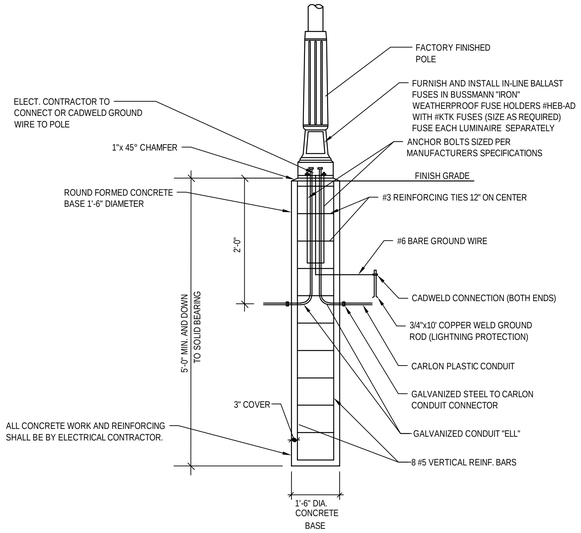
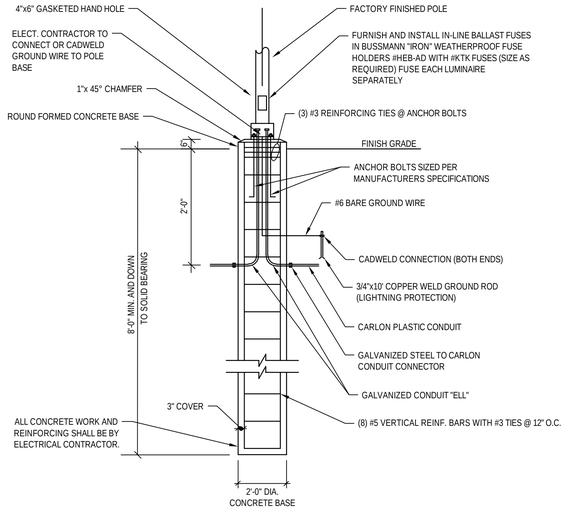


POLE BASE DETAIL - FOR TYPE A

N.T.S.

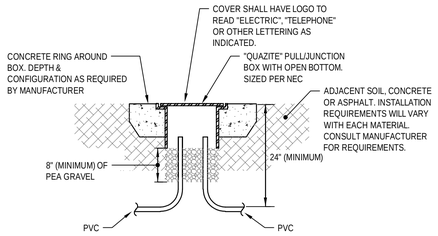
NOTES:
1. 3500 P.S.I. MIN. 28 DAY COMPRESSIVE STRENGTH CONCRETE WITH GRADE 60 REINFORCING STEEL
2. IF WATER IS PRESENT IN HOLE. REMOVE BEFORE POURING CONCRETE.
3. FOUNDATION EXCAVATION SHALL BE BY 18" AUGER IN UNDISTURBED OR PROPERLY COMPACTED FILL PER SPECIFICATIONS.
4. FOUNDATION SHALL HAVE A MINIMUM ALLOWABLE END BEARING OF 2000 P.S.F., INCREASE BASE DEPTH AS REQUIRED.
5. THIS POLE BASE DETAIL MUST BE REVIEWED AND APPROVED BY THE STRUCTURAL ENGINEER PRIOR TO INSTALLATION.



POLE BASE DETAIL - FOR TYPES XA, XB, XD, XE

N.T.S.

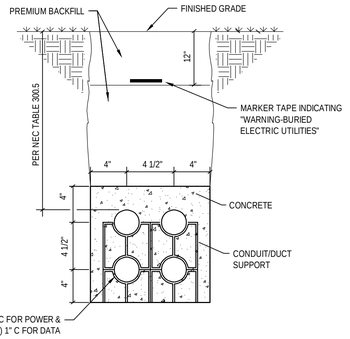
NOTES:
1. 3500 P.S.I. MIN. 28 DAY COMPRESSIVE STRENGTH CONCRETE WITH GRADE 60 REINFORCING STEEL
2. IF WATER IS PRESENT IN HOLE. REMOVE BEFORE POURING CONCRETE.
3. FOUNDATION EXCAVATION SHALL BE BY 24" AUGER IN UNDISTURBED OR PROPERLY COMPACTED FILL PER SPECIFICATIONS. USE TEMPORARY SLEEVE IF REQUIRED.
4. FOUNDATION SHALL HAVE A MINIMUM ALLOWABLE END BEARING OF 2000 P.S.F. (TO BE VERIFIED BY ON-SITE GEOTECH) INCREASE BASE DEPTH AS REQUIRED.



IN-GRADE PULL/JUNCTION BOX DETAIL

N.T.S.

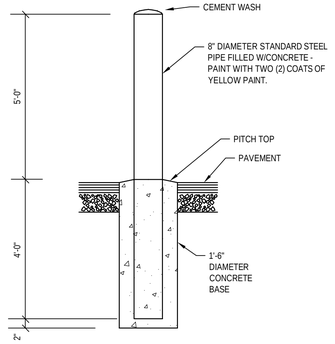
NOTES:
1. SPLICES SHALL BE AVOIDED WHERE POSSIBLE. WHERE REQUIRED, SPLICES SHALL BE MADE WITH WATERPROOF CONNECTORS.
2. CONCRETE ENCASEMENT TO BE 3,000 PSI MINIMUM.
3. DO NOT LOCATE BOXES IN HIGH VOLUME TRAFFIC APPLICATIONS.
4. COMPACT SOIL AROUND BOX TO MANUFACTURERS RECOMMENDATIONS.
5. THIS DETAIL IS INTENDED TO SHOW GENERAL DESIGN INTENT ONLY. THE ELECTRICAL CONTRACTOR MUST VERIFY ALL INSTALLATION REQUIREMENTS WITH THE MANUFACTURER PRIOR TO THE BIDDING AND INSTALL ALL BOXES ACCORDINGLY.



(A) DUCT BANK

N.T.S.

NOTES:
1. FURNISH AND INSTALL CONDUIT SYSTEM PER NEC REQUIREMENTS.
2. REFERENCE SITE ELECTRICAL NOTES FOR SOIL COMPACTION REQUIREMENTS.
3. REFERENCE SITE PLAN FOR PROPOSED ROUTING.

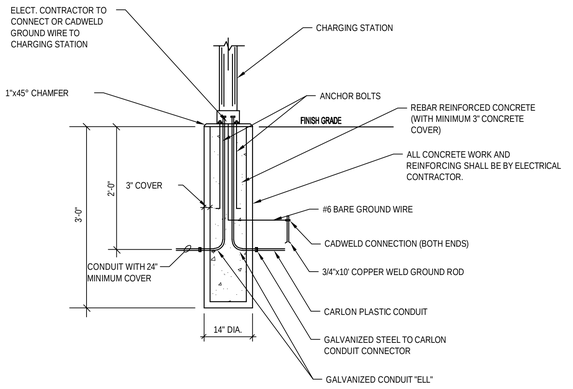


BOLLARD DETAIL

N.T.S.

SITE ELECTRICAL NOTES

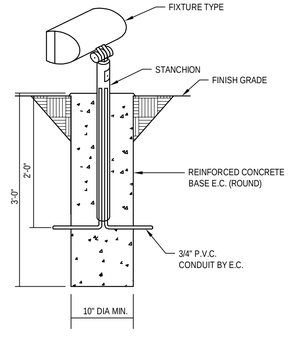
1. EXACT LOCATIONS OF PARKING LOT LIGHTING STANDARDS SHALL BE COORDINATED WITH APPROVED ARCHITECTURAL SITE PLAN AND PARKING LOT LAYOUT.
2. ALL LIGHTING FIXTURES PROJECTING TOWARD ADJACENT RESIDENTIAL AREAS MUST BE PROPERLY SHIELDED TO PREVENT LIGHT SOURCE FROM EXTENDING INTO THIS AREA.
3. THE LUMINAIRE MANUFACTURER SHALL PROVIDE COMPUTER GENERATED POINT BY POINT FOOTCANDLE CALCULATIONS ALONG WITH THEIR SHOP DRAWINGS SUBMITTAL. THE FORMAT OF THIS POINT BY POINT CALCULATION SHALL BE IN THE FORM OF AN OVERLAY OF THE ENTIRE PARKING AREA WITH CALCULATED POINTS 25 FEET ON CENTER.
4. ALL SITE LIGHTING POLES SHALL BE DESIGNED TO WITHSTAND 100 MPH WINDS WITH A 1.3 GUST FACTOR.
5. ELECTRICAL CONTRACTOR SHALL INSTALL EACH LIGHTING POLE PLUMB AND TRUE. ELECTRICAL CONTRACTOR SHALL PROVIDE NECESSARY LEVELING SHIMS.
6. ELECTRICAL CONTRACTOR SHALL BACKFILL ALL ELECTRICAL TRENCHES USING CLEAN FILL MATERIAL FREE OF ORGANIC CONTAMINATIONS AND OTHER DELETERIOUS MATTER. PLACE BACKFILL MATERIAL IN 8" THICK LAYERS WITH EACH LIFT COMPACTED AT NEAR OPTIMUM MOISTURE CONTENT. COMPACT LIFTS TO ACHIEVE A MINIMUM IN PLACE DENSITY OF 95% OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D698.
7. ELECTRICAL CONTRACTOR SHALL COORDINATE LOCATION OF EASEMENTS, UNDERGROUND UTILITIES, AND DRAINAGE PRIOR TO TRENCHING OR AUGERING FOR POLE BASE. (TYPICAL)
8. WHERE THE UTILITY TRANSFORMER AND/OR METERING SHALL BE INSTALLED PAD-MOUNTED IN A PAVED AREA ACCESSIBLE TO VEHICULAR TRAFFIC, THE ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL CONCRETE FILLED BOLLARDS AROUND ALL SUCH ELECTRICAL EQUIPMENT. PROVIDE BOLLARDS AT ALL ACCESSIBLE CORNERS OF EQUIPMENT WITH ADDITIONAL BOLLARDS IN BETWEEN AS REQUIRED FOR A MAXIMUM SPACING OF 4'-0" O.C. VERIFY EXACT LOCATION OF BOLLARDS WITH ENGINEER PRIOR TO INSTALLATION. MAINTAIN ALL REQUIRED CLEARANCE AND ACCESS REQUIREMENTS PER POWER COMPANY, CODE AND LOCAL AUTHORITY HAVING JURISDICTION.



CHARGING STATION BASE DETAIL

N.T.S.

NOTES:
1. COORDINATE EXACT REQUIREMENTS WITH MANUFACTURER PRIOR TO BID



FLOODLIGHT BASE DETAIL

N.T.S.

Thorson Baker + Associates
CONSULTING ENGINEERS
3030 West Streetsboro Road
Richfield, Ohio 44286
(330) 659-6688 Ph.
(330) 659-6675 Fax

STOW LIBRARY PARKING LOT

STOW-MUNROE FALLS PUBLIC LIBRARY

3512 DARROW ROAD, STOW, OHIO

SHEET ISSUE: FOR BIDS
ISSUE DATE: 12-20-23

MARK	DATE	DESCRIPTION

PROJECT NO: 2023-0668
ORIGINAL DATE:

GENERAL NOTES AND DETAILS

E3.1

ELECTRICAL SPECIFICATIONS

Section 260010 - General Provisions

A. General
1. Requirements specified in Division 1, instructions to bidders, supplemental general conditions, special conditions, addenda, alternates, contract and proposal, along with Division 26, 27, 28 and all its sections, comprise the contract documents for the electrical contract, along with these specifications as though they were one, and anything implied by the specifications shall be interpreted as also implied by the drawings and vice versa. Provide necessary items for a complete installation of all electrically operated equipment listed in the specifications or shown on the contract drawings.
2. The architectural, structural, mechanical, plumbing and equipment drawings and specifications are incorporated into, and become a part of this division. This contractor shall examine all such drawings and specifications and become thoroughly familiar with the provisions contained therein. The submission of his bid shall indicate such knowledge.
3. Electrical drawings are diagrammatic. They are intended to show the approximate locations of equipment and conduit. Dimensions given on the plans, in figures, shall take precedence over scaled dimensions and shall be verified in the field. The electrical contractor shall layout all equipment rooms to make sure the equipment, as purchased, fits in the room or space shown. Exact location of all equipment shall be verified in the field and routing of conduits shall suit field conditions.
4. Until the time of installation, the architect reserves the right to make minor changes in the location of conduit and equipment without additional cost to the contract.
5. The electrical drawings and specifications are intended to supplement each other. Material and labor necessary to the project shall be furnished and installed even though not specifically mentioned in both. Labor and/or materials neither shown nor specified, but obviously necessary for the completion and proper functioning of the system, shall be furnished and installed by the electrical contractor.
6. Arrange all equipment substantially as shown on the drawings. Make deviations only where necessary to avoid interference. Check all equipment sizes against available space prior to shipment to avoid interference.
7. Examine the work of other trades insofar as their work comes in contact with or is covered by this work in no case attach to, or finish against any defective work or install work in a manner which will prevent proper installation of the work of other trades.
8. Electrical contractor shall verify with other trades all electrical characteristics of equipment requiring electrical connections, contractor shall verify voltage, phase and horsepower and shall notify engineer of any discrepancies prior to start of work. Electrical contractor shall provide disconnecting means and overload protection for all equipment, unless furnished integral with equipment package.
9. It is the intent of these drawings that this be a complete electrical job, any errors or omissions shall be brought to the attention of the engineer prior to bidding the job.
10. In the case of conflict between drawings, notes, and specifications, or among drawings, the strictest provision or larger quantity shall govern.
11. The existing conditions of these documents are based upon existing drawings prepared by _____ dated _____ and may not reflect current installations or as-built conditions. Prior to initiating material procurement and construction, it is the contractor's responsibility to verify existing conditions are consistent with the contract documents. This may require removal of existing finishes and possible selective demolition to verify as-built conditions.
12. Do NOT scale drawings.
13. The contractor shall make provisions for the delivery and safe storage of his/her materials and equipment in coordination with the work of other trades. Materials and equipment shall be delivered at such stages of the work as will expedite the work as a whole and shall be marked and stored in such a way as to be easily checked and inspected. The arrival and placing of large equipment items shall be scheduled early enough to permit entry and setting when there is no restriction or problem due to size and weight. Protection of all finishes during delivery is the responsibility of the contractor.

