A D D E N D U M N O. 2

Lake Campus Workforce Development Project
7600 Lake Campus Drive
Celina, Ohio 45822

Wright State University
3640 Colonel Glenn Highway
Dayton, Ohio 45435-0001

Project No. 224102.00

Index of Contents

Addendum No. 2, 4 items, 1 page
Revised Project Manual, Section 03 30 00 – Cast-in-Place Concrete
New Project Manual, Section 22 15 19 - General-Service Compressed Air and Welding Systems
Revised Project Manual, Section 26 05 33 - Conduit and Boxes for Electrical Systems
Revised Project Manual, Section 26 05 37 – Wire Mesh Type Cable Trays
Revised Drawing Sheet Nos. A-101, PL11, E-501, E-601, E-602, E-701, ED11, EF101, EL11, EP11, EP12, ES101, ET11, ET51, and ETD1
Information Available To Bidders
Pre-Bid Agenda
Meeting Minutes
Pre-Bid Sign-In Sheet
Pre-Bid Request for Interpretation/Clarification Log

October 21, 2026

I hereby certify that the Project Drawings and the Project Manual were prepared by me or under my direct supervision and that I am a duly registered Architect/Engineer under the Laws of the State of Ohio.

FANNING/HOWEY ASSOCIATES, INC.
ARCHITECTS/ENGINEERS



JENNIFER M. FULLER, License # 1115297
Expiration Date 12/31/25

TO: ALL BIDDERS OF RECORD

ADDENDUM NO. 2 to Drawings and Project Manual, dated September 3, 2026, for Lake Campus Workforce Development Project, Wright State University, Dayton, OH 45435-0001; as prepared by Fanning/Howey Associates, Inc., Celina, Ohio.

This Addendum shall hereby be and become a part of the Contract Documents the same as if originally bound thereto.

The following clarifications, amendments, additions, revisions, changes, and modifications change the original Contract Documents only in the amount and to the extent hereinafter specified in this Addendum.

Each bidder shall acknowledge receipt of this Addendum in his proposal or bid.

NOTE: Bidders are responsible for becoming familiar with every item of this Addendum. (This includes miscellaneous items at the very end of this Addendum.)

RE: ALL BIDDERS

ITEM NO. 1. PROJECT MANUAL, TABLE OF CONTENTS

A. Page 5 of 6, add Section 22 15 19 – General-Service Compressed Air and Welding Systems.

ITEM NO. 2. REVISED PROJECT MANUAL SECTION

A. Section 03 30 00 – Cast-in-Place Concrete, Section 26 05 33 - Conduit and Boxes for Electrical Systems, and Section 26 05 37 – Wire Mesh Type Cable Trays have been revised, dated 10-21-26, are included with and hereby made a part of this Addendum.

ITEM NO. 3. NEW PROJECT MANUAL SECTION

A. New Project Manual Section 22 15 19 - General-Service Compressed Air and Welding Systems is included with and hereby made a part of this Addendum.

ITEM NO. 4. REVISED DRAWING SHEETS

A. Drawing Sheet Nos. A-101, PL11, E-501, E-601, E-602, E-701, ED11, EF101, EL11, EP11, EP12, ES101, ET11, ET51, and ETD1 have been revised, dated 10-21-26, and are included with and hereby made a part of this Addendum. These Drawings supersede the original documents.

PROCUREMENT AND CONTRACTING REQUIREMENTS GROUP

Division 00 – Procurement and Contracting Requirements

Introductory Information
00 01 01.....Project Title Page
00 01 05.....Certification Page
00 01 10.....Table of Contents

Procurement Requirements
00 10 00.....Solicitation
00 21 13.....Instructions to Bidders (General Contracting/Paper Bid)
00 21 15.....Substitution Request Form
00 31 00.....Available Project Information
00 31 01.....Roofing Information
00 31 32.....Geotechnical Data
00 41 13.....Bid Form (General Contracting Project)
00 43 13.....Bid Security Form
00 45 13.....Bidder's Qualifications
00 45 39.....EDGE Affidavit

Contracting Requirements
00 52 00.....Agreement Form (University Project)
00 52 14.....Subcontract Form (OAC 153.1-03-02)
00 61 13.....Performance and Payment Bond Form
00 61 13.19.....Acknowledgement of Survey
00 62 43.....Certified Payroll Report
00 62 46.....Contractor's Personal Property Tax Affidavit
00 71 00.....Contracting Definitions
00 72 13.....General Conditions (General Contracting Project)
00 73 00.....Supplementary Conditions
00 73 43.....Wage Rate Requirements

SPECIFICATIONS GROUP

GENERAL REQUIREMENTS SUBGROUP

SPECIFICATIONS

DIVISION 01: GENERAL REQUIREMENTS

01 10 00	Summary
01 22 00	Unit Prices
01 23 00	Alternates
01 25 00.00	Substitution Procedures
01 25 00.01	Substitution Request (After the Bidding Phase)
01 32 00.00	Construction Progress Documentation
01 32 00.01	Milestone Schedule
01 32 33	Photographic Documentation
01 33 00.00	Submittal Procedures

01 33 13.01 Steel Fabricator Certification
01 33 13.02 Contractor Certification
01 40 00 Quality Requirements
01 42 00 References
01 50 00.00 Temporary Facilities and Controls
01 50 00.01 Construction Sign Sample
01 57 19 Indoor Air Quality Management (During Construction)
01 60 00.00 Product Requirements
01 73 00 Execution
01 73 29 Cutting and Patching
01 74 00 Progress Cleaning
01 74 19.00 Construction Waste Management and Disposal
01 77 00 Closeout Procedures
01 78 23 Operation and Maintenance Data
01 78 39 Project Record Documents
01 79 00 Demonstration and Training
01 81 19 Indoor Air Quality Requirements (Before Occupancy)

FACILITY CONSTRUCTION SUBGROUP

DIVISION 02: EXISTING CONDITIONS

02 41 19 Selective Demolition

DIVISION 03: CONCRETE

03 06 30.01 Concrete Schedule
R03 30 00 Cast-in-Place Concrete

DIVISION 04: MASONRY

04 20 00 Unit Masonry

DIVISION 05: METALS

05 12 00 Structural Steel Framing
05 21 00 Steel Joist Framing
05 31 00 Steel Decking
05 40 00 Cold-Formed Metal Framing
05 50 00 Metal Fabrications
05 52 13 Pipe and Tube Railings

DIVISION 06: CARPENTY

06 10 53 Miscellaneous Rough Carpentry
06 16 00 Sheathing
06 41 16 Plastic-Laminate-Faced Architectural Cabinets
06 42 19 Plastic-Laminate-Faced Wood Paneling
06 64 00 Plastic Paneling

DIVISION 07: THERMAL AND MOISTURE PROTECTION

07 01 50.91	Roofing Restoration
07 19 00	Water Repellents
07 21 00	Thermal Insulation
07 25 00	Weather Barrier
07 27 23	Boardstock Air Barrier
07 42 13 16	Metal Plate Wall Panels
07 42 13 23	Metal Composite Material Wall Panels
07 54 00	Thermoplastic Membrane Roofing (PVC and KEE)
07 61 00	Sheet Metal Roofing
07 62 00	Sheet Metal Flashing and Trim
07 71 00	Roof Specialties
07 72 00	Roof Accessories
07 91 00	Preformed Joint Seals
07 92 00	Joint Sealants

DIVISION 08: OPENINGS

08 06 71	Door Hardware Schedule
08 11 13	Hollow Metal Doors and Frames
08 12 13	Hollow Metal Frames
08 13 16.13	Aluminum Doors
08 14 16	Flush Wood Doors
08 31 13	Access Doors and Frames
08 36 13	Sectional Doors
08 43 13	Aluminum Framed Storefronts
08 71 00	Door Hardware
08 80 00	Glazing

DIVISION 09: FINISHES

09 21 16	Gypsum Board Assemblies
09 30 00	Tiling
09 51 13	Acoustical Panel Ceilings
09 54 34	Suspended Modular Ceiling Modules
09 54 36	Sound-Absorbing Ceiling Units
09 65 13	Resilient Base and Accessories
09 65 19	Resilient Tile Flooring
09 68 13	Tile Carpeting
09 72 16.01	Custom Digital Image Wall Coverings
09 84 53	Sound Barrier Mullion Trim Cap
09 91 13	Exterior Painting
09 91 23	Interior Painting
09 96 00	High Performance Coatings

DIVISION 10: SPECIALTIES

10 11 00	Visual Display Units
10 14 19	Dimensional Letter Signage
10 14 23.14-4	Exterior Panel Signage (Security)
10 14 53	Traffic Signage
10 28 00	Toilet, Bath, and Laundry Accessories
10 41 16	Lock Box
10 43 13	Defibrillator Cabinets
10 44 13	Fire Extinguisher Cabinets
10 44 16	Fire Extinguishers
10 73 26	Architectural Canopies

DIVISION 11: EQUIPMENT

11 31 00.00	Residential Appliances
11 57 00	Vocational Shop Equipment

DIVISION 12: FURNISHINGS

12 24 13	Roller Window Shades
12 32 16	Manufactured Plastic Laminate-Faced (Educational) Casework
12 36 19	Wood Countertops
12 48 26.01	Entrance Carpet Tile

DIVISION 13: SPECIAL CONSTRUCTION – NOT USED

DIVISION 14: CONVEYING SYSTEMS – NOT USED

FACILITY SERVICES SUBGROUP

DIVISION 21: FIRE SUPPRESSION

21 05 00	Common Work Results for Fire Suppression
21 10 00	Water-Based Fire Suppression Systems

DIVISION 22: PLUMBING

22 05 00	Common Work Results for Plumbing
22 05 01	Basic Mechanical Materials and Methods
22 05 13	Common Motor Requirements for Plumbing Equipment
22 05 19	Meters and Gauges for Plumbing Piping
22 05 23	General-Duty Valves for Plumbing Piping
22 05 29	Hangers and Supports for Plumbing Piping and Equipment
22 05 53	Identification for Plumbing Piping and Equipment
22 07 00	Plumbing Insulation
22 11 16	Domestic Water Piping
22 11 19	Domestic Water Piping Specialties
22 11 23	Domestic Water Pumps
22 13 16	Sanitary, Waste, and Vent Piping System
22 14 13	Facility Storm Drainage Piping

N22 15 19 General-Service Compressed Air and Welding Systems
22 40 00 Plumbing Fixtures
22 45 00 Emergency Plumbing Fixtures
22 47 00 Drinking Fountains and Water Coolers
22 66 13 Facility Natural Gas Piping

DIVISION 23: HEATING, VENTILATING, AND AIR CONDITIONING

23 01 30 HVAC Air Duct Cleaning
23 05 00 Common Work Results for HVAC
23 05 13 Common Motor Requirements for HVAC Equipment
23 05 23 General-Duty Valves for HVAC Piping
23 05 29 Hangers and Supports for HVAC Piping and Equipment
23 05 48 Vibration Controls for HVAC Piping and Equipment
23 05 53 Identification for HVAC Piping and Equipment
23 05 93 Testing, Adjusting, and Balancing for HVAC
23 07 00 HVAC Insulation
23 09 00 Instrumentation and Control for HVAC
23 09 93 HVAC Sequence of Operation
23 21 13 Hydronic Piping
23 21 23 Hydronic Pumps
23 25 00 HVAC Water Treatment
23 29 23 Variable-Frequency Motor Controllers
23 31 13 Metal Ducts
23 33 00 Air Duct Accessories
23 34 23 HVAC Power Ventilators
23 36 00 Air Terminal Units
23 37 13 Diffusers, Registers, and Grilles
23 74 13 Packaged, Outdoor, Central-Station Air-Handling Units
23 80 61 Fume Collection Systems
23 82 39 Unit Heaters

DIVISION 26: ELECTRICAL

26 00 05 Electrical Demolition
26 00 50 General Electrical Requirements
26 05 05 Electrical Testing
26 05 19 Low-Voltage Electrical Power Conductors and Cables
26 05 26 Grounding and Bonding for Electrical Systems
26 05 29 Hangers and Supports for Electrical Systems
R26 05 33 Conduit and Boxes for Electrical Systems
R26 05 37 Wire Mesh Type Cable Trays
26 05 43 Underground Ducts and Raceways for Electrical Systems
R26 05 53 Identification for Electrical Systems
26 08 00 Commissioning of Electrical Systems
26 09 23 Lighting Control Devices
26 22 00 Low-Voltage Transformers

26 24 16 Panelboards
26 27 26 Wiring Devices
26 28 13 Fuses
26 28 16 Enclosed Switches and Circuit Breakers
26 51 00 Interior Lighting

DIVISION 27: COMMUNICATIONS – NOT USED

DIVISION 28: ELECTRONIC SAFETY AND SECURITY

28 31 11 Digital, Addressable Fire-Alarm System

SITE AND INFRASTRUCTURE SUBGROUP

DIVISION 31: EARTHWORK

31 10 00 Site Clearing
31 20 00 Earth Moving

DIVISION 32: EXTERIOR IMPROVEMENTS

32 12 16 Asphalt Paving
32 13 13.00 Site Concrete Paving
32 13 73 Concrete Paving Joint Sealants
32 31 13 Chann Link Fences and Gates
32 92 00.00 Turf and Grasses
32 93 00 Plants

DIVISION 33: UTILITIES

33 05 00 Common Work Results for Utilities
33 05 10 Utilities Services

END OF TABLE OF CONTENTS

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for following:
   1. Exterior Concrete
      a. Stoops (Frost Slab)
      b. Miscellaneous items including
         1) Light pole bases
         2) Equipment pads
         3) Lean concrete backfill
   2. Interior Concrete
      a. Slab-on-ground
      b. Bases, curbs
      c. Foundations, footings, pads, piers
   3. Provide other cast-in-place concrete and related work as indicated for complete and finished work, except concrete work specifically designated to be provided under Work of other Sections of these Specifications.

B. Related Sections include following:
   1. Division 05 Section “Metal Fabrications” for coordination with embedded edge angle.
   2. Division 07 Section “Thermal Insulation” for underslab perimeter insulation.
   3. Division 07 Section “Joint Sealants” for sealing joints and penetrations in slab-on-grade or slabs below grade.
   4. Division 09 Finish sections for coordination with substrate requirements of finish materials.
   5. Division 31 Section "Earth Moving" for underslab subgrade.
   6. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.2 DEFINITIONS

A. Cementitious Materials: Materials that have cementing value if used in concrete, including Portland cement alone or in combination with fly ash; subject to compliance with requirements.

B. Mineral Fillers: Finely ground inert materials that are used to help the water to powder ratio and are used to supplement cementitious materials.

C. Water-Cementitious Materials Ratio (w/cm): Ratio by weight of water to cementitious materials, excluding that absorbed by aggregate, stated as a decimal.

D. Form-Facing Material: Temporary structure or mold for support of concrete while concrete is setting and gaining sufficient strength to be self-supporting.

E. Formwork: Total system of support of freshly placed concrete, including mold or sheathing that contacts concrete, as well as supporting members, hardware, and necessary bracing.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate with other trades to maintain protection of concrete surfaces scheduled to receive special concrete finish or remain exposed. Protect concrete surfaces from physical damage and staining that could result from subsequent construction operations and might compromise final concrete finish.

