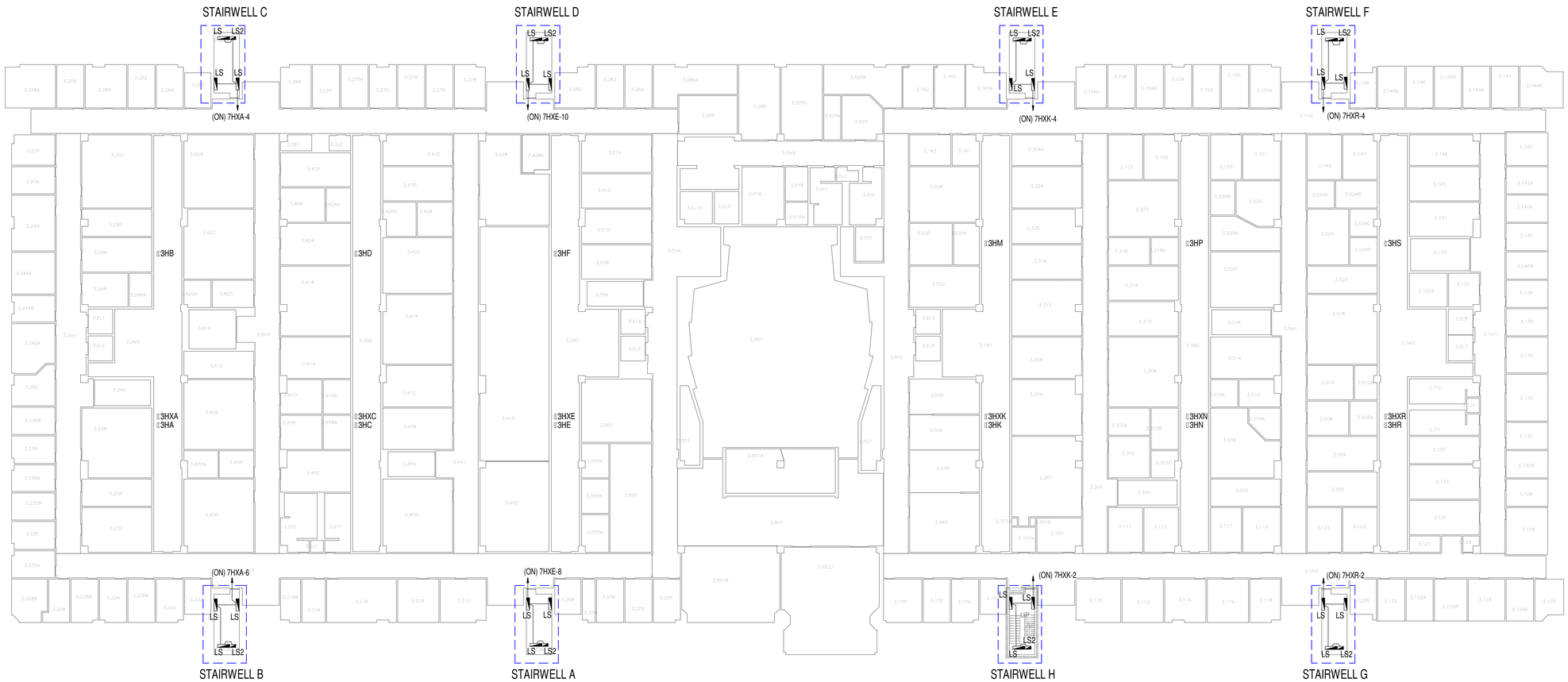
1/6/2020 2:25:25 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 LEVEL 03 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA 133227 LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 03 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E103
Scale	1/16" = 1'-0"

1/6/2020 2:24:19 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED104

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.