B. Visit to the Site
1. This contractor shall visit the site of the work and familiarize himself with all conditions affecting his work. The submission of his proposal shall indicate such knowledge. No additional payment shall be made on claims that arise from a lack of knowledge of the existing conditions

C. Code and Permits
1. Installation shall be in full accordance with all codes, rules and regulations of municipal, city, county, state and public utilities and all other authorities having jurisdiction over the premises.
2. Comply with any specification requirements that are in excess but not in conflict with code requirements.
3. The contractor shall secure and pay for all permits, plan reviews and certificates of inspection in connection with his work, required by the foregoing authorities. Before final payment of the contract is allowed, all certificates shall be delivered to the architect in duplicate.
4. Electrical material and equipment shall bear the UL label except where UL does not label such types of material and equipment.

D. Shop Drawings Submittals
1. The electrical contractor shall submit product data and shop drawings. Each submittal shall be identified using the respective specification numbering system and titles. Each submittal shall clearly identify which products and options are applicable. The submittals shall be submitted through the architect to the engineer and then, if necessary, resubmitted for final approval. Submittals shall be submitted for the following items:
   - D.a. Wiring devices
   - D.b. Switchboards, Panelboards, transformers and safety switches including fault current study based on equipment being supplied.
   - D.c. Lighting control system and devices
   - D.d. Lighting fixtures
   - D.e. Fire / Supervisory alarm system
2. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.
3. Each submittal shall be provided with a cover identifying the following:
   - D.a. Name of the job
   - D.b. Location of the job, address, city and state.
   - D.c. Name and address of the company issuing the submittal.
   - D.d. Date of the submittal
4. All submitted product data and shop drawings (manufacturers' equipment descriptive sheets or vendors' prepared drawings) shall have the general contractor's or subcontractor's "stamp of approval" indicating that the item submitted is as called for on the plans and specifications, is approved by the general contractor or subcontractor, the date of approval and initialed by the person approving the submittal and the name of the company submitting said equipment for approval.
5. Any submittal not as specified shall be returned without review for corrections and re-submittal.
6. Every effort shall be made, in checking the shop drawings, to detect and correct all errors, omissions and inaccuracies. Failure to do this will not relieve the electrical contractor of the responsibility for the proper and complete installation in accordance with the contract documents.

E. As-built Drawings
1. Submit three paper-copy set(s) of marked-up record prints to the architect. Contractor shall use red ink for all contractor mark-ups on record prints.
2. Submit PDF electronic files of scanned record prints. Scanned record prints shall be in color.
3. Print and scan each drawing, whether or not changes and additional information were recorded.

F. Standards and Substitutions
1. Wherever the words "approved by", "approved equal", "as directed" or similar phrases are used in the following specifications, they shall be understood to refer to the owner as the approving agency. The name or make of any equipment or materials named in this specifications (whether or not the words "or approved equal" are used) shall be known as the "standard".
2. These specifications establish quality standard of materials and equipment to be provided. Specific items are identified by manufacturer, trade name or catalog designation. This contractor shall submit his base bid price based upon standard specified equipment described herein and as detailed on drawings and associated contract documents. These specifications are not to be considered proprietary. The contractor may submit information on materials and manufacturers (other than those listed) for review by the architect and engineer no later than ten (10) days before bids are submitted. Manufacturers of products accepted by the architect and engineer will be listed in an addendum to the specifications as an acceptable substitution equipment accepted as detailed below and shall be shown as a separate add or deduct price to be factored into the base bid price by the architect and owner if accepted.
3. Should the contractor propose to furnish materials and equipment other than those specified or approved by addendum, submit a written request for substitutions to the architect at the bid opening. The request shall be an alternate to the original bid; be accompanied with complete descriptive (manufacturer, brand name, catalog number, etc.) and technical data for all items. Failure by this contractor to submit the requisite documentation detailed above shall be understood by the architect and engineer to indicate that substitute equipment will not be presented by the contractor for consideration. Such substitutions will not be considered after the bid opening date and delay of project will not be permitted for further inspection and evaluation after this date.
4. Where such substitutions alter the design or space requirements indicated on the drawings, include all items of cost for the revised design and construction including cost of all allied trades involved.
5. Acceptance or rejection of the proposed substitutions shall be subject to approval of the architect and engineer. If requested, the contractor shall submit (at his cost) inspection samples of both the specified and proposed substitute items.
6. In all cases where substitutions are permitted, the contractor shall bear any extra cost of evaluating the quality of the material and equipment to be provided.

G. Testing and Placing in Service
1. Any material or equipment failing a test shall be repaired or replaced at the contractor's expense.
2. Tests shall include the following:
   - G.a. Measure the load on each phase of the main service and each phase of every feeder under full load conditions.
   - G.b. Measure the no-load and full-load voltages (phase to phase, phase to neutral and phase to ground for each phase of each service, of each separately derived system, and at each panelboard or transformer).
   - G.c. Measure the ground resistance of the main service grounding electrode and the ground resistance of each separately derived system's grounding electrode.
   - G.d. Make insulation resistance tests on all dry type transformers and motors.
3. Provide performance testing as required per N.E.C. or local authority having jurisdiction.

260010 (cont.)

H. Interferences
1. Before the installation of any item begins, the electrical contractor shall carefully ascertain that it does not interfere with clearances for the erection of finish beams, columns, plasters, walls or other structural or architectural members as shown on the architectural drawings. If any work is installed and the architectural design cannot be followed, this contractor shall, at his own expense, make changes in his work as directed by the architect to permit the completion of the architectural work in accordance with drawings and specifications.
2. It shall be the duty of this contractor to report any interferences between his work and that of any of the other contractors as soon as they are discovered. The architect shall determine which equipment will be relocated, regardless of which was installed first. His decision will be final.

I. Quality Assurance
1. All products shall be new and of the type and quality specified. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type of catalog number, such designation shall establish the standards of the desired quality and style. It is the intent of these specifications to establish a standard of quality of materials and equipment installed.

J. Special Inspections
1. Special Inspection (as applicable) is to be provided in addition to inspections conducted by the department of building safety and shall not be construed to relieve the owner or his/her authorized agent from requesting periodic and called inspections required by the building code. Special Inspection shall be paid by the owner.
2. Special Inspector shall meet the qualifications as stated in the applicable building code and shall perform the duties and responsibilities as outlined in the applicable building code.
3. The electrical contractor shall provide access to areas requiring testing or inspections, and provide requested documentation (if required by the Special Inspector).

Section 260050 - Basic Electrical Materials and Methods

A. Nameplates
1. General: furnish and mount on each panelboard, switchboard (including branch devices), large junction box, safety switch, starter, remote control, push button station, and all similar controls, a nameplate descriptive of the equipment or equipment controlled.
2. Provide black and white nameplates constructed from laminated phenolic with a white center core. Letters shall be engraved in the phenolic to form white letters 3/8" high. Fasten the nameplates with an adhesive type fastener.

B. Mounting Accessories
1. This contractor shall furnish and install all angle iron, channel iron, rods, supports, hangers, concrete or plywood required to install, mount and support any electrical equipment or device called for on the plans.
2. Supporting material shall be complete with hangers, connectors, bolts, clamps and necessary accessories to make a complete installation. Supporting material shall be galvanized, painted or otherwise suitably finished. Products by Binkley, Steel City, or Raco will be acceptable.
3. All surface-mounted equipment on block walls shall be mounted on 3/4" plywood backboard. All floor-mounted equipment shall be installed on a 4" high concrete housekeeping pad.

C. Execution
1. The electrical work for construction proposed shall conform to all federal (OSHA), state, all specific safety requirements and the requirements of the current edition of the NEC.
2. Review the HVAC and plumbing specifications for electrical requirements and include the same in the contract cost.
3. Equipment connections, starters, disconnect switches, control transformers and pushbutton stations for the equipment furnished by the owner or under a separate contract shall be installed and connected under this division, as indicated on the contract drawings.
4. All cutting, patching, excavating, backfilling and concrete work related to this contract will be the responsibility of the electrical contractor. This contractor shall assume the responsibility of providing the sleeves, chases and openings necessary for the electrical installation and for their repair in an acceptable manner, as determined by the architect. All holes shall be core-drilled. Provide fire stopping materials, UL Listed for application, in all openings created through fire-rated walls, floors or ceilings. Contractor shall field verify slab on grade floor construction type prior to cutting. Under no circumstances shall the contractor cut a structural floor slab thicker than four (4") inches without prior written approval from Engineer of Record. Notify Engineer of Record of any slab thickness greater than four (4") inches prior to proceeding with any saw cutting.
5. This contractor shall be responsible for providing all required access panels necessary for his work, coordinate with architect prior to installation.

D. Materials and Workmanship
1. All work shall be installed in a practical and workmanlike manner, by mechanics skilled in the several trades necessary.
2. All materials shall be new and free from defects and shall be the best of their several kinds unless specified or indicated on the drawings to the contrary.
3. During each phase and at the completion of the construction, this contractor shall remove all debris and excess materials caused by his work. He shall leave the area of operation broom clean.
4. All electrical equipment shall bear the underwriters laboratories label or ETL label.
5. This contractor shall guarantee his workmanship and material (lamps excepted) for a period of one year from the date of building opening and leave his work in perfect order at the completion. Should defects develop within the guarantee period, the contractor shall, upon notice of the same, remedy the defects and have all damages to other work or furnishings caused by the repairs corrected at his expense to the condition before such damage.

E. Scope of Work
1. The electrical contractor shall provide all labor, material, storage, unpacking and placement; to include but not be limited to, the following items:
   - E.a. Demolition
   - E.b. Emergency lighting and power.
   - E.c. Complete electrical distribution system including, but not limited to, switchboards, distribution and appliance panelboards, transformers, safety switches and feeders.
   - E.d. Complete branch circuit wiring system.
   - E.e. Complete power wiring for all air conditioning equipment, plumbing equipment, heating equipment, ventilating and exhaust equipment.
   - E.f. Complete lighting fixture installation, including all lamps.
   - E.g. Complete communications conduit system including but not limited to, back boxes, plates, j-hooks, cable trays, etc., as specified on the drawings and as required by the local service provider and/or owner.
   - E.h. Temporary electrical power and lighting, as required for construction.
   - E.i. Testing of all cables and circuit wiring after installation.
   - E.j. Exit light system.
   - E.k. Wiring devices, floor boxes, multi-outlet assemblies.
   - E.l. Lighting control system and devices
   - E.m. Grounding and Bonding of the electrical system.
   - E.n. Outdoor lighting and controls.
   - E.o. Fire / Supervisory alarm system.
   - E.p. Communication service
   - E.q. Electric service.

F. Temporary Service
1. The electrical contractor shall furnish, install and remove as required all temporary power and temporary lighting in all areas and individual rooms when needed by the individual trades in the performance of their work. This contractor shall provide a minimum of twenty (20) footcandles of illumination for temporary lighting. Any additional lighting required by individual trades shall be provided by the individual trades including power for the lighting. The electrical work for construction purposes shall conform to all federal (OSHA), state, specific safety requirements, as well as the requirements of the national electric code and national electrical safety code. The electrical contractor shall obtain and pay for all required applications, permits and inspections pertaining to this work. This cost shall be included in the contractor's price.
2. New light fixtures shall not be used for temporary lighting.

G. Electric Service
1. Provide trenching and backfill to the power company specifications.
2. Provide conduit for primary service where required by the power company.
3. Concrete encase conduits where required by the power company and where indicated on the plans.
4. Provide metering to power company specifications.
5. Make provisions for the pad-mount transformer as required by the power company including the transformer pad and grounding.
6. Pay the cost of all power company charges connected with permanent electric service to the building.
7. Coordinate all work with the power company and perform any work necessary to assure a complete, working installation. The entire service installation shall be in complete conformance with the power company's requirements.
8. Verify the exact routing of the primary and secondary services, and all service requirements, with the power company prior to bidding.