B. Pre-installation Meeting: Conduct meeting(s) at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Note: In lieu of one pre-installation meeting as work progresses, additional pre-installation meetings might need to take place to facilitate installation sequences i.e., footing and foundations, slab-on-grade, and elevated slabs.
   1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including following:
      a. Contractor's superintendent.
      b. Independent testing agency for special inspection and testing and inspecting agency procedures for field quality control.
      c. Ready-mix concrete manufacturer.
      d. Concrete subcontractor, including finisher.
      e. Special concrete finish subcontractor.
   2. Review the following:
      a. Construction joints, control joints, isolation joints, and joint-filler strips
      b. Vapor-retarder installation
      c. Anchor rod and anchorage devices installation tolerances
      d. Concrete mixtures-specification and constructability requirements
      e. Scheduling and details of placement
      f. Contract information of responsible persons during placement
      g. Placement procedures and rate of placement
      h. Jobsite adjustments permitted and decision process
      i. Cold and hot weather requirements
      j. Concrete finishes and finishing
      k. Curing procedures
      l. Methods for achieving specified floor and slab flatness and levelness
      m. Floor and slab flatness and levelness measurements
      n. Concrete repair procedures
      o. Concrete protection
      p. Special inspection and testing and inspecting agency procedures for field quality control.
      q. Testing frequency, sampling location

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, including the following, if used for concrete mixtures:
   1. Form coatings
   2. Portland cement
   3. Fly ash
   4. Aggregates
   5. Include installation instructions where applicable.
      a. Vapor Barrier: Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.
   6. Admixtures: Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature of time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
   7. Curing materials
   8. Floor and slab treatments
   9. Joint fillers
   10. Repair materials

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments. Prepare and submit design mixes for each type of concrete and flowable fill. Use an independent testing facility acceptable to A/E for testing compressive strength of proposed mix designs. Submit compression test results for each design mix used to document that proposed mixture will achieve the required average compressive strength and other specified requirement. Test report shall clearly indicate design mix for which it applies. Each design mix shall indicate types of structures in which it is to be used.
   1. Field test records for concrete strength test records must be from concrete supplied from the same production facilities proposed for work. Test data shall be from concrete mixtures containing similar materials proposed for work, including:
      a. Minimum 28-day compressive strength
      b. Maximum w/cm
      c. Slump limit
      d. Air content
      e. Nominal maximum aggregate size
   2. Strength test reports for establishing a standard deviation for each class of concrete or for documenting the required average strength for work shall not be greater than 24 months old and shall be collected over a period not less than 45 days.
   3. Indicate amounts of mixing water to be withheld for later addition at Project site.
      a. Note: A workability retaining admixture may also be used.
   4. Sample design mix submittal form is enclosed herein.

C. Steel Reinforcement Shop Drawings: Comply with ACI SP-066:
   1. Placing drawings that detail fabrication, bending, and placement.
   2. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
   3. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric. Details must indicate clear cover used to determine chair heights.

D. Construction Joint Layout: Indicate proposed construction joints required to construct structure.
   1. Location of construction joints is subject to approval of A/E.

E. Concrete Schedule: For each location of each class of concrete indicated in “Concrete Mixtures” article, include following:
   1. Location within project.
   2. Exposure class designation.
   3. Formed surface finish designation and final finish. Final finish for floors.
   4. Curing process.

1.5 INFORMATIONAL/QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Qualification Data: For installer, manufacturer , and testing agency.
   1. Installer: Include copies of applicable ACI certificates or NRMCA Certification.
   2. Testing agency retained by the contractor for field quality control: Include conformance to ASTM C1077 or ASTM E329 and copies of ACI certificates of testing technicians.

B. Material Test Reports: For following, from a qualified testing agency, indicating compliance with requirements:
   1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

C. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

D. Proposed curing schedule shall include method and duration.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician or equivalent.
   1. When requested, the Installer shall furnish a Quality Control Plan.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities", certification or approval by a state or highway agency or equivalent. Criteria of equal certification shall be included in the submittal.
   2. Quality control personnel with responsibility for concrete mixtures certified as an NRMCA Concrete Technologist Level 2, or equivalent. Criteria of equivalent certification shall be included in the submittal.
   3. When requested, the manufacturer shall furnish a Quality Control Plan.

C. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.

D. Laboratory Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing including mix design.

E. Regulatory Requirements: Comply with requirements of latest edition or edition approved by authorities having jurisdiction.
   1. ACI Publications: Comply with following unless modified by requirements in Contract Documents:
      ~~a.~~ ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
      b. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
      c. ACI 347 “Recommended Practice of Concrete Formwork.”
      d. ACI 318, “Building Code Requirements for Structural Concrete.”
      e. ACI PRC-211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete."
      f. ACI PRC-212.3 “Report on Chemical Admixtures for Concrete.”
      g. ACI PRC-302.1 "Guide for Concrete Floor and Slab Construction."
      h. ACI PRC-304 "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
      i. ACI SPEC-305.1 “Specification for Hot Weather Concreting.”
      j. ACI SPEC-306.1 “Standard Specification for Cold Weather Concreting.”
      k. ACI SPEC-308.1 “Specification for Curing Concrete.”
      l. ACI PRC-311.4 "Guide for Concrete Inspection."
   2. Concrete Reinforcing Steel Institute, “Manual of Standard Practice”.
   3. ASTM Intl.:
      a. ASTM A 1064 “Standard Specification for “Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.”
      b. ASTM C33 “Standard Specification Curing Concrete.”
      c. ASTM C94 “Standard Specification for Ready-Mix Concrete.”
      d. ASTM C138 “Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.”
      e. ASTM C156 “Standard Test Method for Water Loss Through Liquid Membrane-Forming Curing Compounds for Concrete”.
      f. ASTM C260 “Standard Specification for Air Entraining Admixtures for Concrete.”
      g. ASTM C494 “Standard Specification for Chemical Admixtures for Concrete.”
      h. ASTM C309 “Standard Specification for Liquid Membrane – Forming Compounds for Curing Concrete.”
      i. ASTM C779 “Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.”

j. ASTM C989 “Standard Specification for Slag Cement for Use in Concrete and Mortars.”
k. ASTM C1315 “Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.”
l. ASTM E1155 “Determining Floor Flatness and Levelness Using F-Number System.”
m. ASTM F609 “Standard Test Method for Using a Horizontal Pull Slip Meter (HPS).”

F. Concrete ramps and curbs shall be provided to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and State and Local Regulations. These requirements supersede Technical Specifications in this Section.
1. Detectable warnings shall conform to ADAAG.

G. Mockups: Cast concrete slab-on-grade panels***, both new and existing,*** to demonstrate typical joints, surface finish, texture, and standard of workmanship.
1. Slab-On-Ground build panel approximately 225 sq.ft. (area within one set of control joints) in location indicated or, if not indicated, as directed by A/E.
~~***a. Divide panel into four equal panels to demonstrate saw joint cutting.***~~
2. Formed Surfaces: Build panel approximately 100 sq.ft. in location indicated or, if not indicated, as directed by A/E.
3. Approval panels may become part of completed work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Concrete: Comply with ASTM C94 and ACI SPEC-301.
1. Delivery tickets to contain the following, in addition to the information required by C94:
a. Reading of revolution counter at first addition of water.
b. Type and brand of cement and supplementary cementitious materials.
c. Cementitious content.
d. Total water content by producer.
e. Maximum size of aggregate.
2. ASTM C94 requires discharge within 1-1/2 hours or 300 revolutions; whichever comes first, after the introduction of water to cement and aggregates, or the introduction of cement to aggregates. A/E may require an earlier discharge during hot water, or when high-early strength cement is being used.

B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
1. Store reinforcement to avoid contact with earth.

C. Vapor Barrier:
1. Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
2. Store materials in a clean, dry area in accordance with manufacturer’s instructions.
3. Protect materials during handling and application to prevent damage or contamination.

D. Curing Compounds and Liquid Flour Treatments:
1. Deliver materials in original containers, with seals unbroken, being manufacturer labels indicating brand name and directions for storage.

1.8 FIELD CONDITIONS

A. Environmental Requirements.
1. Floor and Slab Treatments: Follow manufacturer’s recommendations for environmental requirements when using floor and slab treatments.
a. Do not apply concrete densifier and chemical hardener when concrete temperature is below 35 degrees F or above 135 degrees F.

B. Cold-Weather Placement: Comply with ACI SPEC-301 and ACI SPEC-306.1 and as follows:
   1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperature.
   2. When average high and low temperature is expected to fall below 40 deg. F for three successive days, maintain delivered concrete mixture temperature within temperature range required by ACI SPEC-301.
   3. Do not use frozen materials or materials containing ice or snow. Do not place concrete in frozen subgrade or on subgrade containing frozen materials.
   4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
   5. Do not place concrete in contact with surfaces less than 35 deg F., other than reinforcing steel.

C. Hot-Weather Placement: Comply with ACI SPEC-301 and ACI SPEC-305.1 and as follows:
   1. Maintain concrete temperature below 95 deg. F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without sanding water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of manufacturers specified.
   2. Products: Subject to compliance with requirements, provide one of products specified.

B. Products of other manufacturers will be considered for acceptance provided they equal or exceed material requirements and functional qualities of specified product. Requests for A/E's approval must be accompanied by "Substitution Request Form" and complete technical data for evaluation. All materials for evaluation must be received by Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

C. Source Limitations: Obtain all concrete mixtures from same ready mixed concrete manufacturer for entire Project.
   1. All cement to be from same mill.

2.2 CONCRETE, GENERAL

A. ACI Publications: Comply with following, unless modified by requirements in Contract Documents:
   1. ACI SPEC-301
   2. ACI SPEC-117

2.3 FORM-FACING MATERIALS

A. Smooth-Formed Finished (Exposed) Concrete Form-Facing Material (As-Cast Surface): Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, fiberglass, or other approved panel materials.

B. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

C. Chamfer Strips: Metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
   1. Products:
      a. Greenstreak 622; Greenstreak
      b. Vinylex CSN-3/4; Vinylex Corp.
      c. CHM-75-75-110 Poly-Comp Plastic Chamfer; Sylvan Products
      d. CS-750 Chamfer Former; BoMetals Inc.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
   2. Products: Subject to compliance with requirements, provide one of following:
      a. MasterFinish RL Series; Master Builders Solutions.
      b. Crete-Lease 20-VOC; Cresset Chemical Co.
      c. Clean Strip J1EF; Dayton Superior Corporation
      d. Asphalt Release; Franmar Chemical, Inc.
      e. Bio-Form; Leahy-Wolf Co.
      f. Soy Form Release and Natural Form Oil: Natural Soy, LLC
      g. SOYsolv; SOYsolv
      h. Formshield WB; Tamms Industries
      i. SealTight Duogard II; W.R. Meadows, Inc.
      j. Easy Strip Form Releaser; Formex
      k. L&M EZ Strip; Laticrete

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.4 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed for bars No. 3 to 11, unless otherwise noted.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets. Note: Roll stock is not acceptable.

2.5 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
   1. Use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports as recommended for application indicated.

2.6 CONCRETE MATERIALS

A. Source Limitations: Obtain each type of class or cementitious material of same brand from same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Material: Use cementitious materials, of same type, brand, and source, throughout Project. Supplement cement as necessary to meet project conditions.
   1. Coordinate with mix design for special finishes.
   2. Portland Cement: ASTM C 150, Type I or III, gray.
   3. Limit fly ash to Class F if concrete expansion from alkali silica are anticipated.
      a. Fly Ash: ASTM C 618, Class C or F.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, uniformly graded not to exceed 1-1/2 inch nominal size per ACI 301. Provide aggregates from a single source to ensure uniformity in color, size, and shape with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials. Aggregates shall not be potentially reactive as defined in Appendix X1 of ASTM C33.
   1. Local aggregates not complying with ASTM C33, but which have shown by special test or actual service to produce concrete of adequate strength and durability, may be used when acceptable to A/E.
   2. Fine Aggregate: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
   3. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
      a. Crushed stone, processed from natural rock or stone.
      b. Washed gravel, either natural or crushed. Use of pit or bank-run gravel is not permitted.
      c. Maximum Aggregate Size: Not larger than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourths of minimum clear spacing between individual reinforcing bars or bundles of bars.
      d. Exterior concrete shall have crushed limestone aggregate, complying with ASTM C33, Class 4S or better.
   4. Alkali-Silica Reaction: Comply with one of following:
      a. Expansion Result of Aggregate: 14-day expansion less than or equal to 0.10 percent when tested in accordance with ASTM C 1260, or not more than 0.04 percent at one-year when tested in accordance with ASTM C 1293.
      b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C 1567. Do not use this option with fly ash with an alkali content greater than 4.0 percent. Submit supporting data for each aggregate showing expansion in excess of 0.10 percent when tested in accordance with ASTM C1260.
      c. Alkali Content in Content in Concrete: Not more than 4 lb./cu.yd. for moderately reactive aggregate or 3 lb./cu.yd. for highly reactive aggregate, when tested in accordance with ASTM C 1293 and categorized in accordance with ASTM C 1778, based on alkali content being calculated in accordance with ACI SPEC-301. Calculate alkali content of concrete in accordance with ACI 301. Do not use this option with natural pozzolan or fly ash that has a calcium oxide content greater than 18 percent or an alkali content greater than 4.0 percent; or for an aggregate with expansion at one year greater than or equal to 0.24 percent when tested in accordance with ASTM C1293.

D. Combined aggregate gradation for slabs and other designated concrete shall be 8%-18% for large, top size aggregates (1-1/2 inch) or 8%-22% for smaller, top size aggregates (1 inch or 3/4 inch) retained on each sieve size below top size and above No. 100.

E. Water: ASTM C1602.

2.7 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260 as indicated in Article ”Concrete Mixtures for Building Elements”.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Admixtures containing intentionally added chlorides shall conform to limit consistent with ACI 318 and ACI 301.
   1. Water-Reducing Admixture: ASTM C 494, Type A.
   2. Retarding Admixture: ASTM C 494, Type B or D.
   3. Accelerating Admixture: ASTM C 494, Type C or E.
   4. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
   5. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
   6. High-Range, Water-Reducing Admixture: ASTM C 494, Type F or G.
   7. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
   8. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
   9. Workability-Retaining Admixture: ASTM C494, Type S. Shall retain concrete workability without affecting time of setting or early-age strength development.
   10. ASR-Inhibiting Admixtures: ASTM C494, Type S. Shall contain a nominal lithium nitrate content of 30 percent.
   11. Other Specific Performance Admixtures: ASTM C494, Type S.
   12. Admixtures with no standard (ASTM or other) designation shall be used with the permission of the engineer of record when its use for specific properties is required and can be submitted with documentation that demonstrates appropriate testing.

2.8 VAPOR BARRIER

A. Vapor Barrier:
   1. Plastic Vapor Barrier
      a. Water Vapor Barrier: ASTM E-1745; meets or exceeds Class A.
      b. Permeance Rating: ASTM E-96 or ASTM F 1249; 0.01 Perms or less.
      c. Thickness of Barrier: ACI 302.2R-06; not less than 15 mils.
      d. Puncture resistance greater than or equal to 3,000 grams tested by ASTM D1709.
      e. Tensile strength greater than or equal to 65 lbf/in tested by ASTM E1745.
      f. Chemical Resistance “Unaffected” tested by ASTM E154.
   2. Products:
      a. Stego Wrap (15 mil) Vapor Barrier; Stego Industries
      b. VaporBlock 15/VaporBlock G; Raven Industries
      c. Perminator (15 mil); W.R. Meadows
      d. Viper Vaporcheck II (15 mil); Insulation Solutions Inc.
      e. Barrier-Bac VB-35 16 mil); Interplast
      f. Husky Yellow Guard (15 mil); Poly-America
      g. Tex-Trude Xtreme Vapor Barrier (15 mil); Tex-Trude, LP

B. Vapor Barrier Accessories
   1. Seam/Transition Tape: Tape with pressure sensitive adhesive or double-sided adhesive. Minimum width 4 inches.
   2. Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer’s instruction.

C. Drainage Fill (Coarse):
   1. Narrowly graded mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448; ODOT Item No. 304, Aggregate Base; with 100 percent passing a 2-inch sieve and 90 to 33 percent passing a No. 30 sieve.

2.9 FLOOR AND SLAB TREATMENTS

A. Pigmented Mineral Dry-Shake Floor Hardener (DSCH) ***at new concrete floors***: Factory-packaged, dry combination of Portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides inter-ground with cement.
   1. Products:
      a. Concolor; ChemMasters.
      b. Quartz Tuff; Dayton Superior Corporation.
      c. Surflex; Euclid Chemical Company (The).
      d. Tycron; Kaufman Products, Inc.
      e. Colorhard; Lambert Corporation.
      f. Quartz Plate FF; Laticrete International, Inc.
      g. MasterTop 100; Master Builders Solutions.
      h. Floor Quartz; Metalcrete Industries.
      i. Lithochrome Color Hardener; Scofield, L. M. Company.
      j. Quartz Floor Hardener, SpecChem, LLC
   2. Color: As indicated in "List of Finishes.