1 LEVEL 04 DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED
PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 04 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED104
Scale	1/16" = 1'-0"

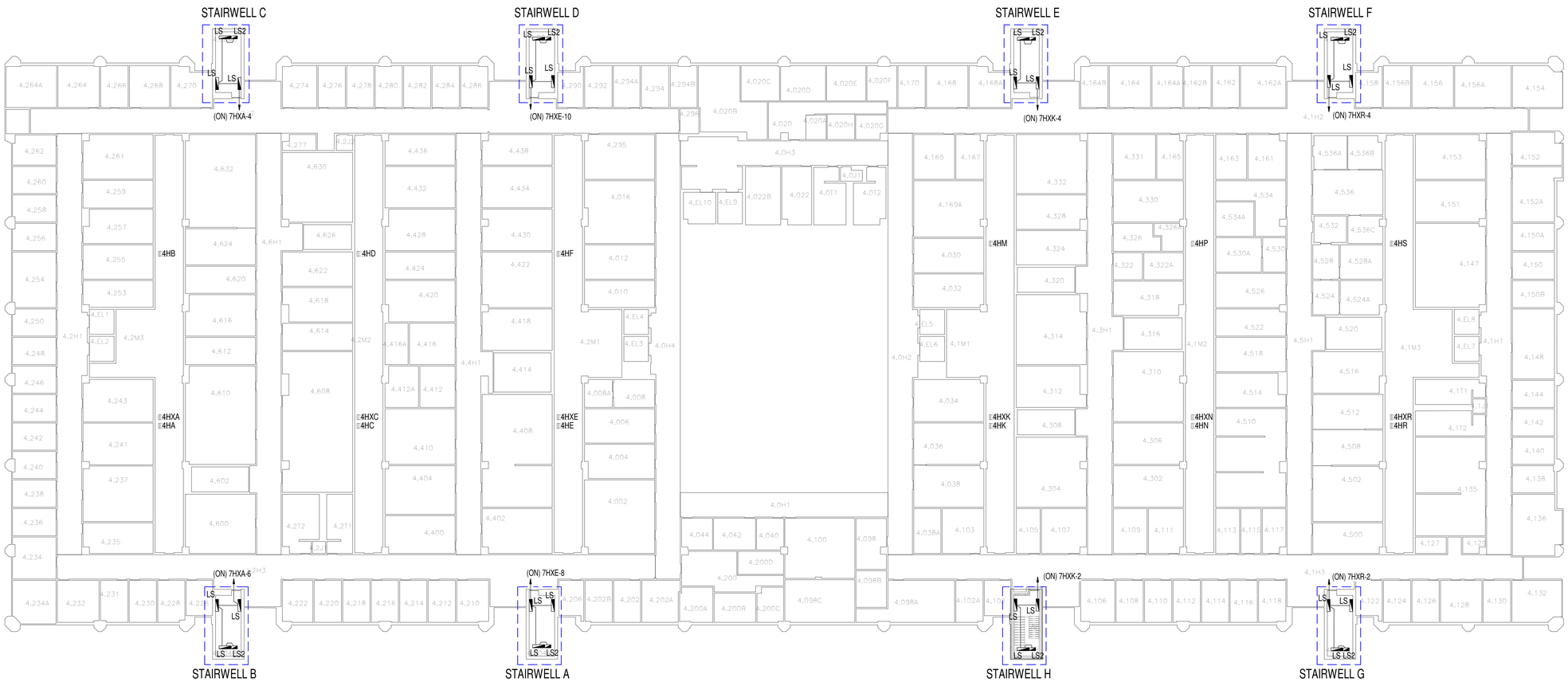
1/6/2020 2:25:31 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 LEVEL 04 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH

Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 04 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E104
Scale	1/16" = 1'-0"