Section 260519 - Wiring and Cable

A. Color code conductors (except control and instrumentation conductors) as follows:

	208/120 System	480/277 System
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Grey
Ground	Green	Green

1. #12 and #10 conductors shall have continuous insulation color, as listed above.
2. Color code conductors larger than above, which do not have continuous insulation color by application of at least two laps of colored tape on each conductor at all points of access including junction boxes. Color tape shall be the equal of 3M products Scotch #35.
3. Conductors shall be soft annealed copper insulated for 600 volts unless specifically indicated otherwise. Aluminum conductors are not allowed on this project.

260519 (cont.)

B. Insulation type shall be type THWN for wire sizes #8 AWG and larger and THHN or THWN for #10 AWG and smaller. THHN shall not be used in wet or damp locations.

C. Flexible cord shall be heavy duty type so with an equipment ground conductor in addition to the current carrying conductors.

D. Provide #12 conductors, unless otherwise indicated.
1. Control conductors shall be #14 minimum for NEC class I and #16 for NEC class II.

E. Conductors #8 AWG and larger shall be stranded.

F. Conductors #10 AWG and smaller shall be solid.

G. Install wiring in conduit.

H. Connect #10 and smaller wires with constant pressure expandable spring type connectors, "Scotchlok" by 3M or B-Cap by Buchanan.

I. Connect #8 and larger wires with compression connectors or splices as manufactured by Burndy or T&B.

J. Insulate splicing connectors to at least 200% of the wire insulation. Use pre-stretched tubing connector insulators, 3M PST for #2 and larger conductors.

K. Pull conductors using recognized methods and equipment leaving at least 6" wire at all junction boxes for connections.
1. Clean out each conduit system before pulling wire.

L. Form and tie all wiring in panelboards.

M. There shall be no wirenut joints or splices made inside switchboards/panelboards.

N. Branch circuit wire sizes (and conduits) shall be increased from those indicated on the plans to prevent excessive voltage drop. Branch circuits shall be installed with wires of sufficient size so that voltage drop between the panel and the loads does not exceed limit of 3%.

O. Regardless of the temperature rating of the conductor insulation, all conductor ampacity rating for this project shall be determined from the 75°C conductor temperature ratings indicated in the NEC tables. Where equipment or devices are provided with terminals/lugs rated for 60°C, the ampacity rating of the 75°C conductor shall be limited to its associated 60°C rating as indicated in the NEC tables. The electrical contractor shall be responsible to increase the conductors and conduit size as required.

P. Circuits may be multi-plexed in conduit provided wire is properly derated and conduit sized per code. Under no circumstances shall more than six (6) current carrying conductors be run in a single conduit.

Section 260526 - Grounding and Bonding

A. Ground all equipment per N.E.C.

B. Ground each outside lighting pole separately with one ground rod and a #6 ground wire.

C. Ground all dry type transformers as per drawings and NEC #450-10.

D. All conduits shall contain a code-sized ground wire size per N.E.C. in addition to the conductors shown on the plans. Where circuit conductors are increased in size for any reason (i.e. voltage drop, derating, etc.), the ground wire size shall be increased proportionately (according to circular mil area).

E. Where an isolated, insulated ground is required a separate isolated green ground shall be run from the panel isolated ground bus to the isolated ground connection of the device served. In no case shall the system ground (green wire and associated outlet boxes, conduit and building steel) be allowed to contact the isolate ground (green wire with white stripe).

Section 260533 - Raceways and Boxes

A. Raceways
1. All wire shall be run in accordance with code in corrosion resistant, rigid, threaded, metal conduit or electrical metallic tubing (E.M.T.) unless otherwise specifically stated herein.
   - A.a. Conduit in exterior walls, below floor slab, or underground shall be rigid, threaded, galvanized, heavy wall type.
   - A.b. Carlon PVC type 40 heavy wall conduit with ground wire may be used below floor slab or underground in lieu of rigid, threaded, galvanized conduit. PVC 40 conduit shall not be run in or above floor slab. PVC conduit shall terminate below floor slab with rigid, threaded metal conduit adapter. Conduit above slab shall be metal.
   - A.c. Conduit run exposed to the weather shall be heavy wall, metal threaded type.
2. Conduit size shall be 3/4" minimum.
3. Conduit shall be securely fastened in place.
4. All conduit shall be concealed in walls, floors and ceilings wherever possible. Exposed conduit in finished areas will not be permitted. Exposed conduit will be permitted in the unfinished areas with the specific approval of the architect.
5. Use flexible conduit for the connection to recessed or semi-recessed lighting fixtures (6' length maximum). Use liquid tight metal conduit for all connections to motors and other equipment subject to vibration and in areas subject to moisture.
6. Use watertight joints with buried and concrete encased conduit. All buried conduits outside of buildings shall have a minimum of 24" of cover. Metal conduits buried in earth shall be painted (two coats) with heavy asphaltum paint.
7. Support runs of conduit as detailed in the appropriate table of the national electrical code (NEC).
8. Installed exposed runs of conduit and conduit above lay-in ceilings parallel or perpendicular to the walls, structural members of intersections of vertical planes and ceilings. Provide right angle turns using fittings or symmetrical bends. Support conduits within 1" of all changes in direction.
9. If a conduit is suspended, it shall be supported on trapeze hangers which use "all-thread" rods from the structural steel. The use of ceiling support wire or similar material will not be accepted.
10. Install empty conduit for future use as indicated on the drawings. Conduit shall be complete with jetline or pull rope, junction/outlet boxes, tile rings and appropriate cover plates.
11. Provide pitch pockets where conduits penetrate the roof.
12. Thread lubrication/sealant is required on outdoor and underground threaded metal joints.
13. Install fire seal fittings where conduits penetrate concrete floor slabs or masonry walls required to be fire rated.
14. Horizontal portion of conduit exposed on the roof and feeding equipment shall not be more than 5'-0" unless the written approval from architect or engineer is obtained.

B. Pull and Junction Boxes
1. Install pull and junction boxes where shown on the drawings, and where required for changes in direction, at junction points, and to facilitate wire pulling. Furnish box sizes in accordance with NEC unless larger boxes are indicated.
2. Provide steel boxes and removable covers of code gauge, hot rolled sheet steel, hot dipped galvanized inside and outside, for above ground work. Furnish weatherproof boxes when installed above ground outside.
3. Provide cast iron boxes, hot dipped galvanized inside and outside where shown on the drawings. Furnish removable covers with gaskets and stainless steel, brass or bronze screws.
4. Provide concrete boxes for underground work unless otherwise indicated on the drawings. Furnish steel frames and covers with the cover attached to the frame with hexagon head, brass or bronze cap screws, 3/8" in diameter. Provide a rubber gasket for sealing between the cover and the frame. Paint the cover with two coats of heavy asphaltum.

C. Outlet Boxes
1. Use sheet steel boxes, zinc coated or cadmium plated, for concealed interior work.
2. Use cast boxes, zinc-cadmium finish malleable iron, for exposed interior work, and for exposed or concealed work in wet, damp or exterior locations. Cast boxes shall be series FD by Crouse Hinds or Appleton.
3. Wall box sizes (minimum) shall be 4" square X 2-1/2" deep where wall construction permits. Where wall construction dictates, the depth may be reduced to 2-1/8" or 1-1/2" under special conditions.
4. Fixture outlets in ceilings (minimum) shall be 4" octagonal X 1-1/2" deep (4-11/16" octagonal X 2-1/2" deep where required to accommodate larger conduit or larger number of wires).
5. Ganged boxes shall be one piece (minimum), 2-1/8" deep.
6. Provide cast iron, concrete-tite floor boxes with adjustable covers set flush and level with the finished floor, with outlets as indicated on the drawings. Provide Hubbell #B-2400, 4200, or 4300 series boxes with leveling screws. Flush type covers and openings to serve outlets used. Furnish flush caps for closing off box when not in use.
7. Flush mount boxes in all finished walls, install the plaster rings in drywalled plastered walls and raised covers as required in walls with other finishes so that the cover plates fit tightly against boxes or rings, 3/16" maximum gaps are allowed for noncombustible walls.
8. Adjust location of outlets in masonry or tile construction to occur in the nearest joint to the height specified. Heights shall meet A.D.A. requirements.
9. Support all boxes to maintain proper alignment and rigidity.
10. Clean boxes of all foreign matter prior to the installation or wiring of devices.
11. Mounting heights on the drawings are to the centerline of the box unless otherwise noted.

Section 260536 - Cable Trays

A. Source limitations: Obtain cable tray components through one source from a single manufacturer.

B. Electrical components, device, and accessories: listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

D. Coordinate layout and installation of cable trays and suspension system with existing and new construction including, but not limited to light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

260536 (cont.)

E. Manufacturers: subject to compliance with requirements, provide products by one of the following: B-Line Systems, Inc., Chalfant, or Wiremold.

F. Cable tray description:
1. Type: louvered trough
2. Materials and finish: Aluminum.
3. Width: 18" - three compartment with factory installed dividers.
4. Minimum fitting radius: 12".
5. Inside depth: 3".
6. Cover type: none.

G. Cable trays, fittings, and accessories shall be aluminum complying with aluminum association's alloy 6063-T6 for rails, rungs, and cable trays, and alloy 5052-H32 or alloy 6061-T6 for fabricated parts.

H. Fabricate cable tray products with rounded edges and smooth surfaces.

I. Provide tees, crosses, risers, elbows, and other fittings as required, of same materials and finishes as cable tray.

J. Barrier strips shall be of the same materials and finishes as the cable tray.

K. Provide cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

L. Remove burrs and sharp edges from cable trays.

M. Fasten cable tray supports securely to building structure. Locate and install supports according to NEMA VE 1.

N. Install expansion connectors where cable tray crosses building expansion joints and in cable tray runs that exceed 90 feet (27 M). Space connectors and set gaps according to NEMA VE 1.

O. Make changes in direction and elevation using standard fittings.

P. Make cable tray connections using standard fittings.

Q. Locate cable tray above piping unless accessibility to cable tray is required or unless otherwise indicated.

R. Seal penetrations through fire and smoke barriers.

S. Install capped sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.

T. Install cable trays with sufficient space to permit access for installing cables.

U. Ground cable trays according to manufacturer's written instructions.

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

W. Visually inspect each cable tray joint and each ground connection for mechanical continuity.

X. Measure ground resistance of each system of cable tray from the most remote element to the point where connection is made to service disconnect enclosure grounding terminal. Record resistance in OHMS.

Y. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure cable tray is without damage or deterioration at time of substantial completion.

Section 260539 - Infloor Raceway System

A. Provide and install a complete infloor raceway system consisting of the following components:
1. #WCR1EE-10/24 10'-0" long (3) compartment unibody raceway sections with PK preset punching 24" O.C. (quantity as required for length shown).
2. #PK150 field installed presets to be located 24" O.C. as shown.
3. #CBR-1-LHT (3) compartment cell boot risers.
4. #RSCB IEE-18 raceway adjustable support coupling brackets to be located at each Walkercell butt joint and 5'-0" O.C.
5. #RECIEE raceway end closures (quantity as required).
6. #PMS-415B mud caps with marker screws to be located on either side of junction boxes and at beginning and end of runs.
7. #IIEE JB 2510 4-way Walkercell junction box with 1" extension ring (quantity as required).
8. #IIEE JBC junction box closure (quantity as required).
9. #RAKMII Source III flush floor covers for activation to be used where shown for carpeted areas.
10. #RAKMTR-BUFF Source III flush floor covers for activation to be used where shown for tile floor areas. Provide gasket seal between floor tile and coverplate.
11. #H296 duct tape.

B. Provide all required accessories for a complete system.

C. Provide a vapor barrier between the system and grade.

D. Provide a concrete sidewalk that finishes level with top of compacted grade, AFFIX #RSCBIEE-18 supports to this sidewalk, vibrate concrete pour so that the concrete completely encapsulates the Walkercell system. Concrete must be vibrated at all headers, junction boxes and raceway to insure that the concrete completely fills underneath the Walkerduct system. Care must be taken not to over vibrate.

E. The entire system shall be installed to manufacturer's specifications.

F. Submit manufacturer's specifications and installation instructions for each product specified. Submit detailed drawings showing layout of all walkerduct raceways, junction boxes, and accessories as necessary for the proper installation of the infloor system.

G. Before concrete placement, make a final inspection of the entire raceway system. Any gaps in the system shall be sealed with Walker 290G sealing compound to prevent mortar or concrete from entering. Level junction box cover plates flush with finished concrete floor.

H. After placement of concrete fill and before wiring is installed, remove debris and other foreign materials from raceway system.