2.10 CONCRETE FINISHING, EXISTING SLABS (WHERE INDICATED)

A. Performance-Based Specification:
   1. Concrete densifier and chemical hardener compound shall be a ready-to-use, water-based, colorless liquid formulated with chemically reactive raw materials that meets the maximum VOC content limits of 100 g/L for sealers as required by the South Coast Air Quality Management District requirements, as well as the 400 g/L VOC maximum required by the U.S. EPA Architectural Coatings Rule.
   2. Concrete enhancer shall be a ready-to-use, water-based, synthetic polymer concrete floor enhancer containing a proprietary stain-blocking additive that meets the maximum VOC content limits of 100 g/L for sealers as required by the South Coast Air Quality Management District requirements, as well as the 400 g/L VOC maximum required by the U.S. EPA Architectural Coatings Rule.

B. Basis-of-Design Specification:
   1. Concrete densifier and chemical hardener compound: LIQUI-HARD ULTRA manufactured by W.R. MEADOWS.
   2. Concrete enhancer: BELLATRIX® manufactured by W.R. MEADOWS.

2.11 CURING MATERIALS

A. Curing and sealing compounds shall comply with testing and product requirements of California Department of Public Health's "Standard Method for Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers".

B. Evaporation Reducer: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
   1. Products:
      a. Spray-Film; ChemMasters.
      b. AquaFilm; Dayton Superior Corporation.
      c. Eucobar; Euclid Chemical Company (The).
      d. Vapor Aid; Kaufman Products, Inc.
      e. Lambco Skin; Lambert Corporation.
      f. E-Con; Laticrete International, Inc.
      g. MasterKure ER 50; Master Builders Solutions.
      h. Evapre; Meadows, W. R., Inc.
      i. Waterhold; Metalcrete Industries.
      j. Monofilm; Nox-Crete Products Group, Kinsman Corporation.
      k. SikaFilm; Sika Corporation, Inc.
      l. Certi-Vex EnvioSet; Vexcon Chemicals, Inc.

m. TK-2120 TRI-FILM; TK Products, Division of Sierra Corp.
n. AntiVap; SINAK Corporation
o. SpecFilm, SpecChem, LLC

C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

D. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
1. Color:
a. Ambient Temperature below 50 deg. F.: Black.
b. Ambient Temperature between 50 deg F. and 85 deg F.: Any color or clear.
c. Ambient Temperature above 85 deg F.: White.

E. Curing Paper: Eight feet wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.
1. Basis-of-Design: Henry Company; a Carlisle Company.

F. Water: Potable or complying ASTM C1602 that does not cause staining of the surface.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Compounds will need to be abrasively removed by applicator. Product maybe used unless prohibited in PART 3 Execution, Article “CONCRETE PROTECTING AND CURING”.
1. Products:
a. AH Curing Compound #2 DR WB; Anti-Hydro International, Inc.
b. Safe-Cure Clear; ChemMasters.
c. Clear Resin Cure J11W or Clear Cure VOC J7WB; Dayton Superior Corporation.
d. Kurez DR VOX, TAMMSCURE WB 30C; Euclid Chemical Company (The).
e. Thinfilm 420; Kaufman Products, Inc.
f. Aqua Kure-Clear; Lambert Corporation.
g. L&M Cure R; Laticrete International, Inc.
h. 1100 Clear; Meadows, W. R., Inc.
i. Resin Cure E; Nox-Crete Products Group, Kinsman Corporation.
j. Clear Water Resin; Right Pointe.
k. E-Cure or Spec Rez; SpecChem, LLC.
l. Certi-Vex Enviocure 100; Vexcon Chemicals, Inc.
m. TK-2519 DC WB; TK Products, Division of Sierra Corp.

H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound (CSC): ASTM C 1315, Type 1, Class A. Use only where slabs receive no other type of coating or finish.
1. Products:
a. Polyseal WB; ChemMasters.
b. Cure & Seal 1315 J22WB; Dayton Superior Corporation.
c. Super Diamond Clear VOX; LusterSeal WB300; Euclid Chemical Company (The).
d. Sure Cure 25 Emulsion; Kaufman Products, Inc.
e. UV Safe Seal; Lambert Corporation.
f. Lumiseal WB Plus; Laticrete International, Inc.
g. Vocomp-30; Meadows, W. R., Inc.
h. Metcure 30; Metalcrete Industries.
i. Right Sheen WB 30; Right Pointe.
j. Vexcon Starseal 1315; Vexcon Chemicals, Inc.
k. Cure & Seal WB 25; SpecChem, LLC

2.12 SEALERS

A. Penetrating Anti-Spalling Sealer (Exterior stoops): Sealer shall be a siloxane-based compound or silane modified siloxane emulsion formulated to reduce chloride ion absorption/intrusion by 80 percent when tested in accordance with NCHRP #244, Test Method Series II or IV tests. In addition, sealer-treated concrete shall exhibit no scaling when exposed to 125 cycles of freezing and thawing when tested in accordance with ASTM C 672. Tests shall be by an independent testing laboratory.
   1. Products:
      a. Baracade Silane 100c; Euclid Chemical
      b. Baracade Silane 40; Euclid Chemical (lower area coverage rate per gallon)
      c. Aquanil Plus 100; Chemmasters
      d. Aquanil Plus 40 A; Chemmasters (lower area coverage rate per gallon)
      e. Specsilane 100; Specchem LLC
      f. Specsilane 40; Specchem LLC (lower area coverage rate per gallon)

B. Floor Sealer: ASTM C1315, Type I, Class A and ASTM C309, Type I, Class A and B. Acrylic water-based urethane clear sealer, non-yellowing, resistant to blush, and satin finish as recommended by manufacturer for preventing staining by waterborne and oil substances.
   1. Products:
      a. Everclear VOX (Acrylic Sealer); Euclid Chemical Co.
      b. Cure and Seal 1315 EF; Dayton Superior
      c. Polyseal WB; ChemMasters
      d. Cure & Seal WB 25; SpecChem LLC

2.13 ACCESSORIES

A. Expansion and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, ASTM D 1752, cork or self-expanding cork, or ASTM 4819, Type II, or ASTM D 1622 closed-cell compressible foam, 1/4-inch maximum thickness.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
   1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Floor Slab Protective Covering: Eight feet with cellulose fabric.
   1. Basis-of-Design: McTech Group, Inc. or a comparable product as recommended by a specialty concrete finish manufacturer.

2.14 REPAIR MATERIALS

A. Epoxy Crack Injection Adhesive (Repair): ASTM C881, Type I, Grade 1, solvent free.
   1. Products:
      a. Sikadur 35 Hi-Mod LV; Sika Corp.
      b. EUCO #452 LV; Euclid Chemical Co.
      c. MasterInject 1380; Master Builders Solutions.
      d. Pro-Poxy 100; Unitex
      e. SpecPoxy 1000; SpecChem, LLC

B. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.
5. Products:
    a. Ardex K-15; Ardex Inc.
    b. Econolevel; Dayton Superior Corporation.
    c. MasterTop 110SL; Master Builders Solutions.
    d. Skimflow ES; Dependable Chemical Co., Inc.
    e. EZ Level; TEC Specialty Products.
    f. Super FLO TOP; Euclid Chemical Co.
    g. Levelex; L & M Construction Chemical.
    h. Custom Building Products; CustomTech TechLevel 150
    i. LEVELEZ; Maxxon Corp.
    j. Schonox US; Schonox HPS North America
    k. SpecFlow; SpecChem, LLC

C. Repair Overlayment (Traffic-Bearing): Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.
5. Products:
    a. Level Topping; Dayton Superior
    b. Duracrete; L & M Construction
    c. Wearflow; Dependable Chemical Co. Inc.
    d. Ardex SD-T or K500; Arden Americas.
    e. Custom Building Products; CustomTech TechLevel-HPT High Performance Topping.
    f. SpecLevel-Gray SpecChem, LLC

2.15 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI SPEC-301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
2. The installer and manufacturer shall coordinate to establish properties of the fresh concrete to facilitate placement and finishing with reduced potential for segregation and bleeding. Factors shall include but are not limited to slump or slump flow, setting time, method of placement, rate of placement, hot and cold weather placement, curing, and concrete temperature. Selection of fresh concrete properties shall be notified to the Engineer of Record in the submittal.
3. Contractor shall indicate reportable changes in sources of materials and quantities when such changes are necessary to ensure constructability, performance of concrete and compliance with the specification requirements. The Contractor is permitted to make minor adjustments less than the reportable deviations noted in the original submittal to concrete mixtures to ensure uniformity of concrete without a resubmittal for review or approval.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
   1. Fly Ash: 25 percent, unless otherwise recommended by ready mix manufacturer and approved in mix design by A/E.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cementitious materials.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
   3. Use water-reducing and accelerating admixture when required by low temperatures or cold-weather placement conditions.
   4. Use water-reducing admixture in pumped concrete with a water-cementitious materials ratio below 0.50.

2.16 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Exterior Concrete (Stoops and miscellaneous items, including but not limited to light pole bases and equipment pads): Proportion normal-weight concrete with following properties:
   1. Compressive Strength (28 days): Refer to Division 03 Section “Concrete Schedule”.
   2. Maximum Water-Cementitious Materials Ratio at Point of Placement: Refer to Division 03 Section “Concrete Schedule”.
   3. Slump Limit: 5 inches, plus or minus 1 inch.
   4. Air Content 6.0 percent, plus or minus 1.0 percent at point of delivery for concrete containing 3/4 inch nominal maximum aggregate size.

B. Footings: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: Refer to Division 03 Section “Concrete Schedule”.
   2. Maximum Water-Cementitious Materials Ratio: Refer to Division 03 Section “Concrete Schedule”.
   3. Slump Limit: Not less than one inch and not more than 3 inches.

C. Foundation Walls and Retaining Walls: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: Refer to Division 03, Section “Concrete Schedule”.
   2. Maximum Water-Cementitious Materials Ratio: Refer to Division 03, Section “Concrete Schedule.
   3. Slump Limit: Not less than one inch and not more than 3 inches.
   4. Air Content: 6.0 percent, plus or minus 1.0 percent at point of delivery for concrete containing 3/4 inch nominal maximum aggregate size.

D. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
   1. Minimum Compressive Strength: Refer to Division 03, Section “Concrete Schedule”.
   2. Slump Limit: 4 inches, plus or minus 1 inch, before adding water-reducing or plasticizing admixtures, with maximum slump less than 6 inches.
   3. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.17 PROPORTIONING AND DESIGN OF MIXES

A. Proportion mixes by either laboratory trial batch or field experience methods as specified in ACI SPEC-301, using materials to be employed on project for each class of concrete required.

B. Submit written reports to A/E of each proposed mix for each type of concrete at least 15 days prior to start of Work. Indicate with each mix design items or structures for which it is to be used. Do not begin concrete production until mixes have been reviewed by A/E. Submit following information:
   1. Complete identification of aggregate source of supply.

2. Tests of aggregates for compliance with specified requirements.
3. Scale weight of each aggregate.
4. Absorbed water in each aggregate.
5. Brand, type, and composition of cement with product information.
6. Brand, type, and amount of each admixture with product information.
7. Amounts of water used in trial mixes.
8. Proportions of each material per cu.yd., including fibrous secondary reinforcement, if used.
9. Gross weight and yield per cu.yd. of trial mixtures.
10. Measured slump, with and without water reducer, if used.
11. Measured air content.
12. Submit compressive strength results from tests performed by an independent testing agency on at least 30 consecutive strength tests or two groups of tests totaling at least 30 within past 12 months. Supply standard deviation and average strength in accordance with ACI SPEC-301.
13. Identification number or name of mix to verify agreement with compression test reports.
14. Water/Cementitious Materials Ratio

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by A/E. Laboratory test data for revised mix designs and strength results shall be submitted to and must be accepted by A/E before using in work.

D. Maximum Water-Cementitious Materials Ratio: Concrete mixes shall be limited to water-cement ratios specified in Concrete Schedule in these Specifications (Division 03 Section “Concrete Schedule”). Water reducers and SCM’s may be used to increase slump while maintaining or reducing water-cementitious materials ratio at or below maximums specified values, except where specifically prohibited in these specifications.

2.18 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.19 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and furnish batch ticket information.
1. Addition of water to batch will be permitted only to regain target slump for particular mix design or with verification that design water/cement ratio has not been exceeded and only under direct control of concrete testing agency field representative. All water added at site to be noted on concrete field inspection report. All tests on concrete to be performed after water is added.
2. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
3. Mix proprietary materials in accordance with manufacturer’s instructions, including product data and product technical bulletins.
    a. Once specific mix design and sequencing of raw materials have been established, do not alter. Consistency of raw materials in each phase of mixing is most important element in making quality concrete.

B. Project-Site Mixing: Not permitted without prior approval of A/E in writing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive concrete sealer. Do not apply over curing compounds. Notify A/E if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 PREPARATION

A. Preplacement Observation: Before placing concrete, observe and complete formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other trades to permit installation of their work; cooperate with other trades in setting such work, as required.
   1. Observe soil at bottom of foundation systems, which will be subject to testing for soil bearing value by testing laboratory, as directed by A/E. Place concrete immediately after approval of foundation excavations.
   2. Observe underslab drainage course areas that were subject to testing for soil bearing value by testing laboratory as required by A/E. Place concrete immediately after approval of underslab compaction tests.
   3. Remove all debris from forms and deck. Clean steel deck of grease, oil, and other substrates that would reduce bond to concrete.
   4. Standing water shall be removed from place of deposit before concrete is placed.
   5. Do not use additives or salts to remove ice. Non-chloride deicers may be used.

B. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
   1. Daily access to the work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Security and protection for samples and for testing and inspection equipment at Project site.

C. Material placement for interior slabs on grade and exterior concrete stoops.
   1. Install and properly support and anchor slab welded wire fabric.
   2. Position expansion joint fillers where indicated and as recommended by manufacturer. Special precautions shall be taken to avoid collapse during installation.

D. Under slabs-on-grade, place drainage course on prepared subbase and as follows:
   1. Place drainage course on subgrades free of mud, frost, snow, or ice.
   2. Compact drainage course to required cross sections and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

E. Clean surfaces to receive coatings. Remove loose and foreign matter that could interfere with application or performance of sealer.

F. ***Surface Preparation at Existing Concrete***
   1. Protect adjacent surfaces not designated to receive concrete densifier and chemical hardener.
   2. Clean and prepare surfaces to receive treatment in accordance with manufacturer's instructions, ensuring that all stains, oil, grease, form release agents, curing compounds, dust and dirt are removed prior to application as recommended by manufacturer for existing slabs.
   3. Fill and repair all holes, cracks, and deteriorated areas that have been removed to sound concrete.

3.3 FORMWORK INSTALLATION

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to required shapes, lines, and dimensions.
   1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
   2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.
   3. Contractor responsible for foundations is responsible to verify from Geotechnical Engineering Report included in this Project Manual that soil conditions allow use of earth-formed foundations. If soil conditions do not allow earth-forming, Contractor shall include cost of forming foundations in his bid.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces, where exposed to view.
   2. Class C, 1/2 inch for rough-formed finished surfaces, unless otherwise noted.
   3. Variation from plumb in lines and surfaces of columns, piers, walls, and arrises; 1/4 inch per 10 feet, but not more than 1 inch. For exposed corner columns, control joint grooves, and other conspicuous lines, 1/4 inch in a bay or 20 feet maximum; 1/2 inch maximum in 40 ft. or more.
   4. Variation in sizes and locations of sleeves, floor openings, and wall openings, 1/4 inch.
   5. Variations in footings plan dimensions, minus 1/2 inch and plus 2 inches; misplacement or eccentricity, 2 percent of footing width in direction of misplacement but not more than 2 inches; thickness reduction, minus 5 percent.

D. Construct forms tight enough to prevent loss of concrete mortar.
   1. Minimize joints.
   2. Exposed Concrete: Symmetrically align joints in forms.

E. Construct forms for easy removal without hammering or prying against concrete surfaces.
   1. Provide crush or wrecking plates where stripping may damage cast concrete surfaces.
   2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   3. Install keyways, reglets, recesses, and like, for easy removal.
   4. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
   1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
   2. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete, unless otherwise noted.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in Work.
   1. Determine sizes and locations from trades providing such items.
   2. Obtain written approval of A/E prior to forming openings not indicated on Drawings.

J. Construction and Movement Joints
   1. Construct joints true to line with faces perpendicular to surface plane of concrete.

a. Where joints divide footings and walls, joints shall have keyway formed. Keyways shall be 1/3 of thickness of element, shall extend to within 3 inches of ends of element and shall be at least 1-1/2 inch thick, unless otherwise noted.