1/6/2020 2:24:25 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

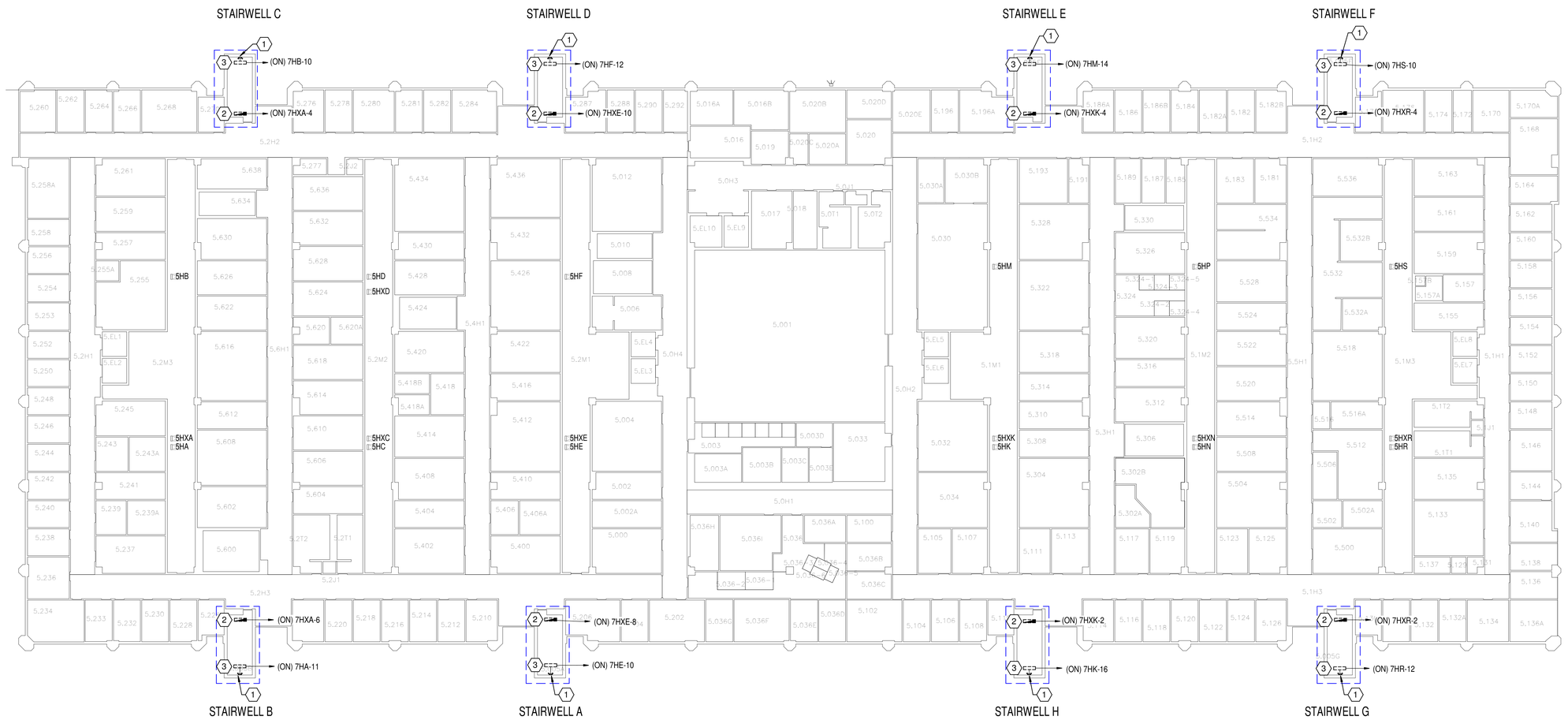
A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED105

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.



1 LEVEL 05 DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209

Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
REGISTERED PROFESSIONAL ENGINEER
RAMANN B. MANTHA
133227
LICENSED
PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 05 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED105
Scale	1/16" = 1'-0"