I. Shrinkage and temperature reinforcement above the Walkerduct system shall be in accordance with AC1318-83. Care shall be taken during concrete placement and, in particular, during concrete vibration, to prevent rising of top reinforcement within the slab.

J. Contractors placing the concrete shall carefully hand finish a minimum of 24" adjacent to junction box access opening, so that the top of finished concrete and junction box access openings are flush.

K. The installed raceway system shall be UL listed under standard 884, shall comply with article 390 of the national electrical code, and be certified or listed by Canadian standards association or comparable testing facility.

L. Protect infloor system from damage. Do not allow equipment or heavy traffic over duct during construction period, without first installing ramps over the duct. Ramps shall be designed so that imposed loads are not transferred to the duct. Components of the system which are damaged during construction shall be replaced at no cost to the owner.

Section 260573 - Fault Current Study

A. The studies shall be performed by the distribution equipment manufacturer or qualified 3rd party professional engineer with field support being provided by the electrical contractor. The studies shall be submitted to the engineer prior to receiving final approval of the distribution. Equipment shop drawings and/or prior to release of equipment for manufacture. If formal completion of the studies may cause delay in equipment manufacture, approval from the engineer may be obtained for a preliminary submittal of sufficient study data to ensure that the selection of device ratings and characteristics will be satisfactory.

B. The studies shall be performed with the aid of a "Windows" based computer program. Comply with referenced standards below and NFPA 70.

C. Study the electrical distribution system from normal and, where applicable, from the alternate power sources throughout electrical distribution system for the project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.

D. Short Circuit input data shall include the power company's fault current contribution, resistance and reactance components of the branch impedances, the X/R ratios, base quantities selected, and other source impedances. Gather and tabulate input data to support the short circuit study. Comply with IEEE 399 and IEEE 551. The study shall be based on the device characteristics supplied by device manufacturer.

E. Short circuit momentary duty values and interrupting duty values shall be calculated on the basis of three phase bolted short circuits at each switchgear bus, switchboard, motor control center, distribution panel, branch circuit panel, and other significant locations through the system associated with the area being renovated. The short circuit tabulations shall include symmetrical fault currents and X/R ratios. For each fault location, the total duty on the bus, as well as the individual contribution from each connected branch, shall be listed with its respective X/R ratio. Base study on the device characteristics supplied by the device manufacturer. Calculation to occur at each of the following: Switchgear, Switchboards, Motor Control Centers, Distribution Panelboards, Branch Circuit Panelboards, Disconnect Switches, and Control Panels associated with the project.

Thorson Baker + Associates
CONSULTING ENGINEERS
3030 West Streetsboro Road
Richfield, Ohio 44286
(330) 659-6688 Ph.
(330) 659-6675 Fax

STOW LIBRARY PARKING LOT
STOW-MUNROE FALLS PUBLIC LIBRARY
3512 DARROW ROAD, STOW, OHIO

SHEET ISSUE: FOR BIDS
ISSUE DATE: 12-20-23

MARK	DATE	DESCRIPTION

PROJECT NO: 2023-0668
ORIGINAL DATE:

ELECTRICAL SPECIFIFCATIONS

E4.0

ELECTRICAL SPECIFICATIONS (cont.)

F. The overcurrent protective device coordination study shall determine overcurrent protective devices and determine overcurrent protective device settings for selective tripping. Study results shall be used to determine coordination of series-rated devices where utilized. Refer to short circuit criteria for electrical equipment to be analyzed. Gather and tabulate input data to support the overcurrent device coordination study. The study shall be based on the device characteristics supplied by device manufacturer. Study shall comply with IEEE 242 and IEEE 399.

G. Protective Devise Coordination Study shall provide the following, where applicable:
1. Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
   a. Phase and Ground Relays:
      1) Device tag.
      2) Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
      3) Recommendations on improved relaying systems, if applicable.
   b. Circuit Breakers
      1) Adjustable pickups and time delays (long time, short time, ground).
      2) Adjustable time-current characteristic.
      3) Adjustable instantaneous pickup.
      4) Recommendations on improved trip systems, if applicable.
   c. Fuses: Show current rating, voltage, and class.
2. Protective Device Evaluation:
   a. Evaluate equipment and protective devices and compare to short-circuit ratings.
   b. Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
   c. Any application of series-rated devices shall be recertified, complying with requirements in NFPA 70.

H. Adjust relay and protective device settings according to the recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.

I. The Arc-flash study shall determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment. Refer to short circuit criteria for electrical equipment to be analyzed. Gather and tabulate input data to support the arc flash study. Study shall comply with IEEE 1584 and NFPA 70E.

J. Arc Flash Incident Energy and Flash Protection Boundary Calculations:
1. Arcing fault magnitude.
2. Protective device clearing time.
3. Duration of arc.
4. Arc-flash boundary.
5. Working distance.
6. Incident energy.
7. Hazard risk category.
8. Recommendations for arc-flash energy reduction.

K. Arch Flash Labels shall be a 3.5-by-5-inch thermal transfer label of high-adhesion polyester for each work location included in the analysis. Furnish and install labels for each piece of equipment analyzed.

L. Arc Flash Labels shall have an orange header with the wording, "WARNING, ARC-FLASH HAZARD", and shall include the following information taken directly from the arc-flash hazard analysis:
1. Location designation.
2. Nominal voltage.
3. Flash protection boundary.
4. Hazard risk category.
5. Incident energy.
6. Working distance.
7. Engineering report number, revision number, and issue date.

M. Arc Flash Labels shall be machine printed, with no field-applied markings.

Section 260923 - Lighting Control Devices

A. Sensor Layout: Utilizing project-specific floor plans, manufacturer shall produce a CAD layout of their recommended locations for all occupancy sensors and daylight sensors. Indicate where additional sensors are recommended or where any sensors can be eliminated. Contractor shall use this layout for rough-in of sensor locations.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Acuity Controls
2. Hubbell Control Solutions
3. Wattstopper
4. Lutron
5. Greengate
6. Douglas Lighting Controls
7. Crestron
8. Steinel Professional
9. Touché Lighting Control
10. B.E.G. Controls

C. Daylight Harvesting Controls
1. Sequence of Operation: A daylight harvesting lighting control system shall be furnished and installed complete in rooms indicated on plans. The control sequence shall be as follows:
   a. General Mode: Occupants shall have the ability to turn on/off and dim all lighting fixtures in the room to a desired light level via the wall dimmer switch(es). Refer to plans for the quantity of zones required.
   b. Occupancy Detection (where indicated): The occupancy sensor shall turn off all lighting fixtures in the room if occupancy is not detected within 20 minutes. Sensor shall function as off only (manual on).
   c. Daylight Harvesting: The daylight sensor shall measure lighting levels within the space and automatically dim lighting fixtures according to their daylight zones. Daylight zones shall be dimmed independently to maintain a consistent lighting level across the space. Note: Some rooms may have fixtures that are not on daylight zones. Confirm lighting level setpoints with the Architect prior to programming.
   d. Emergency Mode (rooms with lighting fixtures on an emergency circuit): Upon loss of normal power, any lighting fixtures on emergency circuits shall be forced on to full light output. All such rooms shall either have UL924 power packs as part of the lighting controls or UL924 devices furnished and installed as required.
2. Dimming Control Module
   a. Provide an open loop continuous dimming daylight harvesting control module with three individually adjustable zones of control.
   b. Module shall have pushbutton programming and automated setup.
   c. LCD display shall provide "real-time" light-level readings.
   d. Compatible with 2-wire 0-10 volt dimming ballasts, 50 ballasts per channel.
   e. Module shall be capable of integrating with occupancy sensors and manual override control stations.
   f. DIN rail mounting.
   g. Shall have standard 2 year warranty and shall be UL listed.
3. On/Off Control Module
   a. Provide an open loop on/off daylight harvesting stepped control module with three individually adjustable zones of control.
   b. Module shall have pushbutton programming and automated setup.
   c. LCD display shall provide "real-time" light-level readings.
   d. Module shall be capable of integrating with occupancy sensors and manual override control stations.
   e. DIN rail mounting.
   f. Shall have standard 2 year warranty and shall be UL listed.
4. Power Pack (with 3 Relays)
   a. Provide a 120/277VAC to +24VDC power pack to power the dimming control module with three individually controlled relays for ON/OFF control.
   b. Built-in overload protection.
   c. Quick connect.
   d. DIN rail mounting.
   e. Shall have standard 2 year warranty and shall be UL listed.
5. Power Pack (with 1 Relay)
   a. Provide a 120/277VAC to +24VDC power pack with one relay for ON/OFF control.
   b. Built-in overload protection.
   c. Quick to install connector.
   d. Plenum rated for mounting inside or outside a junction box or inside a fluorescent ballast cavity.
   e. Shall have standard 5 year warranty and shall be UL listed.

260923 (cont.)

6. Relay
   a. Provide a 10 amp single-pole double-throw relay with 10-30 VAC/DC/120 VAC coil or 10-30 VAC/DC/208-277 VAC coil.
   b. Normally open and normally closed isolated contacts.
   c. LED status indicator.
   d. Plenum rated housing.
   e. Shall have standard 1 year warranty and shall be UL listed.
7. UL924 Relay
   a. Provide a 10 amp single-pole double-throw relay with 10-30 VAC/DC/120 VAC coil or 10-30 VAC/DC/208-277 VAC coil.
   b. Normally open and normally closed isolated contacts.
   c. LED status indicator.
   d. Plenum rated housing.
   e. UL924 listed for emergency use.
   f. Shall have standard 1 year warranty and shall be UL listed.
8. Photosensor
   a. Provide an open loop photosensor that continuously measures footcandle levels using a photodiode element to provide input to the dimming control module.
   b. Foot-candle range of 3 to 6,000 fc.
   c. Sensor shall be capable of mounting both horizontally and vertically.
   d. User selectable foot-candle range setting via jumper beneath front cover.
   e. Shall have standard 2 year warranty and shall be UL listed.
9. Occupancy Sensor
   a. Provide a digital dual-technology ultrasonic and passive infrared occupancy sensor to turn lighting ON/OFF based on occupancy via the dimming control module.
   b. Automatic self-adaptive technology with no manual adjustment required.
   c. Non-volatile memory for sensor settings.
   d. 1,600 square-foot coverage area.
   e. Auxiliary relay for building automation system integration.
   f. Shall have standard 5 year warranty and shall be UL listed.
10. 4-Button Wall Dimmer Switch
   a. Provide a low voltage four button wall switch for manual override control of the dimming control module.
   b. Four buttons provide ON/OFF, dim up, dim down and automatic controls with LED indicators.
   c. Mounts in standard single-gang box.
   d. Contractor shall provide decorator style wall plate (not included).
   e. Buttons shall have engraved labels.
   f. Standard finish as selected by architect.
   g. Shall have standard 2 year warranty and shall be UL listed.
11. 1-Button Wall Switch
   a. Provide a low voltage one button latching wall switch for manual override control of lighting fixtures.
   b. Single button provides ON/OFF control with LED indicator.
   c. Mounts in standard single-gang box.
   d. Contractor shall provide decorator style wall plate (not included).
   e. Button shall have engraved label.
   f. Standard finish as selected by architect.
   g. Shall have standard 2 year warranty and shall be UL listed.

D. Occupancy Sensors, Line Voltage, Wall Switch Type
1. Shall use passive infrared motion detection.
2. Shall be compatible with incandescent, magnetic or electronic low voltage, and magnetic or electronic fluorescent, as well as motor loads.
3. Switch shall be microprocessor controlled.
4. Shall be capable of detecting occupancy with true, 180º field of view.
5. Shall utilize zero crossing circuitry, which increases relay life, protects from the effects of inrush current, and increases sensor longevity.
6. Wall switch shall have integral shutters that narrow the field of view from 180º.
7. Shall feature pushbutton for manual on and off, which times out based upon occupancy detection.
8. An LED shall indicate occupancy status.
9. Internal timer shall be factory set at 10 minutes, shall be push-button programmable from 30 seconds to 20 minutes and shall reset every time occupancy is re-detected. Requires no field calibration or sensitivity adjustments.
10. Manual range, photocell, and time settings shall be user-configurable.
11. Switch shall be rated at 120/277V in one unit.
12. Unit shall fit in a standard box and use a standard wallplate, which is gangable.
13. Wall switch shall not protrude more than .4 inches from box.
14. Shall be a Decora style unit with a matching wallplate available.
15. Shall have standard 5 year warranty and shall be UL listed.
16. Two-pole devices shall provide switching for 2 separate banks from a single unit.

E. Occupancy Sensors, Low Voltage, Ceiling Mount
1. Shall incorporate dual-technology passive infrared and ultrasonic motion detection.
2. Shall mount on ceiling.
3. Shall have 360° coverage with at least a 28 ft coverage pattern (when mounted at 9 ft) in all directions for walking motions.
4. Shall automatically adapt to changing room conditions--including background PIR levels and continuous airflow not less than 6 feet from sensor.
5. Shall incorporate a real-time motion indicator LED, which is visible from the front of unit.
6. Shall have mask inserts for PIR rejection to prevent false tripping.
7. Internal timer shall be factory set at 10 minutes, shall be push-button programmable from 30 seconds to 20 minutes and shall reset every time occupancy is re-detected. Requires no field calibration or sensitivity adjustments.
8. Shall be included with a low voltage relay for tie-in to building automation system.
9. Shall have standard 5 year warranty and shall be UL listed.