2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by A/E.
3. Place joints perpendicular to main reinforcement.
4. Locate joints for beams, slabs in the middle third of spans.
5. Locate horizontal joints in walls and columns at underside of floors, slabs, and at the top of footings or floor slabs.

K. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

L. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

M. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

N. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

O. Earth Forming: Where footings are to be constructed in cohesive soils, Contractor may elect to earth form footings with approval of A/E. Earth forms shall be excavated to create vertical faces to detailed dimensions within a tolerance of plus 6 inches, minus 0 inch.

3.4 EMBEDDED ITEMS INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's 303 "Code of Standard Practice for Steel Buildings and Bridges."
3. Install reglets to receive waterproofing in outer face of concrete frame at exterior walls.
4. Conduits and pipes of aluminum shall not be embedded in structural concrete unless effectively coated to prevent aluminum-concrete reaction or electrolytic action between aluminum and concrete.

3.5 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place a minimum of 14 days and not until concrete has achieved its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in Work.
1. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces.

2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by A/E.

3.6 VAPOR BARRIER INSTALLATION

A. Vapor Barriers: Place, protect, and repair vapor barriers according to ASTM E 1643 and manufacturer's written instructions.
1. Place vapor barrier directly below slab and above drainage fill.
a. Install vapor barrier material with largest dimension parallel with direction of pour.
b. Face laps away from expected direction of concrete pour whenever possible.
2. Extend vapor barrier over footings and seal to foundation wall, grade beam, or slab at an elevation consistent with top of slab or terminate at impediments such as waterstops or dowels. Seal around penetrations such as utilities and columns in order to create a monolithic membrane between surface of slab and moisture sources below slab as well as at slab perimeter.
a. Seal top edge with continuous bead of high-grade mildew resistant silicone sealant or manufacturer’s tape.
3. Lap joints minimum 6 inches, or as instructed by manufacturer, and seal laps in accordance with manufacturer’s recommendations in a manner consistent with ASTM E1643.
4. Seal all penetrations (including pipes) with manufacturer’s pipe boot or manufacturer’s instructions.
5. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged areas 6 inches and sealing all four sides with tape.

3.7 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for placing and supplying reinforcement.
1. Do not cut or puncture vapor barrier. Repair damage and reseal vapor barrier before placing concrete.
2. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

B. Accurately position, support, and secure reinforcement against displacement.
1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

G. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging.
1. Support welded-wire reinforcement in accordance with CRSI “Manual of Standard Practice”.
2. Lap edges and ends of adjoining sheets at least one mesh spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

H. Provide sufficient numbers of supports and of strength to support reinforcement in correct position. Do not place reinforcing bars more than 2 inches beyond last leg of continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

I. Reinforcing steel installed in continuous footings shall run continuous. This shall include specially shaped components with proper lap where corner reinforcing and step footings occur.

J. Provide additional reinforcing around required openings in footings and slabs having a one foot least dimension.

K. Support welded wire fabric in slabs-on-ground at 2 feet spacing in both directions.

L. Provide continuous chairs or bolsters to support welded wire fabric in elevated slabs at each line of support for steel deck (e.g., at centerline of supporting joists or beams) and as required to support reinforcing steel in correct position.
   1. It is not acceptable to lift mesh into place during concrete placements

3.8 INSTALLATION OF JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete. Place joints at ends of pours and where placement operations are stopped for more than 1/2 hour, except where such pours terminate at expansion joints.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
   1. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by A/E.
   2. Place joints perpendicular to main reinforcement.
      a. Continue reinforcement across construction joints, unless otherwise indicated.
      b. Do not continue reinforcement through sides of strip placements of floors and slabs.
   3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   4. Locate joints for beams, slabs, joists, and girders in middle third of spans. Offset joints in girders a minimum distance of twice beam width from a beam-girder intersection.
   5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at top of footings or floor slabs.
   6. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control (Contraction) Joints in Slabs-on-Grade: Form weakened-plane control (contraction) joints, sectioning concrete into areas as indicated. Construct control (contraction) joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form control (contraction) joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control (contraction) joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form control (contraction) joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades with a triangular arbor configuration. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random control (contraction) cracks.
      a. For most concrete mixtures, this means sawing should be completed within first six to 18 hours and never delayed more than 24 hours. Early-entry saws are available which may allow cutting to begin within a few hours after placement.
   3. Control (contraction) joints shall be filled with self-leveling traffic grade sealant as specified in Division 07 Section “Joint Sealants” for following locations, unless otherwise noted:

a. Exposed and concealed concrete slabs on grade with no additional floor finish or sealed concrete finish only.
1) Sealant color shall match sealed concrete color.

4. Locate control (contraction) joints in slabs-on-ground, as indicated, if not shown, then so as to divide slab into sections with a maximum distance of 12 feet between control joints both directions, unless otherwise noted.
5. Contractor may elect to omit all control joints, where slabs are to be covered with a finish material, provided that all cracks that develop at greater than 1/64 inch width be filled with epoxy crack injection adhesive 60 days or more after slab placement.
a. Exception: Do not omit control joints in slabs scheduled to be exposed.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated.
2. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.9 INSTALLATION OF CAST-IN-PLACE CONCRETE

A. General: Comply with ACI SPEC-301.

B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as work progresses.

C. Notify A/E and testing and inspection agencies 24 hours prior to commencement of concrete placement.

D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed amount indicated on concrete delivery ticket.

E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
2. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
3. Consolidate placed concrete with mechanical vibrating equipment according to ACI SPEC-301.
a. Do not use vibrators to transport concrete inside forms.
b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.

d. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

4. Concrete shall be completely discharged within 1-1/2 hours after entering conveying drum.
5. Pumping methods using steel or plastic pipelines will be permitted. Aluminum alloy lines shall not be used. Minimum pipe diameter allowed for pumping shall be 3 inches.
6. Pumped Concrete: Comply with ACI 304R.

F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.
4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on surface. Do not further disturb slab surfaces before starting finishing operations.
8. Do not further disturb slab surfaces before starting finishing operations.

3.10 APPLICATION OF FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:
1. Rough-Formed Finish (SF-1.0): ACI SPEC-301 surface finish as-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
b. Remove projections larger than 1 inch.
c. Tie holes do not require patching.
d. Surface Tolerance: ACI SPEC-117 Class D.
e. Apply to concrete surfaces not exposed to public view.
2. Smooth-Formed Finish (SF-2.0): ACI SPEC-301 surface finish as-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
b. Remove projections larger than 1/4 inch.
c. Patch holes.
d. Surface Tolerance: ACI 117 Class B.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.11 APPLICATION OF FINISHING FLOOR AND SLABS

A. General Information (Slabs-on-Grade): Requirements indicated are based upon latest FF/FL method. Bids for this work shall reflect these requirements and enforcement can be expected.
1. Comply with ACI 302.1R recommendations for screeding, re-straightening and finishing operations for concrete surfaces. Do not wet concrete surfaces.
a. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Finished surface is to be free of trowel marks, uniform in texture and appearance and with surface leveled to tolerances indicated. Do not burnish trowel surface.

b. Elevated slabs shall comply with following floor flatness (FF) values. Floor levelness values will not apply to elevated slabs.

2. Finish surfaces to the following tolerances, in accordance with ASTM E 1155.

B. Float Finish (Flt-Fn):
1. When bleed water sheen has disappeared and concrete has stiffened sufficiently to permit operation of specific float apparatus, consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots.
2. Repeat float passes and re-straightening, until surface is left with uniform, smooth, granular texture and complies with ACI SPEC-117 tolerances for conventional concrete.
~~a.~~ Specified Overall Value: FF 20/FL 15.
3. Apply float finish to monolithic slab surfaces that are to receive a trowel finish.

C. Trowel Finish; General:
1. After applying float finish, apply first troweling and consolidate concrete by hard or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor covering.
4. Do not add water to concrete surface.
5. Trowel Finish 1 (Tr-Fn1): Carpeted Floors, unless otherwise noted.
a. Specified Overall Value: FF 25/FL 20.
b. Minimum Local Value: FF 17/FL 14.
c. Apply trowel finish to monolithic slab surfaces that are to receive carpet and noncritical floors where slabs remain exposed, such as mechanical.
6. Trowel Finish 2 (Tr-Fn2): Floors with improved flatness/levelness requirements.
a. Specified Overall Value: FF 35/FL 25.
b. Minimum Local Value: FF 24/FL 17.
c. Apply trowel finish to monolithic slab surfaces that are to receive thin-set flooring, resilient flooring, linoleum flooring, fluid-applied flooring, resinous flooring and other flooring types, unless otherwise indicated.
1) At thin-set tile with all edges shorter than 15 inches, maximum allowable variation shall be 1/4 inch in 10 feet from required plane, with no more than 1/16 inch variation in 1 foot when measured from high points of surface. After surface is steel troweled, apply a fine broom finish.
2) At thin set tile with at least one edge 15 inches in length or longer, maximum allowable variation in substrate is 1/8 inch in 10 feet from required plane, with no more than 1/16 inch variation in 2 feet when measured from high points of surface. After surface is steel troweled, apply a fine broom finish.
3) At thin-set terrazzo tile floors, maximum permissible variation shall be 1/8-inch in 10 feet from required plane. After surface is steel-troweled, apply a fine broom finish.
7. Trowel Finish 3 (Tr-Fn3): Not Used.
8. Exposed Surfaces: Use steel-reinforced plastic power trowel blades (in lieu of steel) to control dark burnish marks on plain concrete or surface to receive: stain, dye, shake-on, integral pigments, clear sealed.

D. Nonslip Broom Finish (NsBrm-Fn): Apply nonslip broom finish to exterior concrete platforms, steps and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom, perpendicular to main traffic route. Coordinate required final finish with A/E before application.

E. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
1. Uniformly apply dry-shake floor hardener at a rate of 100 lb./100 sq. ft. unless greater amount is recommended by manufacturer for application indicated.

2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.

3. After final floating, apply a trowel finish.

4. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.12 APPLICATION OF CONCRETE FINISHES AT EXISTING CONCRETE SLABS

A. Concrete Densifier and Concrete Hardener

1. Apply concrete densifier and chemical hardener in accordance with manufacturer's instructions.

2. Ensure application equipment is clean and free of previously used materials.

3. Existing Concrete

a. Apply undiluted concrete densifier and chemical hardener using a low pressure sprayer.

b. Keep the surface wet with concrete densifier and chemical hardener for a minimum 20 minute period.

c. Do not allow material to puddle on the surface.

d. Let the surface dry for 2 to 4 hours.

e. Restrict foot traffic for at least 4 hours; 12 hours is preferable.

B. Concrete Enhancer

1. Allow 24 hours before proceeding with concrete enhancer application.

2. Spray concrete enhancer full strength from container using an industrial sprayer delivering 1/10th of a gallon per minute.

3. Pre-wet micro-fiber applicator with concrete enhancer prior to use.

4. Uniformly spread concrete enhancer with a micro-fiber applicator, ensuring that the product is not allowed to dry before spreading is complete. Special caution should be taken to not over apply. A monolithic, thin, even film is desired.

5. For optimum performance, apply a second coat at a 90 degree (right) angle to the first coat, after the first coat is thoroughly dry.

6. Allow 24 hours for concrete enhancer to dry.

3.13 MISCELLANEOUS CONCRETE ITEMS INSTALLATION

A. Filling In:

1. Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete base a minimum of 4-inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond maximum dimensions of supported equipment unless otherwise indicated.
3. Minimum Compressive Strength: 4,000 psi at 28 days, unless otherwise indicated.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of concrete base.
5. For supported equipment, install anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

a. Use setting drawings, templates, diagrams, instructions and directions finished with items to be embedded.
b. Cast anchor-bolt insert into bases.
c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.14 APPLICATION OF CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI SPEC-301 and ACI SPEC-306.1 for cold-weather protection and ACI SPEC-305.1 for hot-weather protection during curing.
2. Maintain moisture loss no more than 0.2 lb./sq.ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Curing Formed Surfaces: Comply with ACI SPEC-308.1 as follows:
1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer’s instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period as follows:
a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
b. Continuous Sprinkling: Maintain concrete surface continuously wet.
c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer’s written instructions.
1) Recoat areas subject to heavy rainfall within three hours after initial application.
2) Maintain continuity of coating and repair damage during curing period.

D. Curing Unformed Surfaces: Cure concrete according to ACI SPEC-308.1, by one or a combination of following methods:
1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of following:
1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install pre-wetted absorptive cover over entire area of floor.
a) Lap edges and ends of absorptive cover not less than 12-inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, following:
a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments or Sealers: Contractor has option of following:
1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install pre-wetted absorptive cover over entire area of floor.
a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.
3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, following:
a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Curing Compound: Do not use where slab will be covered with tile.
1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
a) Apply second coat to all surfaces with a direction of application at 90 degrees to first coat and to same rate of application.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Maintain continuity of coating, and repair damage during curing period.
4) After seven days and curing period has elapsed, remove curing compound as soon as concrete is not subject to rewetting by one of the following methods:
a) Contractor shall “brush blast (shot)” surface. Process involves utilizing a self-contained shot-blasting machine, such as a Blastrac, that utilizes steel shot (170 of 230). By using this process, pores of concrete will open, and floor will be cleaned, but leave a very light profile similar to International Concrete Repair Institute “CSP 1”.
b) Contractor shall employ a mechanical profiling method. Do not acid etch, detergent wash or any method that wets the surface.
c) Curing compounds must be removed after concrete has cured.

d. Floors to Receive Curing and Sealing Compound: Only apply where indicated on Finish Schedule. Do not apply to slabs to receive any other type of coating of finish.
1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.15 TOLERANCES

A. Conform to ACI 117.

3.16 SEALER INSTALLATION

A. Anti-Spalling Sealer: All exterior slabs, unless otherwise noted, shall be sealed with specified penetrating anti-spalling sealer. Surface preparation of slabs and sealer application shall be in strict accordance with directions of manufacturer. Field service shall be provided, upon 5 days' notice, by manufacturer of sealer to assist contractor in obtaining maximum benefits of product under prevailing jobsite conditions. In addition, sealer representative shall attend pre-installation meeting with A/E and contractor to discuss proper equipment and procedures.

B. Floor Sealing Coat: Apply to all exposed slabs that received curing and sealing compounds before turning over building to Owner.
   1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions, including slab preparation requirements. .
   2. Application. Apply at a uniform coverage with an individual handheld pump-up or airless sprayer, or by roller. Common garden-type sprayers should not be used. If applying by roller, use a short 3/8-inch nap, solvent resistant roller cover. First coat acts as a primer for second coat. Allow first coat to dry tack-free before applying second coat.
      a. Follow manufacturer's prescribed coverage rates.

3.17 INSTALLATION OF JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least one month.
   2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Fill control joints with self-leveling traffic grade sealant at following locations:
   1. Exposed slabs with no additional floor finish.
   2. Slabs to receive wood floor system.

3.18 INSTALLATION OF CONCRETE SURFACE REPAIRS

A. Defective Concrete:
   1. Repair and patch defective areas when approved by A/E.
   2. Remove and replace concrete that cannot be repaired and patched to A/E's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins, and other projections on surface, and stains and other discolorations that cannot be removed by cleaning.
   1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by A/E.

D. Repairing Unformed Surfaces:
1. Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface.
   a. Correct low and high areas.
   b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar.
   a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
   a. Treat nonmoving substrate cracks to prevent cracks from telegraphing (reflecting) through underlayment according to manufacturer’s written recommendations.
   b. Concrete Substrates: Mechanically remove laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond according to manufacturer’s written instructions.
6. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
   a. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to A/E's approval, using epoxy adhesive and patching mortar.
1. Fill all cracks larger than 1/64 inch in both slabs-on-grade and elevated slabs with epoxy crack injection adhesive.

F. Repair materials and installation not specified above may be used, subject to A/E's approval.

3.19 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Batch Tickets (Delivery): Comply with ASTM C94. For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added to Project site.