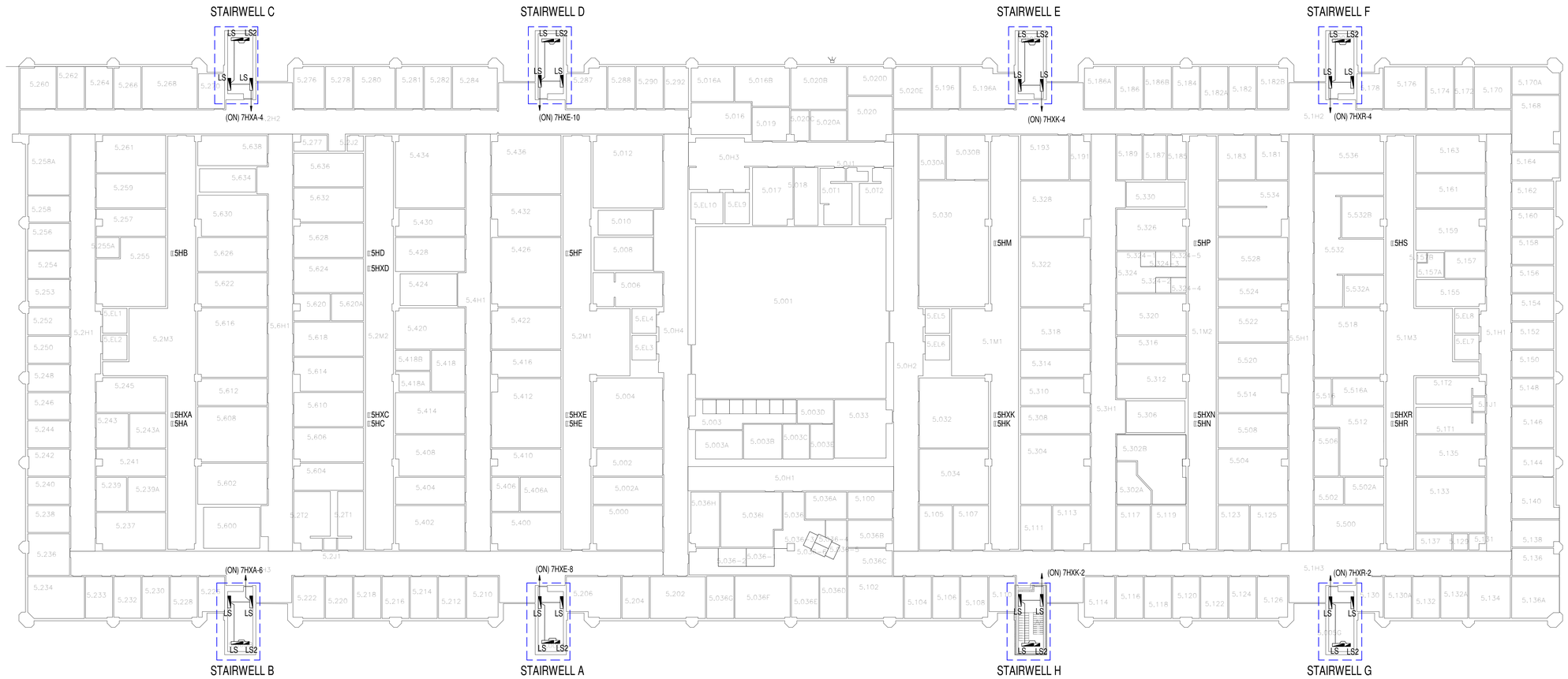
1/6/2020 2:25:37 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 LEVEL 05 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
19327
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 05 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E105
Scale	1/16" = 1'-0"

1/6/2020 2:24:31 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED106

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E108B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.

1 LEVEL 06 DEMO
1/16" = 1'-0"

1	100% CD	01/06/2020
No.	Description	Date

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED
PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 06 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED106
Scale	1/16" = 1'-0"