F. Power Pack
1. Transforms 120 or 277V to class 2, 15 to 24V DC, to power remote sensors.
2. Shall be compatible with incandescent, magnetic or electronic low voltage, and magnetic or electronic fluorescent, as well as motor loads.
3. Ratings: 20A incandescent, 20A fluorescent, 120 or 277V.
4. Shall be plenum rated. Mount in deep junction box where required per local AHJ.
5. Shall have elongated mounting nipple which can be mounted either directly through a ½" knockout in a junction box or to be located inside an adjacent box for specific local code requirements, contractor to verify.
6. Shall be capable of powering up to 14 sensors.
7. Shall have self-contained relays with relay circuit protection.
8. Provide 2-pole version for rooms with two levels of lighting control including inboard/outboard switching.
9. Shall have standard 5 year warranty and shall be UL listed.

G. Wall Timer Switches
1. The timer shall be an electronic interval timer with a manually operated toggle switch.
2. The timer switch shall be capable of 3-way operation.
3. Switch contacts shall break the current at the end of a preset time which is user adjustable from 1 minute to 18 hours. Timer adjustment shall be hidden after wallplate is installed.
4. Flicker feature shall be provided to provide a flick warn of the load controlled two minutes before the end of the timed cycle and again one minute before the end of the timed cycle.
5. Unit shall fit into a standard 2-1/2 inch deep wall box, single or multi-gang installation, and accept a standard toggle switchplate.
6. Unit shall be capable of switching fluorescent lights with electronic or electromagnetic ballasts, incandescent lights, or motor loads. Unit shall accept input of 24, 120, 208-240, or 277 volts AC at 50/60 Hz.
7. Time switch shall have 5 year warranty and shall be UL listed.

H. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and assist in field testing. Report results in writing. Remove and replace lighting control devices where test results indicate that they do not comply with specified requirements.

I. Adjusting
1. Final occupancy sensor locations shall be determined in accordance with manufacturer's recommendations and locations adjusted as required prior to rough-in. Refer to sensor layout submittal provided by manufacturer. All sensors shall have non-adjustable factory calibrated sensitivity for maximum performance. A factory-authorized service representative shall be engaged to meet on-site with the contractor to determine proper device locations prior to rough-in.
2. Once lighting fixtures and occupancy sensors have been installed, a factory-authorized service representative shall be engaged to set-up and program occupancy sensors and photosensors. Contractor and service representative shall meet on-site with the Owner to determine appropriate set points and programming.
   a. All occupancy sensors shall be field adjusted/aimed to effectively detect motion and eliminate nuisance tripping.
   b. Time Delay settings for occupancy sensors shall be factory set at 10 minutes, and shall not be field adjusted unless specifically instructed by Architect. This delay selection is based on lamp life vs. energy savings and sensor performance.

260923 (cont.)

3. Once all occupancy sensors have been set-up, adjusted and programmed, contractor shall meet again with factory-authorized service representative and Owner to test operation of systems. Service representative shall be engaged to make adjustments to sensors, set points and programming as necessary for proper operation.

J. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, a factory-authorized service representative shall be engaged to provide on-site assistance in adjusting sensors to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

K. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting controls. Refer to Division 1 Section "Closeout Procedures." Provide a minimum of four (4) hours of Owner training.

Section 262213 - Dry Type Transformers

A. Transformers shall be continuously rated isolating type for 60 hertz service unless otherwise indicated.

B. Insulation systems shall be 220 degrees C (150 degrees C rise).

C. Enclosures for transformers shall be metallic, suitable for indoor and outdoor installation as applicable and rodent proof.

D. Manufacturer shall be Cutler-Hammer, Square "D", General Electric or I.T.E.-Siemens. Fractional KVA transformers shall be manufactured by Edwards or the special equipment manufacturer in which the transformers are used.

E. Four approved vibration dampeners per transformer shall be employed as necessary to avoid transmitting any vibration to the building structure. Sizes of the mountings shall be selected on the basis of the weight of the transformer, using:
1. A minimum 1" thick rubber-cork-rubber sandwich type for floor mounting.
2. A spring type for suspension mounting.
3. Two (2) spring type at the top (with two (2) steel brackets) and two (2) rubber-in compression type at the bottom (stand-off) for wall mounting.

F. No conduits shall be attached directly to the transformer. At each attachment, provide a vibration dampening assembly consisting of:
1. AT&B #5721, 2, 3 etc., or equivalent female hub type liquid-tight connector by Steel City, Efcor or approved equal.
2. T&B #5331, 2, 3 etc., or equivalent male hub type liquid-tight connector with an insulated throat by Steel City, Efcor or approved equal.
3. Shor length (24" plus or minus) of liquid-tight flexible conduit.
4. A bonding jumper of NEC size outside of the assembly.

G. Floor mounting: All floor mounted transformers shall be installed on a 4" high concrete pad. This contractor shall furnish and install concrete pad.

Section 262413 - Switchboards

A. Furnish and install the switchboards as herein specified and shown on the associated electrical drawings.

B. The equipment referenced herein are designed and manufactured according to the following appropriate specifications:
1. ANSI/NFPA 70 - National Electrical Code (NEC).
2. NEMA AB 1 - Molded case circuit breakers and molded case switches.
3. NEMA PB 2 - Deadfront distribution switchboards, file E8681.
4. NEMA PB 2 - Proper handling, installation, operation and maintenance of deadfront switchboards rated 600 volts or less.
5. NEMA PB 2.2 - Application guide for ground fault protective devices for equipment.
6. UL 50 - Cabinets and boxes; UL 489 - Molded case circuit breakers.
7. UL 891 - Dead - Front switchboards.

C. Shop drawings submittal packages shall indicate front and side enclosure elevations with overall dimensions shown, conduit entrance locations and requirements, nameplate legends, one-line diagrams, equipment schedule, and switchboard instrument details.

D. Equipment manufacturer must conform to the following items:
1. To be considered for approval, a manufacturer shall have specialized in the manufacturing and assembly of switchboard metering for at least five (5) years.
2. Furnish products listed by underwriters laboratories incorporated and in accordance with standards listed in article 1.02.
3. The manufacturing facility shall be registered by underwriters laboratories inc. to the international organization for standardization ISO 9002 series standards for quality.

E. Delivery, storage, and handling.
1. Deliver, store, protect, and handle products in conformance with manufacturer's recommended practices as outlined in applicable installation and maintenance manuals.
2. Each switchboard section shall be delivered in individual shipping splits for ease of handling. They shall be individually wrapped for protection and mounted on shipping skids.
3. Inspect and report concealed damage to carrier within their required time period.
4. Store in a clean, dry space. Maintain factory protection and/or provide an additional heavy canvas or plastic cover to protect structure from dirt, water, construction debris and traffic. Where applicable, provide adequate heating within enclosures to prevent condensation.

F. Environmental requirements must conform to NEMA PB 2 service conditions during and after installation of switchboards.

G. Manufacturer must provide one (1) set of installation and maintenance instructions with each switchboard.

H. Manufacturer shall warrant equipment to be free from defects in materials and workmanship for the lesser of one (1) year from date of installation or eighteen (18) months from date of purchase.

I. Equipment manufacturer shall be one of the following: Square D, Eaton, General Electric and Seimens. Basis of design indicated on the drawings is: Eaton.

J. Substitutions shall be presented in the manner described in the general provisions of this specification.

K. The switchboards shall be dead-front, front connected and front accessible with sections front and rear aligned. Switchboard frames shall be of formed code gauge steel rigidly welded and bolted together to support all cover plates, bussing and component devices during shipment and installation. Steel base channels shall be bolted to the frame to rigidly support the entire shipping section for moving on rollers and floor mounting. Each switchboard section shall have an open bottom and an individually removable top plate for installation and termination of conduit. Switchboard enclosures shall be painted on all exterior and interior surfaces. The paint finish shall be a medium light gray, ANSI #49, Applied by the electo-deposition process over an iron phosphate pre-treatment. All front covers shall be screwed on and removable and all doors shall be hinged with removable hinge pins. Top and bottom conduit areas shall be clearly indicated on shop drawings. Where applicable, all covers shall have utility sealing provisions as required by the utility company.

L. All painted parts shall be pre-treated and provided with a corrosion-resistant, UL recognized acrylic baked paint finish. The paint color shall be ANSI 49 medium light gray per ANSI standard 255.1-1967.

M. Switchboard Ratings:
1. The short circuit current rating for the entire switchboard shall be suitable for operation at the available fault current. The equipment shall be labeled to indicate the maximum available fault current rating, taking into account the structure, bussing main disconnects, and distribution disconnects. Coordinate available short circuit rating with utility company; equipment ratings with short circuit and coordination studies.
2. The equipment shall be service entrance rated, where applicable. Service Entrance Rating: Switchboards intended for use as service entrance equipment shall contain from one to six service disconnecting means with over-current protection, a neutral bus with disconnecting link, a grounding electrode conductor terminal, and a main bonding jumper. Reference drawings for equipment ratings.
3. Equipment enclosures shall be Nema 1 for indoor application and Nema 3R (non-walk-in) with downward, rearward sloping roof for outdoor, wet or damp locations.

N. Switchboards:
1. The equipment through bus shall be silver-plated copper. The bussing shall be of sufficient cross-sectional area to meet UL standard 891 for temperature rise. The through bus shall extend the full length of the equipment and be 100% rated throughout the line-up. Split bus and tapered bus is not acceptable. There shall be provisions for future splicing of additional sections from either end. The neutral bus shall also be 100% rated. The ground bus shall be sized per UL standard 891, and of the same material as the through bus. Bus connections shall be bolted.
2. Main devices shall be panel and/or fixed, individually mounted depending on rating and associated utility metering requirements. fusible switches.
   a. Main Devices shall be Fusible Switches. Switches 800A and smaller shall be NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle. Switches larger than 800A shall be a bolted pressure switch type. The main switch shall be of the fusible bolted pressure contact type with ratings as shown on the associated drawings. Pressure contacts are to be made by firmly bolting blades to both top and bottom stationary contacts. The switches shall have quick-break kinematic-action mechanisms, inter-phase barriers and arcing equipment. Switches shall be manually operated and have an electric trip mechanism. Power for the electric trip circuit shall be obtained from a control transformer connected from phase to phase on the line side of the switch. The electric trip coil shall be designed to operate at 55% of rated voltage. In accordance with UL standard 977, switches shall have an interrupting rating of 12 times the continuous rating. The operating mechanism shall immediately be in a condition to open the switch. The electrical contractor shall furnish and install fuses.
   b. Main Devices shall be Molded Case Circuit Breakers. Breakers shall comply with UL 489, with interrupting capacity to meet available fault currents. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings: Instantaneous trip, Long and short time pick-up levels, long and shot time adjustments, ground fault pick-up level, time delay and I^2t response.

262413 (cont.)

3. The branch devices shall be panel mounted. Branch devices shall be molded case circuit breaker thermal magnetic type rated for application or fusible switches with quick-make, quick-break action and positive handle indication.The electrical contractor shall furnish and install fuses. Fuse type and size per application.
4. Approved utility metering compartments shall be provided for each device greater than 200 amps. The metering compartments shall be barriered and covers shall have sealing provisions. The metering compartments shall be arranged to comply with the utility company's metering requirements. The contractor shall submit shop drawings to the utility company for their review and approval prior to ordering equipment.
5. Approved multi-gang utility meter section(s) with respective over-current devices shall be provided for devices 200A or smaller. The utility meter sockets shall be rated 200A continuous duty. The multi-gang utility meter section(s) shall be arranged to comply with the utility company's metering requirements. The contractor shall submit shop drawings to the utility company for their review and approval prior to ordering equipment.
6. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard
7. Ground fault protection shall be provided for over-current devices within the equipment as required to comply with NEC.
8. Equipment shall be provided with integral factory installed and wired strip heaters, controls and power supply, where equipment is located outdoors.
9. Equipment shall be provided with integral factory installed and wired SPD (Surge Protection Device) and associated overcurrent / disconnecting means. The SPD shall be rated 240/250ka per phase and include, led display, audible alarm, fusing per mode, replaceable modules. (l-l, l-n, l-g, n-g). The SPD shall comply with current UL, IEEE, ANSI, NEC standards regarding switchboard mounted surge suppression.

O. Prior to installing the equipment:
1. Examine area to receive switchboard to provide adequate clearance for switchboard installation.
2. Check that concrete pads are level and free of irregularities.
3. Start work only after unsatisfactory conditions are corrected.

P. Install switchboards in accordance with manufacturer's written guidelines, the NEC, and local codes. Furnish and Install concrete house keeping pads for each switchboard line-up. Coordinate pad dimensions with equipment being furnished.