C. Inspections: Refer to Structural Drawings for list of “Special Inspections”.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to following requirements:
   1. Testing Frequency: Obtain at least one composite sample for each 150-cu. yd. or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change and as needed to monitor control of batches.
   3. Slump Flow: ASTM C1611
      a. One test at point of delivery for each composite sample when strength test specimens are cast, but not less than one test for each day’s pour of each concrete mixture.
      b. Perform additional tests as needed.
   4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture. Additional tests as needed to monitor control of batches.
   5. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 90 deg F and above, and one test for each composite sample.
   6. Concrete Density: ASTM C138
      a. One test for each composite sample when strength test specimens are cast.
   7. Compression Test Specimens: ASTM C 31.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
         1) Strength test results at the designated age shall be the average of two 6 x 12 inch or three 4 x 8-inch specimens.
         2) Transport specimens to lab within 48 hours after casting and cure them in accordance with final curing requirements of ASTM C31 until tested.
   8. Compressive Strength Tests: ASTM C39.
      a. Test specimens for compressive strength at 7 days or at an alternative early are as required and one set at 28 days.
      b. Acceptance of concrete shall be based on strength test results of standard cured cylinders in accordance with ASTM C31 and tested at 28 days in accordance with ASTM C39. Strength test results at the designated age shall be the average of two 6 x 12 inch or three 4 x 8-inch specimens.
      c. When strength cylinders are made, test of slump, air content, temperature and density shall be made and recorded with the strength test results.
      d. Strength of each concrete class shall be deemed satisfactory when both of the following criteria are met:
         1) The average of three consecutive compressive-strength tests equal or exceeds specified compressive strength.
         2) Any individual compressive-strength test result does not fall below specified compressive strength, f’c.
            a) By more than 500 psi when f’c $\leq$ 5000 psi.
            b) By more than 0.1 f’c when f’c . 5000 psi.

e. When compressive strength tests fail to meet the provisions of (d), follow procedure in ACI 301 for evaluation of concrete strength tests.
f. When it is deemed necessary to evaluate the adequacy of concrete strength, at least 3 cores shall be obtained from the portion of the structure represented by the low strength tests. Cores shall be removed and conditioned in accordance with ASTM C42. The strength of cores shall comply with the following:
1) Average strength of 3 cores $\geq$ 0.85 f'c.
2) Individual core strength $\geq$ .75 f'c.

9. Test results shall be reported in writing to A/E, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Nondestructive Testing: Rebound hammer, ultrasonic, or other nondestructive device may be permitted by A/E but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by A/E. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by A/E.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in Work that test reports and inspections indicate do not comply with Contract Documents.

E. Contractor shall measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

3.20 CONCRETE WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess concrete materials are Contractor's property. At completion of work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean hardened concrete waste by crushing and mixing with fill material as fill is placed. Comply with requirements of testing agency. Remove reinforcing and segregate to salvaged materials.
1. Crush concrete waste to less than 1-1/2 inches in each dimension.
2. Mix crushed concrete waste with at least four parts of specified fill material for each part of concrete waste. Fill material is specified in Division 31 Section "Earth Moving".
3. Do not dispose of concrete waste as fill within 24 inches of finished grade.

C. Excess Concrete Waste: Remove excess clean concrete waste that cannot be used as fill as described above, and other concreting operations waste, and legally dispose of off Owner's property.
1. Comply with Division 01 requirement of Section Construction Waste Management and Disposal.

3.21 PROTECTION

A. General, protect concrete surfaces as follows:
1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over unprotected concrete surfaces.
5. Prohibit placement of steel items directly on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Do not drag or drop equipment or material across the slab which will scratch or ship it.

8. Clean up spills on slab immediately. Provide cleaning chemicals and absorptive materials.

B. Protect concrete that will remain exposed and has or will receive a floor or slab treatment or a curing and sealing compound with protective cover.
   1. Protect “burnished” concrete flooring from foot traffic for a minimum of 4 hours (12 hours is preferable) after application of concrete densifier and chemical hardener.

C. Develop a concrete protection procedure which addresses the following procedures:
   1. Communication of protection plan to subcontractors and vendors.
   2. Procedures for cleaning up slab spills, including use of an availability of cleaning chemicals and absorptive materials at site.

D. Slab Protection: Where concrete surface is scheduled to receive special concrete finish or remain exposed.
   1. Floor must be protected from following:
      a. Silicone chalks should not be used if at all possible. Red and yellow chalks are permanent dyes. Red chalks, black markers, wax pencils should not be used for framing. White or blue chalks are ok. Do not over mark for framing. Do not use silicone sprays to hold lines. Sprays repel stain and leave harsh, permanent scars on floor.
      b. Do not use, tape, glue, solvents, pine-sol, varnish, non-breathing plastics, liquid nail, silicone, plastics, nails, plumbers glue, foam insulation, bond release agents, flux, oils, grease, polyurethane, paint, markers (framers often write dimensions of doorways in marker on slab. They need to make notes on framing instead), grease sticks, spray paints, crayons, muriatic acid, and other chemicals both before and after staining.
   2. Do not allow to spill or sit on floor.
      a. It is important that wood, sheet goods, insulation boards, plywood, press board, drywall, sections of framing and like not lay on slab for extended periods of time. They can transfer resins and tannins into slab. This will alter moisture content in slab which leaves a pattern in finished floor. Cardboard should be placed between slab and stacked material to minimize any unwanted transfer. Also food, beverages, oil, glass, metal, paint, chalk, or primers. Be sure to check lifts tires for nails and screws, diaper all equipment from oil and grease drips, don’t allow pipe cutting equipment on slab without protection.

END OF SECTION 03 30 00

SECTION 22 15 19 - GENERAL-SERVICE COMPRESSED AIR AND WELDING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. This Section includes piping and related specialties for general service compressed air and inert welding gas systems operating at 200 psig or less.

1.2 SUMMARY

A. Section Includes:
   1. Type “K” copper tubing.
   2. Steel piping.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
   1. Wiring Diagrams: For power, signal, and control wiring.
   2. Compressed-air/weld gas pipes, fittings, and valves.
   3. Pressure regulators. Include rated capacities and operating characteristics.
   4. Filters. Include rated capacities and operating characteristics.
   5. Lubricators. Include rated capacities and operating characteristics.
   6. Quick couplings.
   7. Hose assemblies.

1.4 INFORMATIONAL/QUALITY ASSURANCE/CONTROL SUBMITTALS

A. Brazing certificates.

B. Qualification Data: For Installers.

C. Field quality control test reports.

1.5 CLOSEOUT DOCUMENTS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Operation and Maintenance data: For general service compressed-air piping specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

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

B. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.

C. Brazing: Qualify processes and operators according to ASME Boiler and pressure Vessel Code: Section IX, “Welding and Brazing Qualifications,” or to AWS B2.2, “Standard for Brazing Procedure and Performance Qualification.”

D. ASME Compliance:

1. Comply with ASME B31.1, “Power Piping,” for high-pressure compressed-air and welding gas piping.
2. Comply with ASME B31.9, “Building Services Piping,” for low-pressure compressed-air piping.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Compressed-Air Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
1. Notify the Owner no fewer than two days in advance of proposed interruption of compressed-air service.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTNIGS

A. Copper Tube: ASTM B88, Type K seamless, drawn-temper, water tube. (Compressed Air – Option)
1. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.
2. Copper mechanical press-fit fittings for copper systems, with compressed air compatible sealing O-rings are acceptable as manufactured by Viega ProPress or approved equal.

B. Black Steel Pipe: ASTM A53, Type E or F, schedule 40. (Compressed Air or Welding Gas – Option)
1. Piping shall be schedule 40 black steel, inert gas compatible with Compressed Air, Argon, CO2 and inert gas mixtures. Fittings shall be weld type or mechanical press-fit equal to Viega MegaPress.
2. All Pipe and Fittings provided shall be minimum 200 PSIG WOG rated.

2.2 JOINING MATERIALS

A. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.

2.3 VALVES

A. Metal Ball and Check Valves: Comply with requirements in Division 22 Section “General-Duty Valves for Plumbing Piping.” All valve components shall be compatible with inert gas, compressed air applications with pressure ratings compatible with operating pressure and test pressure requirements.

2.4 DIELECTRIC FITTINGS

A. General Requirements for Dielectric Fittings: Combination fitting of copper alloy and ferrous materials with insulating material; suitable for system fluid, pressure, and temperature. Include threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Dielectric Unions: Factory fabricated union assembly, for 250 psig minimum working pressure at 180 deg F.

2.5 FLEXIBLE PIPE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Flex-Hose Co., Inc.
   2. Flexicraft Industries.
   3. Metraflex, Inc.
   4. Unaflex, Inc.
   5. Universal Metal Hose; a Hyspan Company

2.6 SPECIALTIES

A. Air-Main Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rate for 250 psig inlet pressure, unless otherwise indicated.
   1. Type: Pilot operated.

B. Air-Line Pressure Regulators: Diaphragm operated, bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for 200 psig minimum inlet pressure, unless otherwise indicated.

C. Automatic Drain Valves: Stainless-steel body and internal parts, rated for 200 psig minimum working pressure, capable of automatic discharge of collected condensate. Provide adequately sized oil separator in line to discharge.

D. Coalescing Filters: Coalescing type with activated carbon capable of removing water and oil aerosols; with color-change dye to indicate when carbon is saturated and warning light to indicate when selected maximum pressure drop has been exceeded.

E. Air-Line Lubricators: With drip chamber and sight dome for observing oil drop entering air stream; with oil-feed adjustment screw and quick-release collar for easy bowl removal.
   1. Provide with automatic feed device for supplying oil to lubricator.

2.7 QUICK COUPLINGS

A. Manufacturers: Subject to compliance with requirements, provide products by on the following:
   1. Aeroquip Corporation; Eaton Corp.
   2. Milton Industries, Inc.
   3. Parker Hannifin Corp.; Fluid Connectors Group; Quick Coupling Division
   4. Rectus Corp.
   5. Snap-Tile, Inc.; Quick Disconnect and Valve Division.

B. General Requirements for Quick Couplings: Assembly with locking-mechanism feature for quick connection and disconnection of compressed-air hose.

C. Automatic-Shutoff Quick Couplings: Straight-through brass body with O-ring or gasket seal and stainless steel or nickel plated steel operating parts.
   1. Socket End: With one-way valve and threaded inlet for connection to piping or threaded hose fitting.

D. Valveless Quick Couplings: Straight-through brass body with stainless steel or nickel plated steel operating parts.
   1. Socket End: With O-ring or gasket seal, without valve, and with barbed inlet for attaching hose.
   2. Plug End: With barbed outlet for attaching hose.

2.8 HOSE ASSEMBLIES

A. Description: Compatible hose, clamps, couplings, and splicers suitable for compressed-air service, of nominal diameter indicated, and rated for 300-psig minimum working pressure, unless otherwise indicated.
   1. Hose: Reinforced [**single**] -wire-braid, CR-covered hose for compressed-air service.
   2. Hose Clamps: Stainless-steel clamps or bands.
   3. Hose Couplings: Two-piece, straight-through, threaded brass or stainless-steel O-ring or gasket-seal swivel coupling with barbed ends for connecting two sections of hose.
   4. Hose Splicers: One-piece, straight-through brass or stainless-steel fitting with barbed ends for connecting two sections of hose.

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Install compressed-air equipment anchored to substrate.

B. Arrange equipment so controls and devices are accessible for servicing.

C. Maintain manufacturer's recommended clearances for service and maintenance.

D. Install the following devices on compressed-air equipment:
   1. Thermometer, Pressure Gauge, and Safety Valve: Install on each compressed-air receiver.
   2. Pressure Regulators: Install downstream from air compressors and dryers.
   3. Automatic Drain Valves: Install on receivers, and dryers. Discharge condensate over nearest floor drain.

3.2 PIPING APPLICATIONS

A. Compressed-Air Piping: Use one of the following piping materials for each size range:
   1. NPS 2 and Smaller: Type K, copper tube; wrought-copper fittings; and brazed joints.
   2. 2-1/2 inches and Larger: Type K or L, copper tube; wrought-copper fittings; and brazed joints.
   3. All Sizes: Schedule 40 black steel, ASTM A53.

B. Inert Welding Gas Piping: Use one of the following piping materials for each size range:
   1. NPS 2 and Smaller: Type K, copper tube; wrought-copper fittings; and brazed joints.
   2. All Sizes: Schedule 40 black steel, ASTM A53.

3.3 VALVE APPLICATIONS

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for metal general-duty valves. Use metal valves, unless otherwise indicated.
   1. General-Duty Valves: Use valve types specified in "Valve Applications" Article in Division 22 Section "General-Duty Valves for Plumbing Piping" according to the following:
      a. Low-Pressure Compressed Air: Valve types specified for low-pressure compressed air.
      b. High-Pressure Compressed Air: Valve types specified for medium-pressure compressed air.

3.4 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air and welding piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping protected from physical contact by building occupants, unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and to coordinate with other services occupying that space.

E. Install piping adjacent to equipment and machines to allow service and maintenance.

F. Install air and drain piping with 1 percent slope downward in direction of flow.

G. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating, unless otherwise indicated.

H. Equipment and Specialty Flanged Connections:
   1. Use steel companion flange with gasket for connection to steel pipe.
   2. Use cast-copper-alloy companion flange with gasket and brazed joint for connection to copper tube. Do not use soldered joints for connection to air compressors or to equipment or machines producing shock or vibration.

I. Extended-tee outlets with brazed branch connection may be used for copper tubing, within extruded-tee connection diameter to run tube diameter ratio for tube type, according to Extruded Tee Connections Sizes and Wall Thickness for Copper Tube (Inches) Table in ASTM F 2014.

J. Install eccentric reducers where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.

K. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

L. Install piping to permit valve servicing.

M. Install piping free of sags and bends.

N. Install fittings for changes in direction and branch connections.

3.5 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Brazed Joints for Copper Tubing: Join according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.

E. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Join according to ASTM B 828 or CDA's "Copper Tube Handbook."

3.6 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping."

B. Install shutoff valve at inlet to each automatic drain valve, filter, lubricator, and pressure regulator.

3.7 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

B. Vertical Piping: MSS Type 8 or 42, clamps.

C. Individual, Straight, Horizontal Piping Runs:
1. 100 Feet or Less: MSS Type 1, adjustable, steel clevis hangers.
2. Longer than 100 Feet: MSS Type 43, adjustable roller hangers.

D. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

E. Base of Vertical Piping: MSS Type 52, spring hangers.

F. Support horizontal piping within 12 inches of each fitting and coupling.

3.8 LABELING AND IDENTIFICATION

A. Install identifying labels and devices for general-service compressed-air piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. Perform field tests and inspections.

B. Tests and Inspections:
1. Piping Leak Tests for Metal Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of 50 psig above system operating pressure, but not less than 150 psig. Welding gas system leak tests shall be to 200 psig. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
2. Repair leaks and retest until no leaks exist.
3. Inspect filters, lubricators, and pressure regulators for proper operation.

C. Prepare test reports.

END OF SECTION 22 15 19

SECTION 26 05 33 - CONDUIT AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes conduits, fittings, boxes, outlet boxes, floor boxes, high capacity floor boxes enclosures, and cabinets for electrical wiring. The term raceway shall also apply to conduit and boxes.

B. Related Sections include the following:
1. Division 26 Section "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks, manholes, and underground utility construction.
2. Division 26 Section "Wiring Devices" for mounting heights of devices.
3. Division 26 Section "Surface Raceways for Electrical Systems" for multioutlet assemblies wireways and surface raceways.

1.2 DEFINITIONS

A. BICSI: Building Industry Consulting Service International.

B. EMT: Electrical metallic tubing.

C. ER: Equipment room (Telecommunications.)

D. FMC: Flexible metal conduit.

E. IMC: Intermediate metal conduit.

F. LFMC: Liquidtight flexible metal conduit.

G. MC: Main cross-connect (Telecommunications.)

H. RMC: Rigid metal conduit.

I. RNC: Rigid nonmetallic conduit.

J. TDMM: Telecommunications Distribution Methods Manual, published by BICSI.

K. TR: Telecommunications room.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. Voice and Data Communications Pathways: Install conduit, raceways, and boxes according to BICSI TDMM, "Horizontal Distribution Systems" Chapter, and comply with NECA 568.

D. Review WSU Standards of Design packet along with WSU Infrastructure and Design Standards.

1.4 COORDINATION

A. HVAC Control and Monitoring: Verify locations of temperature control panels with Building Management System installer.

B. Telephone and Cable Television: Verify location of entrance facilities and exterior underground pathways with Telephone and Cable Television Utility Companies.