ELECTRICAL LEGEND
- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

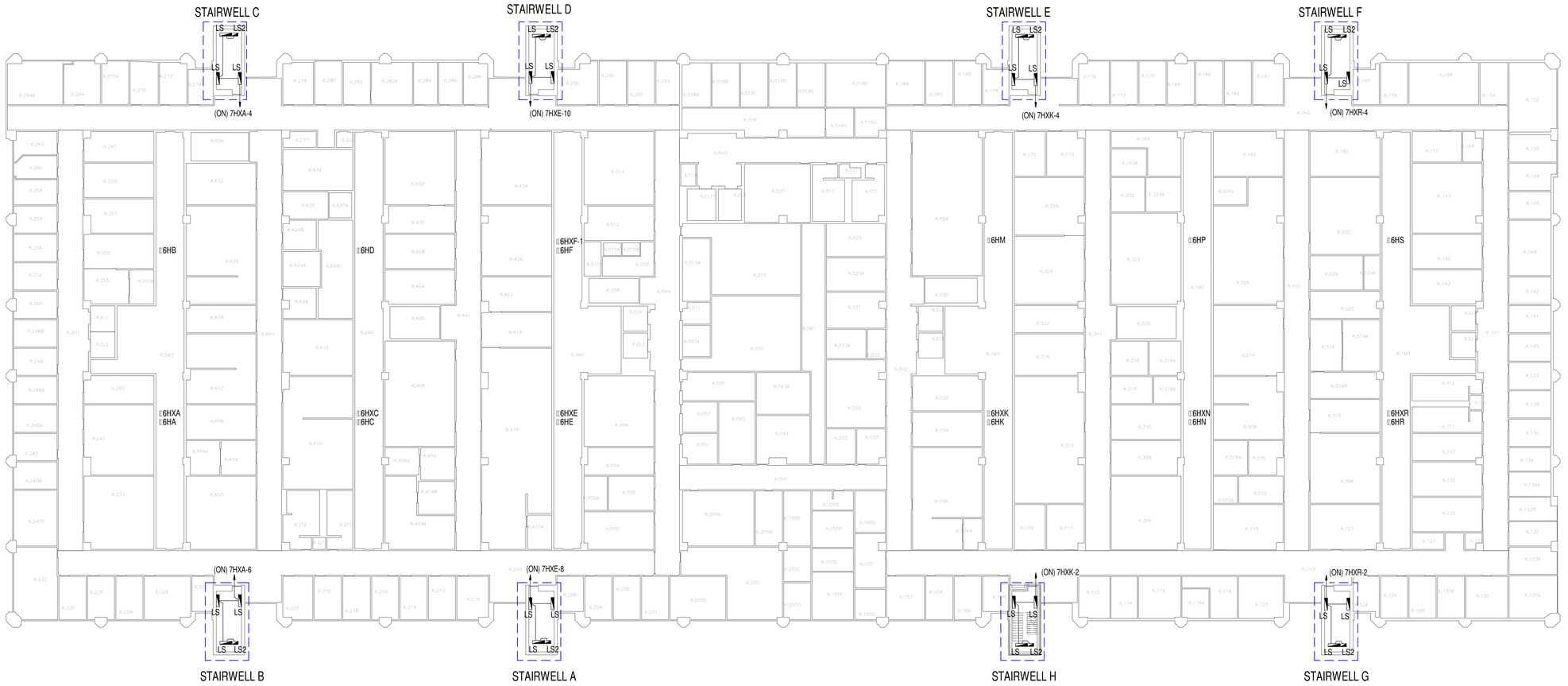
1/6/2020 2:25:43 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 LEVEL 06 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND
NEW WORK SHOWN BOLD
EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 06 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E106
Scale	1/16" = 1'-0"

1/6/2020 2:24:37 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED107

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.

4 CIRCUIT FEEDS LIGHTS FROM PENTHOUSE DOWN TO THE SECOND FLOOR.

1 LEVEL 07 DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 07 DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	ED107
Scale	1/16" = 1'-0"

1/6/2020 2:25:49 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

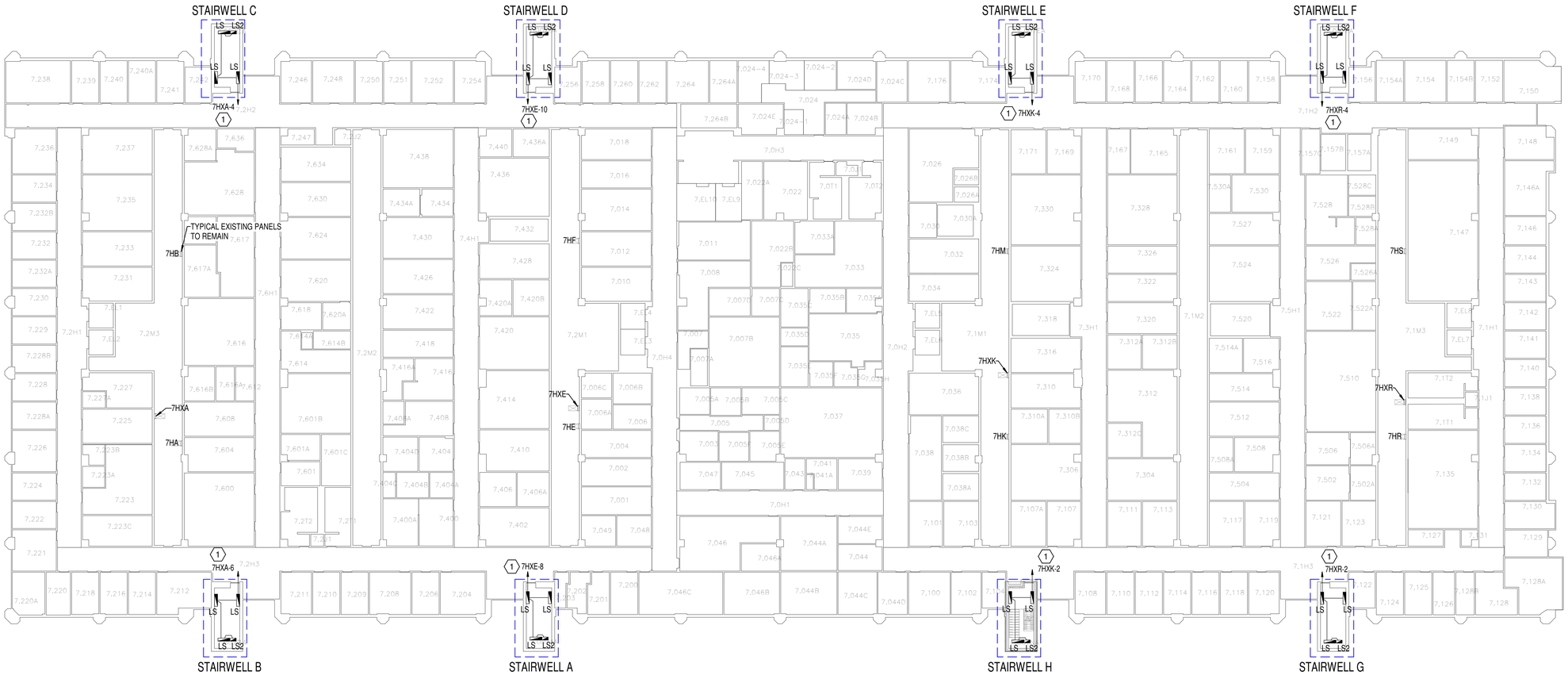
A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.