Q. Conduct the following for field quality control:
1. Inspect completed installation for physical damage, proper alignment, anchorage, and grounding.
2. Measure, using a megger, the insulation resistance of each bus section phase-to-phase and phase-to-ground for one minute each, at minimum test voltage of 1000 bolts DC; minimum acceptable value for insulation resistance is 1 megohm. Note: Refer to manufacturer's literature for specific testing procedures.
3. Check tightness of accessible bolted bus joints using calibrated torque wrench per manufacturer's recommended torque values.
4. Physically test key interlock systems to check for proper functionality.
5. Test ground fault systems by operating push-to-test button.

R. Adjust equipment as follows:
1. Adjust all operating mechanisms for free mechanical movement per manufacturers specifications.
2. Tighten bolted bus connections in accordance with manufacturer's instructions.
3. Adjust circuit breaker trip and time delay settings to values indicated by the results of the fault current study (see specifications) or to be set by the manufacturer. At electrical contractor's discretion, either method can be used.

S. Touchup scratched or marred surfaces to match original finish using touch up paint provided by the manufacturer.

Section 262500 - Busway System

A. This Specification covers the electrical characteristics and general requirements for a track busway system, hereafter referred to as (Busway). The system shall be designed primarily for overhead distribution of electrical power. Supporting designated work areas and equipment. Once installed, the Busway will provide a simple, versatile, fast and economic means of distributing power. Loads fed from a variety of plug-in units can be easily added or removed without shutting power down to the Busway.

B. The Busway shall be designed and manufactured to the following standards:
1. Low Voltage Directive (72/23/EEC) including Amendment (93/68/EEC).
2. Low Voltage Switchgear and Controlgear Assemblies, Part 1: Type Tested and partially type tested Assemblies, IEC 60439-1: 1999.
3. Low Voltage Switchgear and Controlgear Assemblies, Part 1: Particular Requirements for Busbar Trunking systems (Busways), IEC 60439-2: 2000.
4. Underwriters Laboratories Standard, UL 857 - The common UL, CSA, and ANCE Standard for Busways that is derived form the fifth edition of CSA Standard C22.2 No. 27, the twelve edition of UL 857, and the second edition of NMX-J-148-1998-ANCE.
5. CUL Listing
6. National Electric Code (NEC) - Article 368 - Busways
7. NEMA AB1, Molded Case Circuit Breakers and Molded Case Switches
8. NEMA KS-1, Enclosed and Miscellaneous Distribution Equipment Switches (600VAC).
9. NFPA 70 - National Fire Protection Agency

C. System Description
1. Electrical Requirements
   B225G Busway - Approved Manufacturer: Universal Electric Corp.
   Contact E Technologies, Inc., 800-387-2537

Voltage:	120/208 V
Frequency:	60Hz
Phase Ampacity:	225 A
Neutral Ampacity:	100%
Isolated Ground:	Included
Conductors:	Qty 5 (Phases A,B,C, Neutral, Isolated Ground)
Grounding:	Aluminum Housing

2. Environmental
   Indoor, Low Impedance System
   Ambient Operating Temperature: 40°C/104°F
   60°C/140°F (0.8 Amp Rating Multiplier)

D. Submittals
1. Submittals shall be in accordance with specified procedures. Submit shop drawings and product data for record purposes prior to ordering.
2. Indicate construction details, including dimensions, weights, clearances, major component layout, and power details. Include circuit breaker, fused plug-in, and cable schedule (if applicable), including cable lengths and plug-in schedules.
3. Include connection diagram for external wiring and details of conduit and wiring connections and terminations.
4. Indicate special receiving and handling procedures.
5. Provide electrical characteristics and connection requirements for the system and accessories.
6. Isolated Ground Receptacles will be used on the B225G systems according to standard practices and availability.

E. Warranty
1. The Busway Manufacturer shall guarantee the entire system against defective material and workmanship for a period of one (1) year from date of shipment.

F. Busway Frame and Enclosure
1. Extruded Aluminum housing designed to be lightweight and act as a 100% ground. Housing to be 5ft, and 10ft standard length. This housing should be properly extruded with slots to receive rod mount hangers to hand from building structure. This housing should be open on the bottom to accept plug-in units. This opening shall pass UL's hypothetical finger probe test.
2. All conductors shall be made of copper and sized to handle 100% of its rating continuously with ambient temperatures below 40°C/104°F. The conductors shall be electrically isolated from the housing.
3. Dual busway runs shall be provided for all computer room loads and any other dual-cord power supply loads.
4. Each busway run shall be fed with a properly sized circuit breaker and feeder.

G. Busway Plug-in Units
1. Plug-in units shall be polarized to avoid incorrect installation.
2. Plug-in units shall use circuit breakers for branch circuit protection.
3. Plug-in units shall have locking clips or bolt-on tabs to secure units to the busway.
4. Plug-in units that include drop cords shall be manufactured with cord grips and receptacles as specified by owner as indicated in the drawings. Drop-cords shall be available in any length (up to 25-feet) to accommodate the load requirements. Coordinate requirements with owner.
5. Multi-circuit and multi-breaker plug-in units shall be available to provide the maximum flexibility for powering different load requirements and configurators.

H. Current Monitor
1. Each busway run shall have a current monitor built into the power end-feed unit for the purpose of monitoring the load (current) on each phase and neutral.
2. The current monitor display shall show current (in amperes) for each of up to four channels. A green LED corresponding to the channel being displayed shall turn-on to indicate which channel measurement is on display.
3. The display shall cycle through each channel on a 2-second interval.
4. If the current level on a channel exceeds the user-programmable alarm-threshold (default of 80% of its rated capacity), a red LED corresponding to that channel will turn on. An audible alarm shall also be activated.
5. A pushbutton control shall be available to easily display each channel's load and for the purpose of changing the channel-specific alarm threshold level.
6. Remote communications connections shall be available. A remote communications hub shall provide input for up to 32-channels and an Ethernet connection for network communication.

Thorson Baker + Associates
CONSULTING ENGINEERS
3030 West Streetsboro Road
Richfield, Ohio 44286
(330) 659-6688 Ph.
(330) 659-6675 Fax

STOW LIBRARY PARKING LOT
STOW-MUNROE FALLS PUBLIC LIBRARY
3512 DARROW ROAD, STOW, OHIO

SHEET ISSUE: FOR BIDS
ISSUE DATE: 12-20-23

MARK	DATE	DESCRIPTION

PROJECT NO: 2023-0668
ORIGINAL DATE:

ELECTRICAL SPECIFIFCATIONS

E4.1

ELECTRICAL SPECIFICATIONS (cont.)

I. Installation
1. Busway Sections - The B225G ampere runs will consist of lengths as shown on the drawings.
2. Hanging of the Busway - Using supplied "Rod Mount Hangers," the busway will be hung from the building structure using all thread. The installing contractor shall be responsible for the connections made at the building structure. The supplied Rod Mount Hangers will connect the busway to the all thread. The maximum spacing is 10 ft on center for hangers. The height of the busway shall be coordinated with the architect and owner.
3. Connecting Sections of Busway - At a junction of Busway sections, the installer will insert a Bus Connector, coupling the ends of the housings into the adjacent housing end to join (2) sections together using the BHC-2 housing coupler. A manufacturer supplied tool will assist in joining sections together.
4. End of Runs - End pieces and end caps will be provided to install at the ends of each run.
5. Closure Strip - The closure strip can be cut and fitted to cover the bottom opening of the Busway housing to prevent dust and debris from gathering in the Busway.
6. Supply as manufactured by Universal Electric Corporation: 3089 Washington Pike; Bridgeville, PA 15017. Contact E Technologies: (800) 387-2537. No known Equal.

Section 262726 - Wiring Devices

A. Wiring device color shall be selected by architect, unless otherwise indicated.

B. Provide totally enclosed, 20 ampere, 120/277 volt, quiet A/C general use snap switches.

C. Switches shall be specification grade as manufactured by Hubbell, P&S, or Levton.

D. Provide NEMA configuration 5-20R Duplex 125 volt grounding type receptacles rated for 20 amperes unless otherwise indicated on the drawings.

E. Receptacles shall be specification grade as manufactured by Hubbell, P&S or Leviton.

F. Receptacles requiring amperages, voltages or configurations different from the duplex convenience receptacles above shall be as indicated on the drawings.

G. Provide other receptacles of a quality, material and workmanship equal to that specified for duplex convenience receptacles.

H. Provide cover or device plates for outlet boxes as follows unless otherwise noted:
1. Finished areas: Thermoplastic - color to match device.
2. Unfinished areas: Zinc coated sheet metal, aluminum, or cast metal as appropriate for the type of box.
3. Exterior areas: Copper free aluminum with gray, powder epoxy finish, gasket, weatherproof, Crouse-Hinds "WLRD" for duplex receptacles and WLRS for single receptacles or equal.
4. Telephone, communication, and signal outlet plates, shall match those used for receptacles and switches. All outlet and/or junction boxes shall be complete with a cover plate by this contractor.
5. Where devices are ganged, they shall be installed under a common cover plate.

I. Locate the switches approximately 4'-0" above the finished floor elevation or nearest block course (within A.D.A. requirements), unless otherwise indicated. The long dimension of the switches shall be vertical.

J. Locate receptacles approximately 1'-6" above the finished floor elevation or nearest block course (within A.D.A. requirements), unless noted otherwise. The long dimension of receptacles shall be vertical.

Section 262813 - Fuses

A. The contractor shall furnish a complete set of fuses for all switches, plus fusible equipment furnished by other trades. Unless indicated otherwise on plans, the fuses shall be of the following types:
1. Fuses 601 to 6000 amps shall be UL class. Trade type shall be KRP-C as manufactured by Bussmann Company.
2. Fuses 1/10 to 600 amps shall be UL class RK1. Trade type shall be low peak LPS-RK (600V) and LPN-RK (250V) as manufactured by Bussmann Company.
3. All other fuses shall be dual-element current-limiting type with 200,000 amperes symmetrical interrupting capacity.

B. Fuses shall be manufactured by Bussman, Gould-Shawmutt, or Reliance.

C. Spare fuses amounting to a duplicate set of each size installed shall be turned over to the owner upon completion of the project. Provide and place in a spare fuse cabinet similar to Bussman # SFC.

D. This contractor shall replace all fuses blown during construction.

Section 262416 - Distribution and Panelboards

A. *** Choose A. or B. *** Distribution Panels (circuit breaker style)
1. Distribution panels shall be dead front type with features and rating as scheduled on the drawings.
2. Molded case circuit shall be as scheduled, of size and number indicated on the drawings. All breakers shall be bolt-on type.
3. All lugs shall be UL approved CU/AL type.
4. Panels shall be manufactured as a complete unit and not an assembly of parts secured from a supply house.
5. All panels shall be capable of accepting circuit breakers sized up to and including 400 amps.
6. Vertical bussing shall be extended the full length of the panel.
7. All bus bars shall be rectangular solid copper.
8. Distribution panels shall be G.E., Square D, Siemens or Cutler-Hammer.
9. Install panels such that handle for the top breaker does not exceed 6'-6" above finished floor.
10. Provide phenolic labels for each panel.
11. All bolted connections shall be torqued in accordance with manufacturer's standards.
12. Surface-mounted panels shall be mounted on a 3/4" plywood backboard. Floor-mounted panels shall be mounted on a 4" high concrete pad.

B. Panelboards
1. Panelboards shall be enclosed dead front safety type with features and ratings as scheduled on the drawings.
2. Panels known as "load centers" are unacceptable.
3. Molded case circuit breakers shall be as scheduled on the drawings and specified in this division.
4. All bus bar shall be rectangular solid copper.
5. Space, where shown in panel schedules, designates space for future protective devices and shall include bus and support.
6. Install cabinets so that center of the top breaker does not exceed 6'-6" above the finished floor.
7. Entries on directory cards shall be typed, complete and accurate.
8. All bolted connections shall be torqued in accordance with manufacturer's standards.
9. Electrical contractor shall arrange circuits as near as possible to circuit numbers on the drawings. At completion of job, electrical contractor shall take current reading checks of respective phases. A minimum of circuit connections shall be rearranged to balance, as closely as possible, the load in the panel.
10. All breakers shall be bolt-on type.
11. Provide (3) spare 1" conduits into accessible ceiling space where panels are flush-mounted.
12. Manufacturer shall be Square D, Siemens, G.E., or Cutler-Hammer.

Section 262816 - Safety Switches

A. Safety switches shall be the enclosed heavy-duty type (type HD) with quick-make, quick-break mechanism and external pad lockable operating handle.

B. Safety switches shall be rated for 240 or 600 volts as applicable. They shall be horsepower rated when used in motor circuits.