C. MC/ER and TR: Verify locations of backboards, cable trays, equipment cabinets and racks, and conduit stub-outs.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

A. RMC: ANSI C80.1.

B. IMC: ANSI C80.6.

C. EMT: ANSI C80.3.

D. FMC: Zinc-coated steel or aluminum.

E. LFMC: Flexible steel conduit with PVC jacket.

F. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
   1. Die-cast type, pot-metal type, and indenter type fittings are not permitted.
   2. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
   3. Fittings for EMT: Steel, compression type.

G. Joint Compound for RMC or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 NONMETALLIC CONDUIT

A. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.

B. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.

2.3 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
   1. Gangable boxes are not permitted.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.

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

D. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

E. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
   1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
   2. Nonmetallic Enclosures: Plastic.

F. Cabinets:
1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Key latch to match panelboards.
4. Metal barriers to separate wiring of different systems and voltage.
5. Accessory feet where required for freestanding equipment.

2.4 TELCOMMUNICATIONS CONDUIT BODIES

A. General Description: Conduit bodies specifically designed to maintain the required bend radius for data and communications cabling, complying with BISCI TDMM "Horizontal Distribution Systems" Chapter.
1. Material: Die-cast aluminum.
2. Conduits run to the cable tray should end approximately 4"- 6" inches away from the top or bottom edge of the cable tray to maintain a proper bend radius.
3. Refer to ET drawings General Notes column and ET51 for further details.
4. All raceways shall follow the color scheme listed below. All existing conduits that are reused shall have their boxes, couplings, and fittings hand painted by brush to match the color scheme below using the PPG number shown.

SYSTEM	***RACEWAY COLOR/(PPG#)***	***DEVICE & PLATE COLOR***
Fire Alarm	***Red/(70075)***	***Red***
Voice/Data/Video/Security	***Blue/(12809)***	***N/A***
Normal Power	***Unpainted***	***White***
Emergency/Life Safety	***Orange/(71346)***	***Red***
Stand-By	***White/(4185)***	***Gray***
Lighting	***Black/(4337)***	***N/A***
Dedicated Grounding	***Green/(46180)***	***N/A***
Wireless Way-Finding	***Yellow/(80453)***	***N/A***

5. Refer to Sheet ET51 details for Security Door Hardware & WAP/Camera conduit/pathway rough-ins.

PART 3 - EXECUTION

3.1 CONDUIT APPLICATION

A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
1. Exposed Conduit: RMC or IMC.
2. Concealed Conduit, Aboveground: RNC, Type EPC-40-PVC.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
4. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Comply with the following indoor applications, unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed and Subject to Physical Damage: RMC. Includes raceways in the following locations:
a. Loading dock.
b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
c. Kitchens.
3. Concealed in Ceilings and Interior Walls and Partitions: EMT.
4. Concealed in Exterior Walls: RNC, Type EPC-40-PVC
5. Concealed Under Slabs-on-Grade: RNC, Type EPC-40-PVC.
6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
7. Damp or Wet Locations: RMC or IMC.

8. Conduits for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: EMT.
9. Conduits for Optical Fiber or Communications Cable Risers in Vertical Shafts: EMT.
10. Conduits s for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: EMT.
11. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel in damp or wet locations.

C. Minimum RMC, IMC, EMT, or RNC, Type EPC-40-PVC Size: 1/2-inch trade size, unless indicated otherwise.

D. Minimum FMC or LFMC Size: 1/2-inch trade size, unless indicated otherwise.

E. Conduit Fittings: Compatible with raceways and suitable for use and location.
1. RMC or IMC: Use threaded rigid steel conduit fittings, unless otherwise indicated.

3.2 OUTLET AND DEVICE BOX APPLICATION

A. Flush Boxes in Masonry Walls and Partitions: Use masonry boxes at least 3.5 inches deep.

B. Flush Boxes in Gypsum-Board Partitions: Use square boxes at least 2.125 inches deep with raised box covers.

C. Flush Device Boxes in Ceilings: Use square boxes at least 2.125 inches deep with raised box covers.

D. Flush Outlet Boxes in Ceilings: Use 4-inch round or octagonal boxes at least 2.125 inches deep.

E. Surface Boxes: Use cast-metal type with matching cover. Provide knock-out plugs in unused openings.

3.3 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.

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

C. Complete raceway installation before starting conductor installation.

D. Support conduits as specified in Division 26 Section "Hangers and Supports for Electrical Systems."

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

F. Conceal conduit and EMT within finished walls, ceilings, and below floors, unless otherwise indicated.

G. Conduits Beneath Concrete Slabs:
1. Install conduit parallel or at right angles building lines, at least 1 inch below top of drainage fill.
2. Arrange conduits to cross building expansion joints at right angles with expansion fittings.
3. Do not embed conduits in concrete slabs.

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

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

J. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.

K. Install conduit sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed conduits, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install conduit sealing fittings at the following points:
   1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
   2. Where otherwise required by NFPA 70.

L. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 deg F, and that has straight-run length that exceeds 25 feet.
   1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
      a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
      b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
   2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change.
   3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.

M. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
   1. Use LFMC in damp or wet locations.

N. Recessed Boxes in Masonry Walls: Coordinate work with masonry contractor. Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Box shall be vertically plumb and flush with plane of wall, or slightly recessed. All boxes installed improperly will be replaced at Contractors expense. Provide oversized plate for all boxes that have exposed joints.

O. Recessed Boxes in Gypsum-Board Partitions: Coordinate work with drywall contractor. Box shall be vertically plumb and flush with plane of wall, or slightly recessed. All boxes installed improperly will be replaced at Contractors expense. Provide oversized plate for all boxes that have exposed joints.

P. The floor box shall be FSR FL-640P-8”, Contractor should confirm divider & conduit layout into floor box with electrical details prior to installation.

Q. Conduits less than 3-inch trade size may be field bent, unless indicated otherwise. Use factory 45 and 90 degree, and special radius elbows for conduits 3-inch and larger.

R. Conduits for Feeders: Electrically continuous, terminated with grounding and insulating bushings.

S. Conduits for Branch Circuits: Electrically continuous.

T. Finished Spaces: Provide escutcheons where conduits penetrate surfaces of finished spaces. Match finish of adjacent surfaces.

U. Conduits for Optical Fiber and Voice and Data Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
   1. 1-1/2-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.

2. 2-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
4. Elbows: Use factory elbows. Field bent elbows are not permitted for optical fiber and communications cables.
    a. Radii of Elbows for Conduits 1-1/2-inches and Larger: At least 10 times inside diameter of conduit.
5. Conduit Bodies: Use telecommunications conduit bodies.

3.4 NON-METALLIC CONDUIT

A. Provide a continuous equipment ground conductor in all conduits with branch circuits or feeders.

B. Do not use steel, metallic conduit for any bare grounding conductors.

3.5 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
    1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
    2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 37 - CABLE TRAYS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes continuous aluminum cable tray system and accessories.

1.2 CLOSEOUT DOCUMENTS

A. General: Closeout Submittals are to be submitted with O and M Manuals only. Do not submit with other ACTION and INFORMATIONAL Submittals:
   1. Operation and Maintenance Data: For cable trays to include in emergency, operation, and maintenance manuals.

1.3 QUALITY ASSURANCE

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

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Cable tray shall be stored in a well-ventilated, dry location. Unpack and dry wet materials before storage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Cablofil; a Division of ICM Group.
   2. Cooper B-Line, Inc.
   3. GS Metals Corp.; FLEXTRAY products.
   4. MONO-SYSTEMS, Inc.
   5. Hubbell
   6. The Wiremold Co.

B. Products of other manufacturers will be considered for acceptance only when allowed in Section 260050, General Electrical Requirements.

2.2 MATERIALS AND FINISHES

A. Cable Trays, Fittings, and Accessories: Continuous aluminum cable tray system 12-inch wide by 4-inch deep with 1” rungs spaced every 9” to match existing tray including grounding conductor.
   1. Electrogalvanized after fabrication, complying with ASTM B 633 SC1/SC2; with hardware galvanized according to ASTM B 633 or AISI Type 304 stainless steel.

B. Sizes and Configurations: Refer to Part 3 Article "Cable Tray Schedule" for specific requirements for types, materials, sizes, and configurations.

2.3 CABLE TRAY ACCESSORIES

A. Fittings: Field fabricated tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.

B. When making turns and elevation changes the appropriate tray accessories, having the proper bend radius, shall be used.

C. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.

2.4 SOURCE QUALITY CONTROL

A. Perform design and production tests according to NEMA VE 1.

PART 3 - EXECUTION

3.1 CABLE TRAY INSTALLATION

A. Comply with recommendations in NEMA VE 2. Install as a complete system, including all necessary fasteners, hold-down clips, splice-plate support systems, barrier strips, hinged horizontal and vertical splice plates, elbows, reducers, tees, and crosses.

B. Remove burrs and sharp edges from cable trays.

C. Fasten cable tray supports to building structure.
   1. Design each fastener and support to carry load indicated.
   2. Place supports so that spans do not exceed a maximum distance of 10 feet.
   3. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.
   4. Support bus assembly to prevent twisting from eccentric loading.
   5. Manufacture center-hung support, designed for 60 percent versus 40 percent eccentric loading condition, with a safety factor of 3.
   6. Locate and install supports according to NEMA VE 2.

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

E. Make cable tray connections using standard fittings.

F. For access to, and installation of, cables in the cable tray, the following clearances are required around the cable tray. The cable tray system shall have 6” min. unobstructed clearance above the cable tray measured from the top most surface of the tray. The cable tray shall have a 12” minimum obstructed clearance along the side of the cable tray along its entire length. Access to the cable tray from below shall be unobstructed along its entire length.

G. There shall be no other equipment, ductwork, lights, conduits, fixtures etc. attached to, mounted on, running through or on the cable trays that is extraneous to the support of the cable tray system.

H. Cable tray shall not run through walls.

3.2 CABLE INSTALLATION

A. Install cables only when cable tray installation has been completed and inspected.

B. On vertical runs, fasten cables to tray every 18 inches. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.

C. In existing construction, the owner shall remove inactive or dead cables from cable tray.

3.3 CONNECTIONS

A. Ground cable trays according to manufacturer's written instructions and Division 26 Section "Grounding and Bonding for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements. Perform the following field quality-control survey:
   1. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable tray, vibration, and thermal expansion and contraction conditions, which may cause or have caused damage.
   2. Verify that there is no intrusion of such items as pipe, hangers, or other equipment that could damage cables.
   3. Remove deposits of dust, industrial process materials, trash of any description, and any blockage of tray ventilation.
   4. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
   5. Check for missing or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
   6. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable tray.

B. Report results in writing.

3.5 PROTECTION

A. Protect installed cable trays.
   1. Install temporary protection for cables in open existing trays to protect exposed cables from falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials until the risk of damage is over.

3.6 CABLE TRAY SCHEDULE

A. Provide run designation Type-A, unless otherwise indicated.

B. Run Designation Type-A:
   1. Type: Continuous Aluminum Cable Tray System – BOD: LTB412
   2. Width: 12 inches.
   3. NEMA VE 1 Loading Depth: 4 inches.
   4. NEMA Rating: 12B.

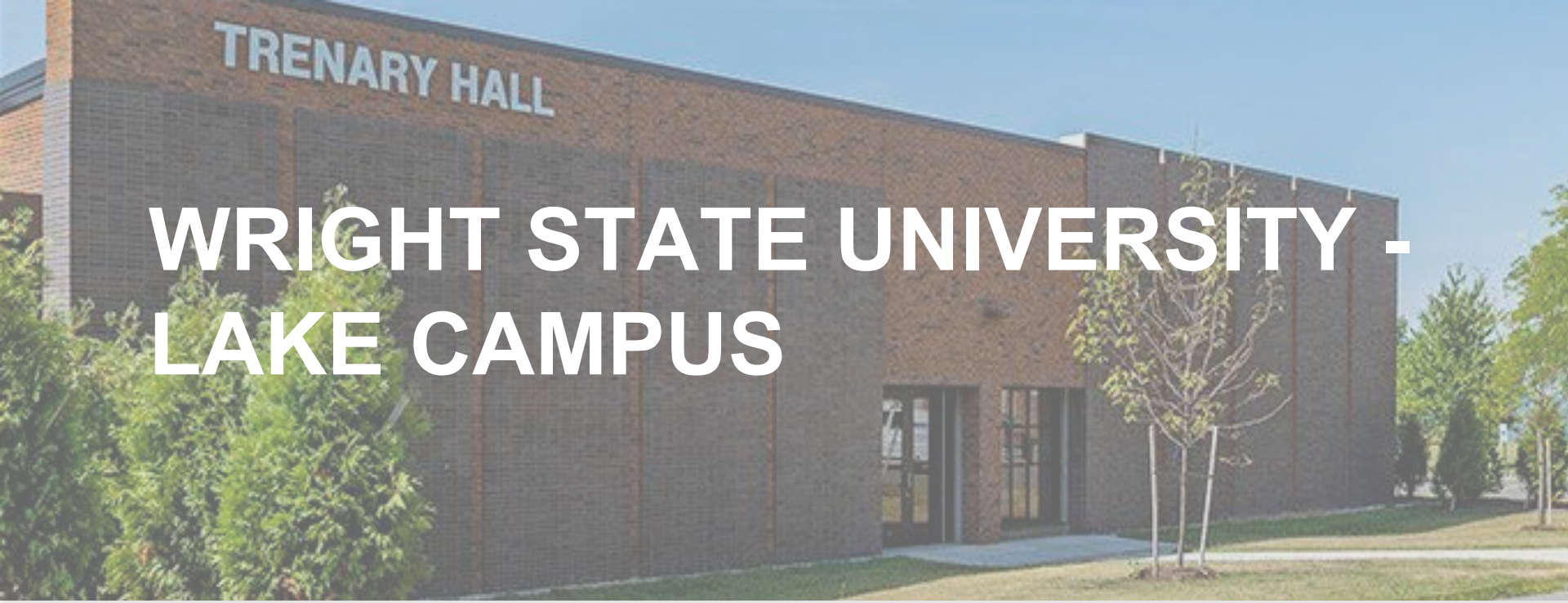
C. Run Designation Type-B:
   1. Type: Wire mesh, trapeze type hanger.
   2. Width: 18 inches.
   3. Minimum Fitting Radius: 12 inches.
   4. NEMA VE 1 Loading Depth: 4 inches.
   5. NEMA VE 1 Span Load: L/200.

END OF SECTION 26 05 37

A. Pre-Bid Meeting Minutes: The pre-bid meeting minutes and sign in sheet have been processed and enclosed herein for informational use only. We, the A/E, do not accept responsibility for the accuracy of these minutes and they do not modify the Contract. The pre-bid meeting minutes are for information only. Any items brought up at the pre-bid meeting that required contract modification has been issued as part of the Addendum.

1. Attachments
    a. Pre-Bid Agenda and Meeting Minutes
    b. Pre-Bid Sign-In Sheet

B. Pre-Bid Request for Interpretation/Clarification (RFI) Log: This Log is issued to all bidders for informational use only. Any RFI items that revise, add to, or delete information in the bidding documents are included as part of the addendum. Contractor's request for information (questions) shall be listed here with a response for all bidders to read. Clarifications in response to bidders questions shall be based on an interpretation reasonably inferable from the Contract Documents, and therefore has no affect on the Contract Sum or Contract Time.



WRIGHT STATE UNIVERSITY - LAKE CAMPUS

Pre-Bid Meeting

224102.00/WSU-231035 – Workforce Development Center

WRIGHT STATE UNIVERSITY LAKE CAMPUS

FANNING HOWEY

10/21/2026

Agenda

- Introductions
- Pre-Bid Meeting
- Q/A
- Tour of site

Introductions

FANNING HOWEY

- Owner
  - Rob Thompson, University Architect
  - Angela Peterson, Design & Construction Project Manager
  - Andrea Faber, Vice Provost & Chief Administrative Officer
  - Tammy Eilerman, Director Workforce Development, BEC
  - Ed Morris, Facilities Supervisor, Lake Campus
- Fanning Howey
  - Rod Wiford, Project Executive/Manager
  - Emily Homan, Project Architect
  - Eric Loughridge, Construction Administrator
- Construction Testing Consultant
  - CTL Engineering, Inc.