KEYED NOTES - E107

1 THIS CIRCUIT SHALL FEED LIGHTS FROM PENTHOUSE THROUGH TO THE SECOND FLOOR.



1 LEVEL 07 RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/16" = 1'-0" 0' 16' 32'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209

Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHI
13322
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 07 RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RBM
Checked By	DBB
Drawing No.	E107
Scale	1/16" = 1'-0"

1/6/2020 2:24:43 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES - GED

A DEMOLITION WORK SHOWN BOLD. EXISTING WORK SHOW LIGHT.

KEYED NOTES - ED108

1 REMOVE EXISTING WALL MOUNTED BATTERY PACK, ASSOCIATED CONDUIT AND CONDUCTORS.

2 REMOVE EXISTING FIXTURE AND CONDUCTORS. EXTEND EMERGENCY CONDUIT AND CONDUCTORS TO NEW FIXTURE LOCATIONS SHOWN ON RENOVATION PLANS, E108 THROUGH E100B.

3 REMOVE EXISTING CEILING MOUNTED FIXTURE, REMOVE CONDUCTORS BACK TO LAST POINT OF ACTIVE SERVICE.

1 LEVEL 8 PENTHOUSE DEMO
1/16" = 1'-0"

ELECTRICAL LEGEND

- DEMOLITION WORK SHOWN BOLD
- EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/8" = 1'-0" 0' 8' 16'

SHAH SMITH & ASSOCIATES, INC.
2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
RAMANN B. MANTHA
133227
LICENSED PROFESSIONAL ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 8 PENTHOUSE DEMO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RM
Checked By	DBB
Drawing No.	ED108
Scale	1/16" = 1'-0"