C. Safety switches shall be fusible or non-fusible 2, 3, or 4 pole as indicated on the drawings.

D. Safety switches shall be single throw unless otherwise indicated on the drawings.

E. Enclosures shall be NEMA 1 indoors and NEMA 3R outdoors unless otherwise indicated on the drawings.

F. Manufacturer shall be Square D, Siemens, G.E., or Cutler-Hammer. All safety switches shall be by one manufacturer.

G. Mount the safety switches securely between 3' X 6' levels above the floor unless otherwise indicated on the drawings.

H. Switches on block walls shall be mounted on a 3/4" plywood backboard, where located indoors.

Section 265119 - Lighting Fixtures

A. LED lighting fixtures:
1. Recessed Fixtures: Comply with NEMA LE 4.
2. Bulb shape complying with ANSI C79.1.
3. Lamp base complying with ANSI C81.61.
4. CRI of minimum 80.
5. CCT of 3500K, unless noted otherwise on the plans or fixture schedule.
6. Rated lamp life of 50,000 hours, minimum at 70 percent lumen maintenance.
7. Lamps dimmable from 100 percent to 10 percent of maximum light output, unless noted otherwise on the plans or fixture schedule.
8. Integral driver. Driver power factor shall be 40 percent or greater. Harmonic distortion shall be less than 10% THD. Drivers shall be equipped with automatic thermal protection and 20 KA surge protection with end of life LED indicator.
9. Nominal Operating Voltage: as indicated on plans and schedules.
10. Efficiency minimum of 80 lumens per watt.
11. Each LED luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires.
12. Fixtures shall comply with UL 1598 and UL 8750.

265119 (cont.)

B. Linear fluorescent lighting fixtures:
1. Lamps for new light fixtures shall be T8, 3500K, minimum 80 CRI of the following manufacturers:
a. General Electric "Starcoat" SPX35 Series
b. Sylvania "Octron" 835 Series
c. Phillips TLD835 Series
2. Ballasts shall be electronic, parallel, instant-start, normal output type, less than 10% THD, CBM and ETL certified, as manufactured by Sylvania, Philips Advance, Universal Lighting Technologies and Robertson.
3. All lamps shall be furnished and installed by electrical contractor. Lamps shall be of the same manufacturer for all types.
4. Fixtures shall comply with UL 1598.

C. Compact fluorescent lighting fixtures:
1. Lamps for new light fixtures shall be 3500K, minimum 80 CRI of the following manufacturers:
a. General Electric "Biax" SPX35 Series (4 pin base)
b. Sylvania "Dulux" 835 Series (4 pin base)
c. Phillips "PL-T" 3500K Series (4 pin base)
2. Ballasts for "T5" compact fluorescent lamps shall be electronic, parallel, instant-start, normal output type, less than 10% THD, CBM and ETL certified, as manufactured by Sylvania, Philips Advance, Universal Lighting Technologies and Robertson.
3. Ballasts for "T4" compact fluorescent lamps shall be electronic, parallel, rapid-start, normal output type, less than 10% THD, CBM and ETL certified, as manufactured by Sylvania, Philips Advance, Universal Lighting Technologies and Robertson.
4. All lamps shall be furnished and installed by electrical contractor. Lamps shall be of the same manufacturer for all types.
5. Fixtures shall comply with UL 1598.

D. Exit Signs:
1. Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction.
2. Internally Lighted Signs: Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
3. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

E. All lighting fixtures shall be furnished and installed by electrical contractor as indicated on the lighting fixture schedule. Other acceptable manufacturers shall be at the discretion and approval of the architect and engineer.

F. All fixtures shall bear the underwriter's laboratories (UL) label, be listed and approved for the purpose intended and installed according to manufacturer's instructions.

G. Existing fixtures noted to be reused shall be cleaned and relamped.

H. Electrical contractor shall confirm that all lighting fixtures and associated drivers, ballasts, etc. are coordinated with the lighting/dimming controls being provided. Contractor shall verify if and where Generator Transfer Devices (GTDs) are required prior to ordering lighting fixtures.

I. Electrical contractor shall confirm that all lighting fixture mounting options and hardware are coordinated with the ceiling height and construction. Contractor shall verify fixture mounting heights with architect prior to ordering and rough-in.

J. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

K. Set all lighting fixtures level, plumb, and square with ceilings and walls.

L. This contractor shall provide and install all necessary support media for all lighting fixtures including structural steel, angle, rods, etc. and shall be supported in a manner acceptable to the local inspection authorities. All fixtures shall be firmly supported from beams or joists.
1. Provide all necessary backing, blocking and supports for wall mounted fixtures.
2. Fixtures shall not be supported from roof deck.
3. Support for Fixtures in or on Grid-Type Suspended Ceilings:
a. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from fixture corners.
b. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
c. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling trees.
4. Suspended Fixture Support: Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.

M. If required by code, light fixtures shall be Chicago Plenum or New York City rated. If required by code or project requirements, light fixtures shall be CALGREEN, DC Green, Title 24 and/or Energy Star compliant/certified.

N. Recessed fixtures recessed in air plenums shall be approved for the purpose intended and installed according to manufacturer's instructions. Fixtures shall be air-tight rated and/or provide air-tight gaskets to seal around openings.

O. Recessed fixtures in direct contact with insulation shall be IC (Insulated Ceiling) rated. Insulation shall be kept away from Non-IC rated fixtures as required by code and manufacturer's instructions. Provide barriers as required.

P. All penetrations associated with the electrical installation located in or passing through fire rated assemblies shall be fire-stopped using a UL approved method. Furnish and install UL listed fire rated materials and equipment such as boxes, puddy pads, endothermic mat, lighting fixtures with rated enclosures, fire rated covers for lighting fixtures, etc. to comply with code for project conditions. UL approved method for fire stopping shall meet or exceed fire rating of structure being penetrated. Reference architectural plans for fire ratings.

Q. All adjustable fixtures shall be aimed and adjusted during evening hours to the satisfaction of the architect.

R. Submittals: In accordance with other sections of these specifications, provide shop drawings for lighting fixtures containing the following information (as applicable):
1. Project specific luminaire designation
2. All features, options, accessories, mounting, etc. clearly marked
3. Luminaire dimensions
4. Delivered lumen output, CCT and CRI
5. Lamp life
6. Energy efficiency data
7. Photometric data
8. Listings (NRTL, IC, IP, etc.)
9. Lighting controls compatibility
10. Emergency batteries (integral or remote) including the capacity and lumen output
11. Factory shop drawings indicating project specific lengths and layouts for all continuous linear products

Section 270528 - Telephone System

A. Electrical contractor to provide telephone service conduit or duct to telephone board as shown on plans. Service conduit size and quantity shall be as determined by local telephone company.

B. This contractor shall provide and install all conduits with pull wires, outlet boxes, metal cabinets and pull boxes. Provide a complete conduit system with pull wire as indicated on drawings.

C. All plates shall be standard telephone type with jack. Provide plates of same material and finish as specified for receptacles. Wall phone plates shall have mounting studs.

D. Provide fire-rated plywood terminal board as shown on drawings.

E. A conduit run shall have not more than three (3) bends in a run between outlet boxes or between outlet box and a metal cabinet or pull box. When a run requires more than three (3) bends, a pull box of suitable size shall be placed in suitable location to meet the above conditions.

Thorson Baker + Associates
CONSULTING ENGINEERS
3030 West Streetsboro Road (330) 659-6688 Ph.
Richfield, Ohio 44286 (330) 659-6675 Fax

STOW LIBRARY PARKING LOT
STOW-MUNROE FALLS PUBLIC LIBRARY
3512 DARROW ROAD, STOW, OHIO

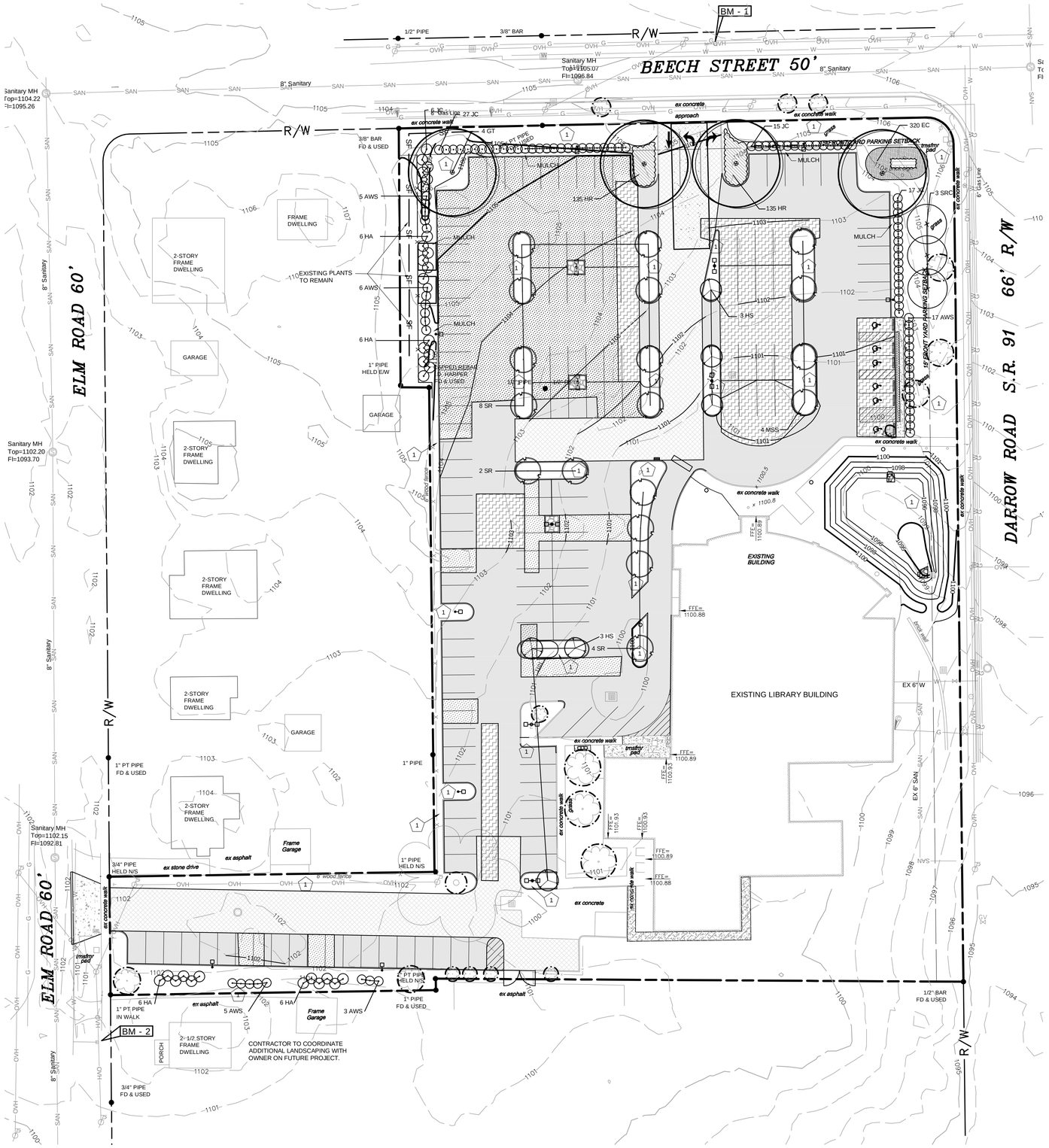
SHEET ISSUE: FOR BIDS
ISSUE DATE: 12-20-23

MARK	DATE	DESCRIPTION

PROJECT NO: 2023-0668
ORIGINAL DATE:

ELECTRICAL SPECIFIFCATIONS

E4.2



PLANTING NOTES AND SPECIFICATIONS

1. THESE DOCUMENTS ARE MEANT TO SERVE AS A GUIDE FOR CONSTRUCTION. MODIFICATIONS TO THE DESIGNS MAY BE REQUIRED TO ACCOMMODATE VARYING FIELD CONDITIONS OR MODIFIED PLANT ARRANGEMENTS. MODIFICATIONS MUST BE APPROVED BY CITY OF STOW LANDSCAPE ARBORIST.
2. CONTRACT SHALL CONSIST OF TOTAL UNITS AUTHORIZED BY OWNER.
3. UNLESS OTHERWISE DIRECTED, CONTRACTOR SHALL PROTECT ALL TREES SCHEDULED TO REMAIN. FENCE THOSE WHICH MAY RISK DAMAGE FROM CONSTRUCTION EQUIPMENT OR WORK. ALL HONEY LOCUST STREET TREES TO REMAIN AND MAY NOT BE REMOVED.
4. ALL TREES WHICH ARE TO BE REMOVED SHALL BE REMOVED IN A MANNER WHICH WILL NOT INJURE PLANT MATERIAL SCHEDULED TO REMAIN. STUMPS ARE TO BE COMPLETELY REMOVED AND HAULED OFF SITE. NO BURIAL OR BURNING WILL BE PERMITTED. STUMPS WHICH ARE NOT IN THE PATH OF PROPOSED PAVEMENTS, STRUCTURES OR OTHER SIMILAR IMPROVEMENTS MAY BE GROUND IN PLACE.
5. THE GENERAL CONTRACTOR WILL PROVIDE AND PLACE 9" OF TOPSOIL. TOPSOIL SHALL CONTAIN NO ROCKS AS SPECIFIED. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR ALL FINE GRADING RELATING TO HIS WORK (WHEN APPLICABLE).
6. TREES & VEGETATION WITHIN LIMITS OF CONSTRUCTION SHALL BE CLEARED AND GRUBBED UNLESS NOTED OTHERWISE.
7. BEFORE PLANTING, DETERMINE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES AND PERFORM WORK IN A MANNER WHICH WILL AVOID POSSIBLE DAMAGE. HAND EXCAVATE, AS REQUIRED. IF CONDITIONS DETRIMENTAL TO PLANT GROWTH ARE ENCOUNTERED, SUCH AS RUBBLE FILL, ADVERSE DRAINAGE CONDITIONS, OR OBSTRUCTIONS, NOTIFY LANDSCAPE ARCHITECT BEFORE PLANTING.
8. ALL PLANT MATERIAL QUALITY AND SIZES WILL CONFORM TO THE CURRENT ISSUE OF THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN. PLANT MATERIAL MUST BE SELECTED FROM NURSERIES THAT HAVE BEEN INSPECTED AND CERTIFIED BY STATE PLANT INSPECTORS. NOMENCLATURE WILL BE IN ACCORDANCE WITH HORTUS 111 BY L.H. BAILEY.
9. SEE THIS SHEET FOR PLANT MATERIAL LIST. TOTAL QUANTITIES OF MATERIALS SHOWN ON LANDSCAPE DRAWINGS SHALL TAKE PRECEDENCE OVER QUANTITIES SHOWN ON THE PLANT MATERIAL LIST. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL QUANTITIES ON THE PLANTING PLAN.
10. REPORT ANY DISCREPANCIES IN THE PLANS TO THE LANDSCAPE ARCHITECT PRIOR TO START OF CONSTRUCTION. LANDSCAPE ARCHITECT IS TO BE THE AUTHORITY FOR INTERPRETATION OF PLAN(S) AND QUALITY OF WORK.
11. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO INSPECT THE PLANTS EITHER AT THE NURSERY OR AT THE JOB SITE PRIOR TO PLANTING. CONTRACTOR SHALL LABEL AT LEAST ONE PLANT OF EACH VARIETY WITH A SECURELY ATTACHED WATERPROOF TAG BEARING LEGIBLE DESIGNATION OF THE BOTANICAL AND COMMON NAMES.
12. CONTRACTOR SHALL NOT MAKE PLANT SUBSTITUTIONS. IF SPECIFIED LANDSCAPE MATERIAL IS NOT OBTAINABLE, SUBMIT PROOF OF NON-AVAILABILITY TO LANDSCAPE ARCHITECT TOGETHER WITH A PROPOSAL FOR USE OF EQUIVALENT MATERIAL.
13. WHERE FORMAL ARRANGEMENTS OR CONSECUTIVE ORDER OF TREES OR SHRUBS ARE SHOWN, SELECT STOCK FOR UNIFORM HEIGHT AND SPREAD TO ASSURE SYMMETRY IN PLANTING.
14. DO NOT BEND OR BIND-TIE TREES OR SHRUBS IN SUCH A MANNER AS TO DAMAGE BARK, BREAK BRANCHES OR DESTROY NATURAL SHAPE. PROVIDE PROTECTIVE COVERING DURING DELIVERY. DO NOT DROP BALLED AND BURLAPPED STOCK DURING DELIVERY. IF PLANTING IS DELAYED MORE THAN 6 HOURS AFTER DELIVERY, SET TREES AND SHRUBS IN SHADE, PROTECT FROM WEATHER AND MECHANICAL DAMAGE, AND KEEP ROOTS MOIST BY COVERING WITH MULCH, BURLAP OR OTHER ACCEPTABLE MEANS OF RETAINING MOISTURE.
15. PREPARATION OF PLANTING BEDS, LOOSEN SUBGRADE TO A MINIMUM DEPTH OF 6". REMOVE STONE OVER 1" IN ANY DIMENSION, STICKS, STONES, RUBBISH AND OTHER EXTRANEOUS MATTER. ALL BEDS SHALL BE EDGED TO FORM A NEAT AND STRAIGHT, WELL-DEFINED CUT EDGE. BUILD ALL PLANT BEDS WITH A TOTAL 12" OF SETTLED PLANTING SOIL. ADD TOPSOIL IN SUFFICIENT QUANTITY TO RAISE BED APPROXIMATELY 2-3" ABOVE FINISHED ADJACENT GRADES. WHERE BED GRADES MEET ADJACENT GRADES, THE EDGE OF THE BED SHALL BE SLOPED GRADUALLY DOWN TO MEET THE ADJACENT GRADE 1" BELOW IT. THE FINISHED MULCH GRADE SHALL BE 1" BELOW THE ADJACENT LAWN OR PAVEMENT GRADE TO PREVENT IT FROM WASHING ONTO THE ADJACENT GRADES. PROVIDE POSITIVE DRAINAGE AWAY FROM ALL BUILDINGS AND AROUND OR AWAY FROM PLANTING BEDS TO PREVENT PONDING OF WATER. DO NOT RAISE BED GRADES, FINISHED GRADES, OR MULCH ABOVE FINISHED FLOOR ELEVATIONS.
16. PLANT MATERIAL SHALL BE SET IN THE CENTER OF AN INDIVIDUAL PIT AND SET PLUMB AND STRAIGHT. ALL PLANTS SHALL BE ADJUSTED TO CONFORM AND ALIGN WITH SURROUNDING PLANTS AND PROPERLY FACED SO AS TO GIVE THE BEST EFFECT. SHRUBS SHALL BE SET TO WITHIN ONE FOOT OF TRUNK OF TREES AND SHRUBS WITHIN PLANTING BED, AND WITHIN 6" OF EDGE OF BED. ALL WIRE BASKETS, TWINE AND BURLAP SHALL BE COMPLETELY REMOVED FROM ALL PLANTS AT THE TIME OF PLANTING. LANDSCAPE CONTRACTOR TO CONTACT CITY OF STOW ARBORIST (SUE MOTTL 330-689-2700) FOR INSTRUCTIONS FOR MATERIAL REMOVAL PRIOR TO BEGINNING INSTALLATION. CONTAINER GROWN PLANTS TO HAVE 3 TO 4 SLICES THROUGH THE ROOTS AND THE ROOTS ON THE OUTSIDE OF THE PLANT BALL WILL BE WORKED FREE FROM THE SOIL OR ROOT MASS MAY BE BUTTERFLIED. BACKFILL PIT LOOSELY UNTIL FULL. BACKFILL SHALL BE SETTLED BY WATERING AND REFILLED AS NECESSARY. DISH TOP OF BACKFILL TO ALLOW FOR MULCHING.
17. PLANTING SOIL FOR BACKFILLING DECIDUOUS PLANTS BEDS OR PITS SHALL CONSIST OF 1/4 ORIGINAL ON-SITE SOIL AND 3/4 SANDY LOAM OR LOAM SOIL AS DEFINED BY U.S.D.A. SOIL CONSERVATION SERVICE, SOIL CLASSIFICATION SYSTEM. THE PLANTING MIXTURE IS TO BE FREE FROM ADMIXTURE OF SUBSOIL, HEAVY CLAY, COARSE SAND, STONES, PLANTS, ROOTS, STICKS, AND ANY OTHER FOREIGN MATERIALS. 95% OF THE PLANTING TOPSOIL SHALL PASS A 2.0 MIL SIEVE. THE ORGANIC CONTENT SHALL 4% TO 12% OF THE TOTAL DRY WEIGHT. ADD GRANULAR "SOIL MOIST" OR EQUAL TO THE TOPSOIL MIX, APPLIED PER THE MANUFACTURER'S RECOMMENDED RATES FOR THE SIZE AND TYPE OF PLANT MATERIAL SPECIFIED, IF NO IRRIGATION IS TO BE APPLIED. MIX IN APPROPRIATE QUANTITIES OF 20-10-5 "AGRIFORM" SOLID FERTILIZER TABLETS OR EQUAL TO ALL PLANTINGS.
18. IF THE QUALITY OR QUANTITY OF ON-SITE TOPSOIL STOCKPILED IS INSUFFICIENT TO COMPLETE WORK, PROVIDE IMPORTED TOPSOIL. OBTAIN RIGHTS AND PAY ALL COSTS FOR IMPORTED TOPSOIL MATERIAL.
19. PROPOSED TOPSOIL SHALL BE ACCEPTABLE TO THE LANDSCAPE ARCHITECT AND SOILS TESTING FIRM.
20. AFTER PLANTING, PRUNE BRANCHES OF DECIDUOUS STOCK TO REMOVE BROKEN, DAMAGED AND DEAD BRANCHES. DO NOT TRIM THE CENTRAL LEADER. APPLY ANTI-DESICCANT USING POWER SPRAY TO PROVIDE AN ADEQUATE FILM OVER TRUNKS, BRANCHES, STEMS, TWIGS AND FOLIAGE. IF DECIDUOUS TREES OR SHRUBS ARE MOVED IN FULL-LEAF, SPRAY WITH ANTI-DESICCANT AT NURSERY BEFORE MOVING AND AGAIN IN TWO WEEKS AFTER PLANTING.
21. TREE STAKING SHOULD NOT BE REQUIRED FOR ALL PLANTINGS, BUT DETERMINED ON AN INDIVIDUAL TREE BASIS.
22. ANY TREES DAMAGED AND THAT NEED REMOVED MUST BE REPLACED.
23. ALL PLANT MATERIALS AND GROUNDCOVERS TO BE INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT BEFORE FINAL ACCEPTANCE OF WORK.
24. ALL PLANT MATERIAL IS TO BE GUARANTEED FOR ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE.
25. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR ALL CLEAN-UP ASSOCIATED WITH ITS CONSTRUCTION PROCEDURE.
26. LANDSCAPED PERCENTAGE OF SITE = 33.6%.
27. SUBSTITUTIONS FOR PLANT MATERIAL MUST BE APPROVED BY STOW'S LANDSCAPE ARBORIST.
28. PLANTING TO OCCUR IN MARCH, APRIL, MAY, SEPTEMBER, OCTOBER, OR NOVEMBER ONLY.

PLANT LIST:

TREES

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE/COND.	SPACING	NOTES
GT	4	GLEDITIA T.F. INERMIS 'SKYLINE'	SKYLINE HONEYLOCUST	2 1/2" CAL	AS SHOWN	-
HS	6	HIBISCUS SYRIACUS 'PINK GIANT'	PINK GIANT ROSE OF SHARON	2" CAL	AS SHOWN	TREE FORM
MSS	4	MALUS 'SPRING SNOW'	SPRING SNOW CRAB	2" CAL	AS SHOWN	TREE FORM
SR	14	SYRINGA RETICULATA 'IVORY SILK'	IVORY SILK TREE LILAC	2" CAL	AS SHOWN	TREE FORM
SRC	3	SYRINGA RETICULATA 'IVORY SILK'	IVORY SILK TREE LILAC	8' HT	AS SHOWN	CLUMP

SHRUBS

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE/COND.	SPACING	NOTES
JC	65	JUNIPERUS CHINENSIS 'SEA GREEN'	SEA GREEN JUNIPER	36" HT/B&B	4' O.C.	-
AWS	36	SPIREA X BUMALDA 'ANTHONY WATERER'	ANTHONY WATERER SPIREA	24" HT/B&B	4' O.C.	-
HA	24	HYDRANGEA a. 'INVINCIBELLE SPIRIT'	INVINCIBELLA SPIRIT HYDRANGEA	30" HT/B&B	AS SHOWN	-

GROUNDCOVERS / PERENNIALS

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE/COND.	SPACING	NOTES
EC	320	EUONYMUS F. 'COLORATUS'	PURPLELEAF WINTERCREEPER	NO 1 CONT	15" O.C.	-
HR	270	HEMEROCALIS 'HAPPY RETURNS'	HAPPY RETURNS DAYLILY	NO 1 CONT	18" O.C.	-

KEYNOTE:

1 LAWN - SEED DISTURBED AREAS

30' 0' 30' 60'

LANDSCAPE PLAN
1"=30'

2 WORKING DAYS BEFORE YOU DIG
CALL TOLL FREE: 800-362-2764
OHIO UTILITIES PROTECTION SERVICE

Thorson Baker + Associates
CONSULTING ENGINEERS
3030 West Streetsboro Road
Richfield, Ohio 44286
(330) 659-6688 Ph.
(330) 659-6675 Fax

STOW LIBRARY PARKING LOT
STOW-MUNROE FALLS PUBLIC LIBRARY
3512 DARROW ROAD, STOW, OHIO

SHEET ISSUE: FOR BIDS
ISSUE DATE: 12-20-23

MARK	DATE	DESCRIPTION

PROJECT NO: 2023-0668
ORIGINAL DATE: 06-23-2016

LANDSCAPE PLAN

L1.0