What this project ***IS*** and what this project is ***NOT***

FANNING HOWEY

- This is ***NOT*** a LEED project.
- This ***IS*** a project contractually managed by Wright State Univeristy.
- There is ***NOT*** a Construction Manager or Owner's Representative on this project.
- This ***IS*** a General Contracting Delivery Model project.
- ***ALL*** correspondence/communication goes through Fanning Howey.
- This project ***IS*** an Ohio Prevailing Wage project
- This ***IS*** an EDGE project with a participation goal of 5.0% (see 00 45 39 EDGE Affidavit)

Solicitation – Document 00 10 00

FANNING HOWEY

- Bid Type
  - Received, opened and published through electronic means using State's electronic bidding service
  - Must first register at https://bidexpress.com
    - Click "REGISTER FOR FREE", follow instructions
    - Create and enable a digital ID within the service
      - Requires notarized paperwork and may take up to 5 business days to complete!
    - No fees are required to register, create/enable digital ID or download documents, however small monthly expense or per bid basis to submit a bid.
    - Bidding service customer support at 888/352-2439 or support@bidexpress.com
    - Submit bids electronically through https://bidexpress.com
    - Refer to Instructions to Bidders for additional information

Solicitation – Document 00 10 00

FANNING HOWEY

- Bids due
  - November 4, 2026, 2:00 p.m.
    - Bidder is responsible for delivering the bid by the time specified in Bid Express, http://bidexpress.com on the electronic Bid form in Bid Express.
    - The bidder will need to allow several days to receive an electronic signature from Bid Express fi they have not used Bid Express prior to this project.
  - Bid tabulations will be posted no later than 5:00 p.m. on bid day
- Obtaining procurement documents
  - https://bidexpress.com – no charge
  - Dodge, Reed Construction Data, Blue Book, Bid Clerk bid rooms

Instructions to Bidders – Section 002113

FANNING HOWEY

- Other information required to be submitted outlined therein
- Each bidder is required to bid each and every item called for on the bid form, including alternates, allowances and unit costs
- Bids shall not include State of Ohio Sales and Use Taxes for materials incorporated into this project, the Owner will provide the necessary tax exemption forms after award of contract
- Pre-Bid RFIs shall be directed to ohiobidquestions@fhai.com,. Subject line shall include FH project number (224102.00), project name (Workforce Development Project). Interpretations, corrections and changes will be made by addendum; any other manner will not be binding.

Instructions to Bidders – Section 002113

FANNING HOWEY

- Questions and clarifications – Section 002113-2.3
  - Submit in writing (email) to Fanning Howey
  - Submitted no later than 7 days prior to bid, otherwise no response

- Substitutions will only be considered if written request has been received by Fanning Howey at least 10 days prior to bid.

General Items

FANNING HOWEY

- Time and commencement and completion of project
  - Receive bids, 2:00 p.m., local time, November 4, 2026
  - Post bid review meetings (apparent low and second low), November 12-18, 2026
  - Owner intends to award bids within 6 weeks of bid date
  - Owner intends to issue Notice of Intent to Award within 6 weeks of bid date
  - Owner intends to issue Notice to Proceed within 60 days of bid opening
  - Pre-Construction meeting, tentatively January 6, 2027, to be confirmed
  - Substantial Completion is approximately ***November 5, 2027***
- Unit costs are identified in Section 012200 of the Project Manual
- Temporary Facilities and Controls – refer to Section 015000.00 of the Project Manual

General Items

FANNING HOWEY

- Permits, fees and notices – plans have been submitted to the State of Ohio, Division of Industrial Compliance for plan review of building code compliance. All other permits, fees and notices are the responsibility of the contractor.
- Special Inspections – will be performed by CTL Engineering, Inc.
- Quality Control – qualified independent testing laboratory shall be used for all testing services. Contractors are encouraged to review all testing requirements found throughout the Construction Documents.



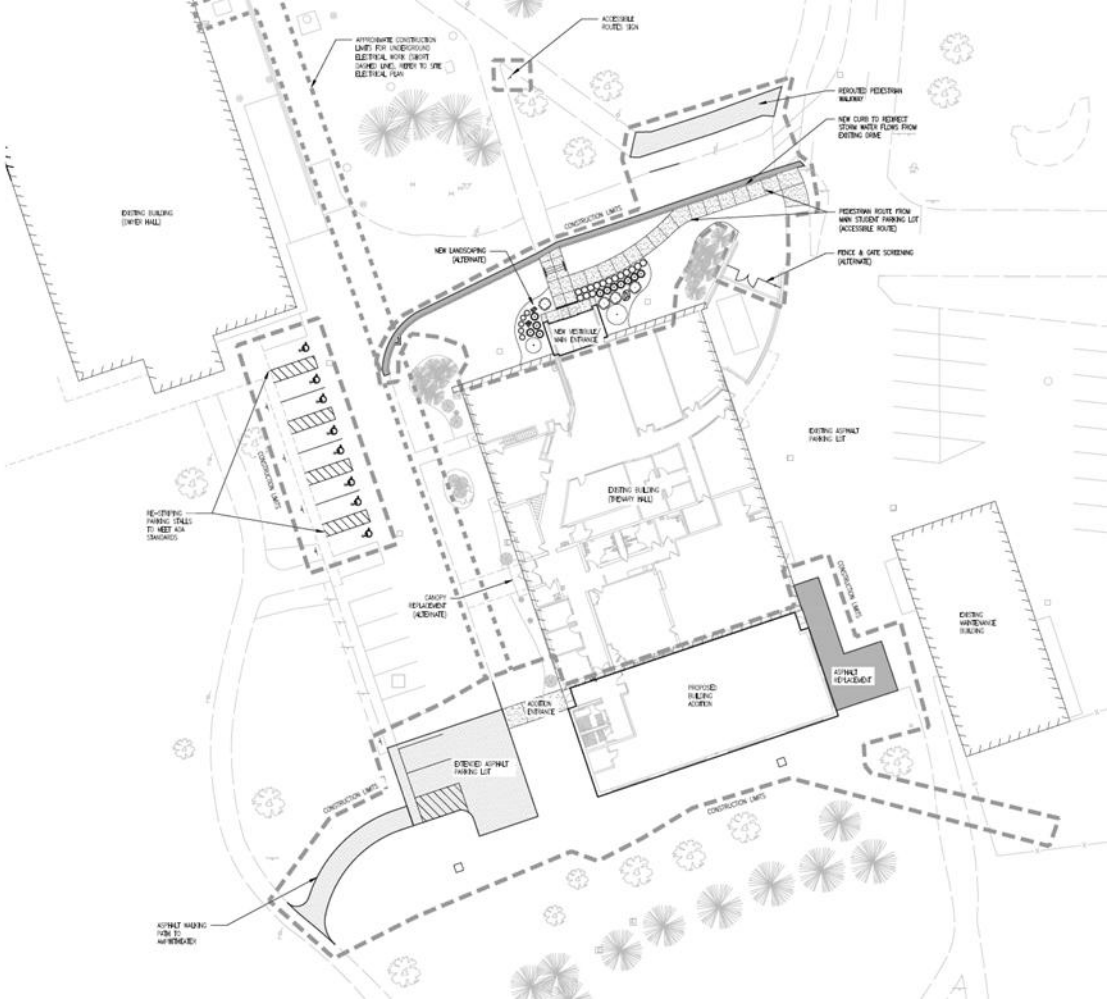
Workforce Development Project

ARCHITECTURE | INTERIORS | ENGINEERING



Project Location

FANNING HOWEY



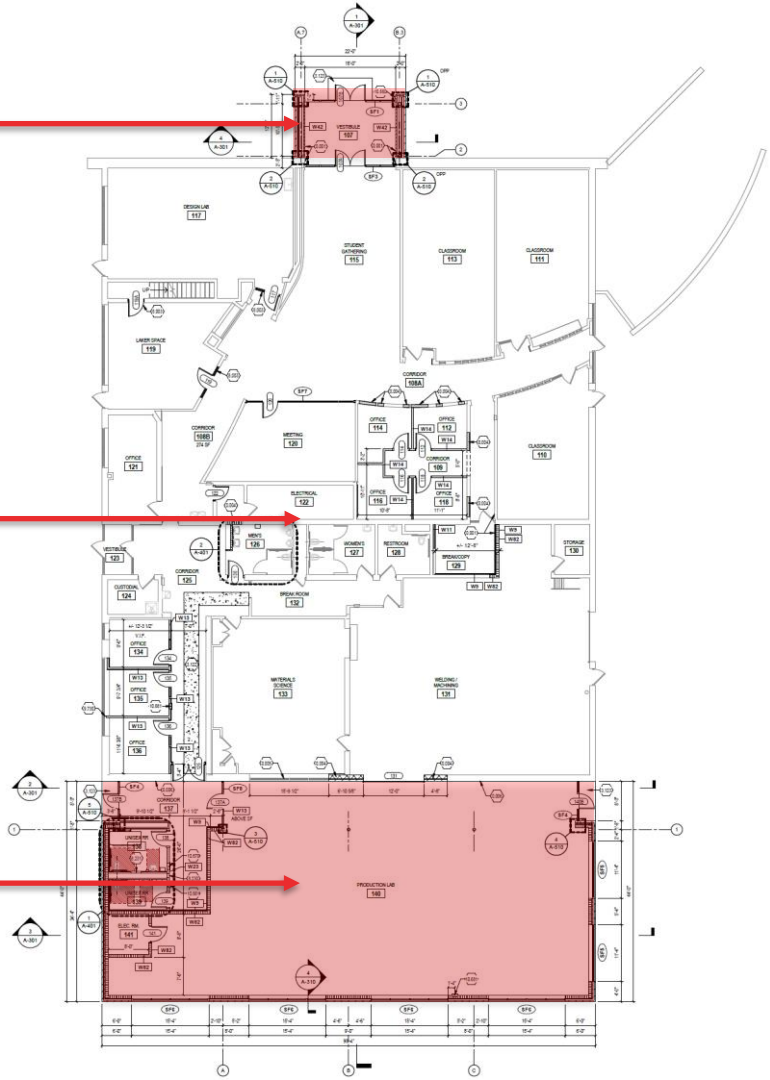
Site Plan

FANNING HOWEY

Addition

Renovations

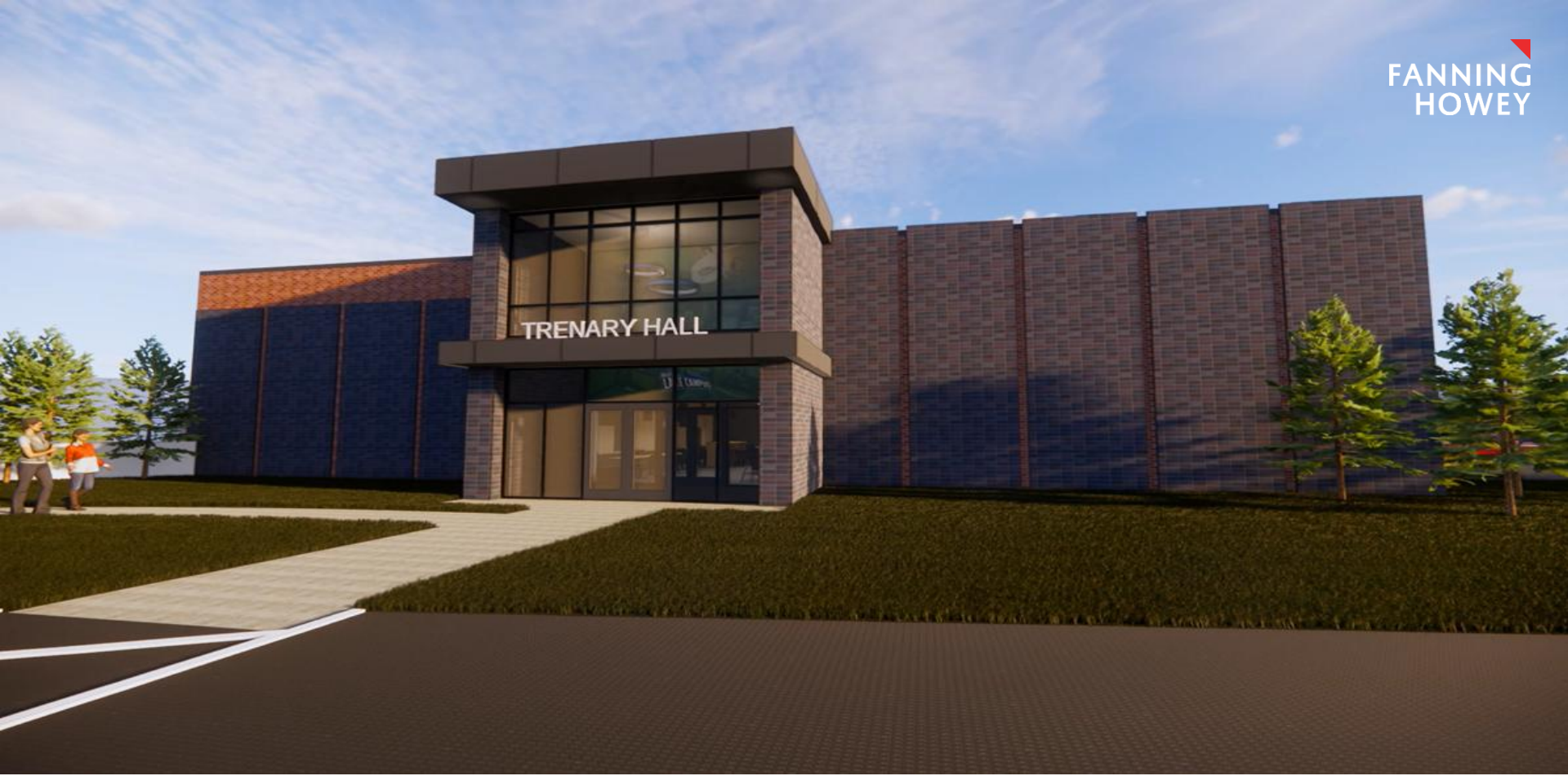
Addition



ARCHITECTURE | INTERIORS | ENGINEERING

Floor Plan

FANNING HOWEY

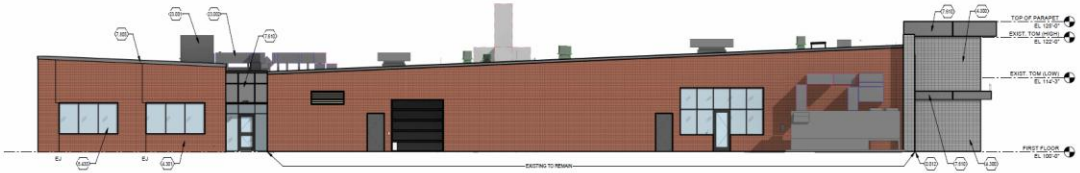


Exterior Design – Early Renderings

FANNING HOWEY



1 NORTH ELEVATION



2 EAST BUILDING ELEVATION



3 SOUTH ELEVATION



4 WEST ELEVATION

Exterior Elevations



FANNING HOWEY

Interior Design – Early Renderings

Base Bid and Alternates for Consideration

FANNING HOWEY

- Base Bid Opinion of Probable Construction Cost – $4,447,383.00

- Alternates Opinion of Probable Construction Costs
  - Room Nos. 108A and 108B - $68,000.00
  - Temperature Control Systems - $66,000.00
  - West Entrance Canopy - $9,700.00
  - Screening Mechanical Yard - $10,000.00
  - Refinish Room No. 133 - $25,000.00
  - Landscaping - $16,000.00

Thank You!

For your interest in this project and your time today.

We look forward to receiving bids from each of you!

FANNING HOWEY

128 West Market St
Celina, OH 45822
419.586.7771
fhai.com

OWNER/ARCHITECT MEETING

Wright State University
Dayton, Ohio

Date:	October 21, 2026
Re:	Lake Campus Workforce Development Project Wright State University Celina, OH Project No. 224102.00
To:	Rob Thompson, University Architect Following is a report of our meeting on the above date. If you find anything with which you disagree, please inform us, in writing, within 10 calendar days of receipt.
Present:	Wright State University (WSU) Rob Thompson, University Architect Ed Morris, Facilities Supervisor Lake Campus Fanning Howey (FH) Rod Wiford Potential Bidders – see the attached Sign-In Sheet
Purpose:	To conduct the Pre-Bid Meeting for the above-referenced Project.

Following is a report of our meeting on the above date. If you find anything with which you disagree, please inform us, in writing, within 10 calendar days of receipt.