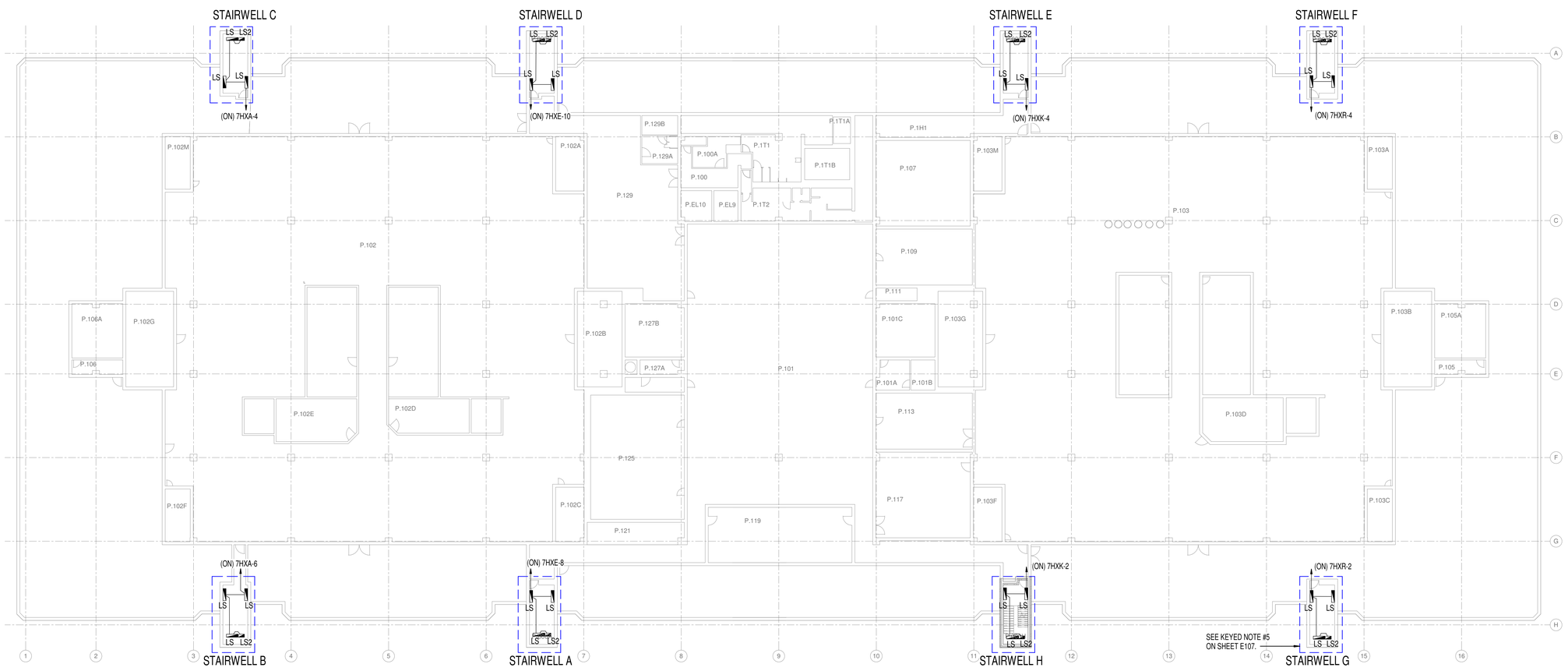
1/6/2020 2:25:55 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt

GENERAL NOTES

A NEW WORK SHOWN BOLD, EXISTING WORK SHOWN LIGHT.

B FOR NEW FIXTURES AT INTERMEDIATE LANDINGS THAT WILL BE CONNECTED TO THE EMERGENCY CIRCUIT, SURFACE MOUNT CONDUIT FROM FIXTURE TO FLOOR EMERGENCY FIXTURE.

C PROVIDE 20 ADDITIONAL LIGHTS EACH (4' AND 2') TO BE STOCKED FOR MAINTENANCE/ REPLACEMENT.



1 LEVEL 8 PENTHOUSE RENO
1/16" = 1'-0"

ELECTRICAL LEGEND

NEW WORK SHOWN BOLD

EXISTING WORK SHOWN LIGHT

True NORTH Plan NORTH

1/8" = 1'-0" 0' 8' 16'

SHAH SMITH & ASSOCIATES, INC.

2825 Wilcrest, Suite #350
Houston, Texas 77042
Ph. 713.780.7563 Fax.713.780.9209
Texas Registered Engineering Firm F-2113

No.	Description	Date
1	100% CD	01/06/2020

Keyplan

Tx. Registration # F-2113
STATE OF TEXAS
RAMANN B. MANTHA
133227
LICENSED
PROFESSIONAL
ENGINEER
01/06/2020

Shah Smith & Associates, 2825 Wilcrest Drive, Suite 350 Houston, Texas. 713-780-7563

UTHSC MSB STAIRWELL LIGHTING

1095-062-01

LEVEL 8 PENTHOUSE RENO PLAN

SSA Project Number	1095-062-01
Date	01/06/2020
Designed By	RM
Checked By	DBB
Drawing No.	E108
Scale	1/16" = 1'-0"

1/6/2020 2:24:49 PM C:\Users\dnguyen\Documents\1095-062-01_Elec_R19_dnguyenR689C.rvt