1. Rod Wiford conducted a presentation utilizing the attached PowerPoint presentation.

2. Mr. Wiford explained to those present that the purpose of today's presentation was to provide some general, brief guidance on bidding issues and to give an overall impression of the Scope of the Project. Mr. Wiford repeatedly encouraged those present to thoroughly review all aspects of the Construction Documents when assembling their bids and to not rely solely on the information presented today, as the Construction Documents are indeed what bidders should be responding to with their bids.

3. Mr. Wiford thanked those in attendance for participating and encouraged everyone to bid on the Project.

4. Interested potential bidders toured Trenary Hall and the site after the Pre-Bid Meeting.

FANNING HOWEY

Rodney D. Wiford, AIA, MBA, LEED AP BD+C, REFP
Project Executive/Manager, Senior Associate

rdw/kmp

attachment: Sign-in Sheet
PowerPoint Presentation: Pre-Bid Meeting

c: Andrea Faber, Wright State University
Tammy Eilerman, Wright State University
Ed Morris, Wright State University
Dylan Wood, Wright State

FANNING HOWEY

LAKE CAMPUS WORKFORCE DEVELOPMENT PROJECT

PRE-BID REQUEST FOR INTERPRETATION/CLARIFICATION LOG

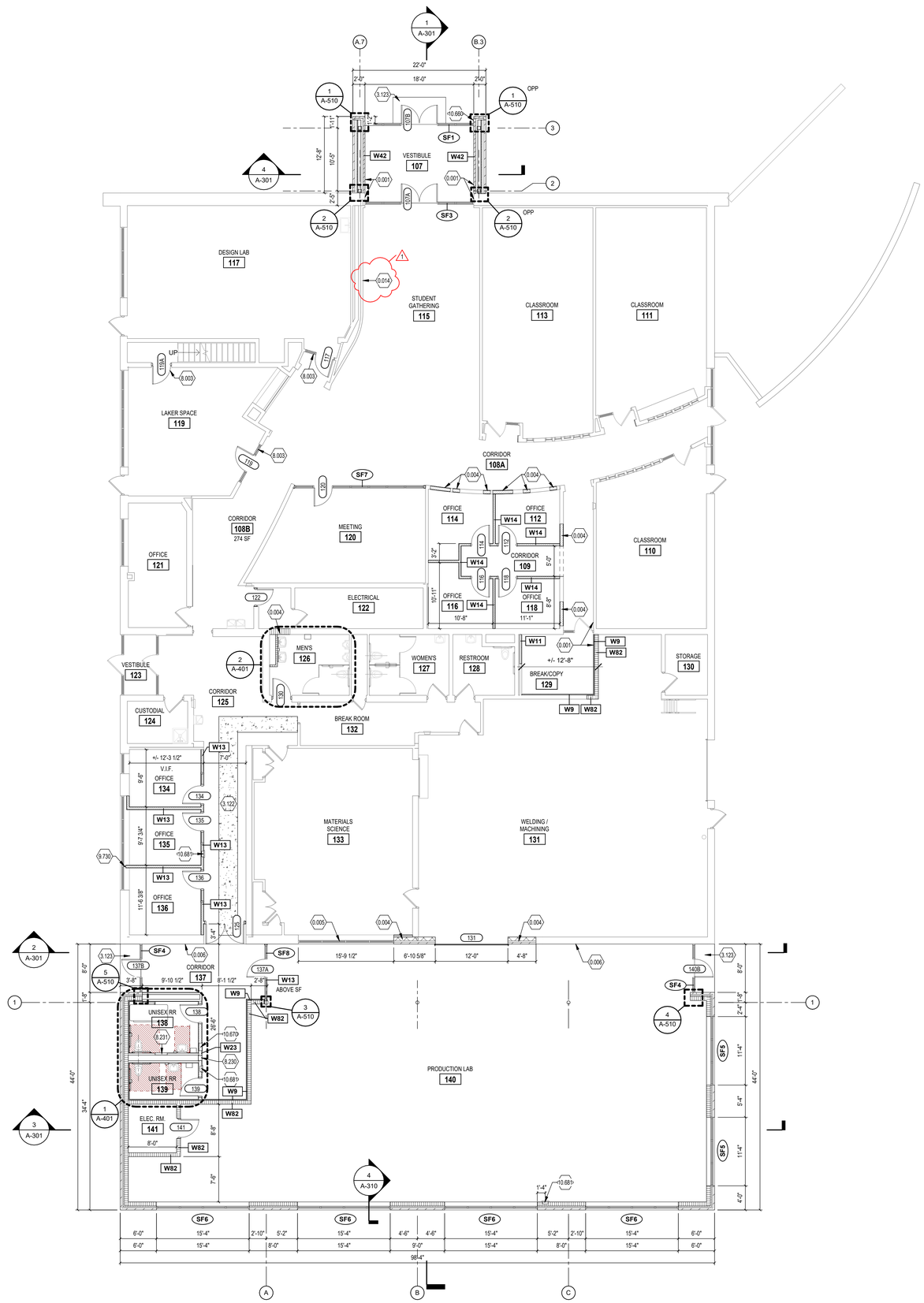
RFI#	Date Received	Request for Interpretation Item	Dwg./Spec.	Response
1	10-13-26	Specification Section 07 19 00 requires penetrating water-repellent treatment for new clay brick masonry; however, the drawings do not appear to identify the locations or extent of application. Please confirm whether water-repellent treatment is required on all new exterior brick veneer only, or whether existing brick masonry is also to receive treatment. If existing masonry is included, please identify the applicable elevations and limits of work.		It is to be applied to only the new brick.
2	10-13-26	Specification Section 05 12 00, Paragraph 2.16.A references a $3,000 allowance for structural steel shop testing when the fabricator is not certified. However, this allowance is not separately identified on the Bid Form. Please confirm whether the GC is required to include the $3,000 allowance in the Base Bid.		Only if certified fabricator is not used. This amount will be used as reimbursement to Owner for testing that is only required when fabricator is not certified.
3	10-23-26	Section 01 32 33 outlines extensive photographic and video documentation requirements, including the use of a qualified professional photographer. Please confirm whether all requirements outlined in this section will be enforced as written, or if standard construction progress photography and documentation performed by the General Contractor's project staff will be acceptable. Specifically, is a third-party professional photographer/ videographer required?		Refer to 01 32 33 Article 1.4.
4	10-13-26	Drawing IF-101 indicates dry-shake floor hardener (DSCH) in existing Welding/Machining Room 131. Since dry-shake hardener must be applied to freshly poured concrete, please clarify the intended installation method over the existing concrete slab.		Refer to Addendum No. 2.

FANNING HOWEY

5	10-13-26	Please confirm that the Owner will contract directly with and pay for all code-required special inspections and associated testing, including soils, concrete, structural steel, and masonry where applicable. Please identify any additional third-party testing or inspection services that the General Contractor is required to procure and pay for under the Contract Documents.		Correct, code required special inspections will be provided by the Owner's testing agent.
6	10-15-26	Per the Public Bid Advertisement, the bid appears to be due November 4, 2026 @ 2:00 PM. However, on Bid Express, it is showing the deadline as 11/10/26. Please confirm actual bid date.		Refer to Addendum No. 1.
7	10-15-26	1. "Security Supplier" / Pro-Watch: who is it, and does it furnish and install readers, panels, contacts, REX, cable and programming? 08 06 71 lists readers "By Security Supplier"; ET51 shows rough-in only. 2. Low-voltage wiring for electrified hardware: who pulls and terminates wire from power supplies to strikes, harnesses, operators, actuators? Div 26 only gives 120 V (EP11 P4). 3. Access-control door list: hardware electrifies 117, 119, 137A, 137B, 138; ET11 shows 12 locations including Laker interior doors, 133, 131 (2), 108A and 123 vestibule that have no electrified hardware specified. Which list governs, and who supplies hardware at existing doors? 4. Cable tray type: 26 05 37 wire mesh (steel, 1'-0" clear above) vs ET11/ET51 aluminum ladder with 1" rungs @ 9" (6" clear above). 5. Camera scope: cameras, cable and VMS by WSU or contractor? Rough-in only shown. 6. Floor box: FSR FL-640P-8" (26 05 33, ET51) vs FSR FL-2000 (ET11 H, R5). 7. Comm handhole: 30"x42"x36" (26 05 43) vs 24"x30"x30" (ES101 S5). 8. Outlet conduit/box: ET11 note D 1-1/4" to 5"x5"x2.75" box vs ET51 legend 1" to 4-11/16" box. 9. Room 133 door: Alt 5 base bid says no new work in 133, but ET11 shows reader/strike/J-box at its door. Base or alternate? 10. Card reader height: 42" AFF (ET51) vs 44" AFF (ET11).		1. WSU furnishes and installs all security cabling, devices, and programming. Division 26 to provide rough ins and pathways only as shown on ET51. 2. WSU furnishes and installs all Security cabling. Division 26 to provide rough ins and pathways only as shown on ET51. Typically, all low-voltage wiring for access controls is by the Technology Contractor. 3. Refer to Addendum No. 2. 4. Refer to Addendum No. 2. 5. WSU furnishes and installs all cameras/cabling/VMS. Division 26 to provide rough ins and pathways only as shown on ET51. 6. Refer to Addendum No. 2. 7. Refer to Addendum No. 2. 8. Refer to Addendum No. 2. 9. Refer to Addendum No. 2. 10. Refer to Addendum No. 2. 11. Refer to Addendum No. 2. 12. Refer to Addendum No. 2. 13. Refer to Addendum No. 2. 14. Clocks are not included in this Project. 15. J-box shown in 124 is intended for main door access in 123 Vestibule. The J-box is used for Door Hardware. The Keynote P4 should explain everything. 16. Division 26 will be responsible for this work. 17. Refer to Addendum No. 2.

		11. Office outlets: note F requires 2 work-station locations per office; ET11 shows 1. 12. "B" tag beside existing classroom outlets (110, 111, 113) is undefined. 13. R6 4" conduits from the 2nd-floor tech room: new, or the existing drops on ETD1? 14. Clock: AC101 says "refer to technology drawings"; none shown. 15. J-box in Custodial 124 has no device tied to it. 16. Amphitheater cable (ETD1 D2): who pulls back and re-extends network, paging and camera cable? 17. WSU missing documents: issue the WSU Construction Electrical Specifications and Standards of Design referenced in 26 05 33 and the ET notes. 18. Div 27 references: 26 05 19 and 26 27 26 point to a Div 27 cabling section that does not exist — confirm all cabling will be done by WSU.		18. WSU furnishes and installs all low voltage cabling. Division 26 to provide rough ins and pathways only as shown on ET51.
8	10-16-26	Please clarify the following discrepancies and requirements associated with the welding gas distribution system: 1. Gas Types: Keynote 16 specifies connections for Argon and Argon/CO_2 mixture (75/25), while Keynote 19 references Argon, CO_2, and Argon/CO_2 mixture. Keynote 20 specifies a control panel for two gases. Please confirm whether two or three separate gas distribution systems are required. 2. Pipe Sizes: Keynote 19 specifies 3/4" gas supply drops, while the plumbing plan depicts 1" piping at the welding stations. Please confirm the required pipe sizes for the main distribution lines and individual station drops. 3. Piping Material: Please confirm the required piping material, fitting types, and applicable specifications for the welding gas distribution system.		1. A 2 gas system (100% Argon and mixed Argon/CO2) is required. Keynote 19 references pure CO2 mistakenly. 2. Horizontal Welding Gas piping design intent is 1" header size with individual ¾" size drops to welding booth outlet stations. 3. Refer to Addendum No. 2.
9	10-16-26	1. Electrified-hardware wiring: who pulls and terminates low-voltage wire from power supplies to strikes, harnesses, operators and actuators? Div 26 only provides 120 V (EP11 P4). 2. Enhanced-security doors: are any doors enhanced (second reader + siren box)? 3. Power meter data pathway: where is the meter E-701 sends "to data network"? Not on the ET sheets.		1. WSU furnishes and installs all Security cabling. Division 26 to provide rough ins and pathways only as shown on ET51. 2. The only Enhanced-Security door is the existing entrance at 123 Vestibule. Contractor shall confirm that all control/monitoring hardware for all exterior doors are installed according to WSU standards as shown on ET51. 3. Power meter data pathway is existing and shall remain in place.

FANNING
HOWEY



1 FIRST FLOOR OVERALL PLAN

SCALE: 1/8" = 1'-0"

ROOM LEGEND - FIRST FLOOR

ROOM NO.	OWNER ROOM NO.	ROOM NAME	AREA (SF)
107	107	VESTIBULE	230 SF
108A	COR100	CORRIDOR	744 SF
108B	COR101	CORRIDOR	274 SF
109	COR102	CORRIDOR	213 SF
110	110	CLASSROOM	496 SF
111	111	CLASSROOM	612 SF
112	114D	OFFICE	93 SF
113	113	CLASSROOM	677 SF
114	114C	OFFICE	104 SF
115	115	STUDENT GATHERING	751 SF
116	114B	OFFICE	102 SF
117	117	DESIGN LAB	843 SF
118	114A	OFFICE	88 SF
119	119	LAKER SPACE	439 SF
120	120	MEETING	405 SF
121	121	OFFICE	197 SF
122	122A	ELECTRICAL	184 SF
123	123	VESTIBULE	57 SF
124	125	CUSTODIAL	70 SF
125	COR104	CORRIDOR	510 SF
126	124M	MEN'S	126 SF
127	124W	WOMEN'S	133 SF
128	126	RESTROOM	92 SF
129	112	BREAK/COPY	120 SF
130	133A	STORAGE	70 SF
131	133	WELDING / MACHINING	1,930 SF
132	128	BREAK ROOM	190 SF
133	130	MATERIALS SCIENCE	812 SF
134	127	OFFICE	112 SF
135	129	OFFICE	109 SF
136	131	OFFICE	131 SF
137	COR105	CORRIDOR	292 SF
138	138	UNISEX RR	97 SF
139	139	UNISEX RR	69 SF
140	140	PRODUCTION LAB	3,417 SF
141	140A	ELEC. RM.	64 SF
			14,851 SF

ARCHITECTURAL PLAN GENERAL NOTES

A. ALL CMU WALLS THAT DO NOT LAY OUT IN FULL OR HALF LENGTHS SHOULD BE BALANCED SO AS NOT TO HAVE ANY PIECES LESS THAN 4" IN SIZE EXPOSED TO VIEW.
B. WHERE DISSIMILAR FLOOR MATERIALS MEET, THEY SHALL DO SO UNDER THE CENTERLINE OF THE DOOR, UNLESS NOTED OTHERWISE.
C. THERE SHALL BE PERIMETER INSULATION CONTINUOUS AROUND THE ENTIRE PERIMETER OF THE BUILDING EXTENDING 2'-0" MINIMUM BELOW GRADE.
D. THE BASE FLOOR ELEVATION INDICATED FOR THE PROJECT IS 100'-0". REFER TO SITE PLAN FOR CORRELATION TO USGS DATUM.
E. ALL INTERIOR MASONRY WALLS THAT RUN TO UNDERSIDE OF DECK ABOVE SHALL HAVE A 2" JOINT (U.N.O.) AT THE DECK TO BE FILLED WITH MINERAL WOOL AT THE NON-RATED WALLS, TO ALLOW FOR DEFLECTION.
F. FOR TYPICAL COMMON JOINT DETAILS AND CONSTRUCTION MOVEMENT JOINT DETAILS REFER TO DETAILS ON SHEET A-502.
G. ALL DIMENSIONS ON FLOOR PLANS ARE TO FINISH FACE OF CMU, CONCRETE, BRICK OR FINISH FACE OF GWB AT METAL STUD WALLS. UNLESS NOTED OTHERWISE.
H. HINGE SIDE DOOR JAMB AT WALLS WILL TYPICALLY BE LOCATED 4" MINIMUM FROM ADJACENT WALL UNLESS NOTED OTHERWISE.
I. ALL EXPOSED CONCRETE MASONRY UNITS (CMU) CORNERS ARE TO BE BULLNOSE, EXCEPT AT WINDOW JAMBS, BULKHEADS, WINDOW AND DOOR HEADS.
J. SEE REFLECTED CEILING PLANS FOR BULKHEAD LOCATIONS AND DETAIL REFERENCES.
K. REFER TO ROOM FINISH SCHEDULE OR PLAN AND EQUIPMENT PLANS FOR LOCATION AND EXTENT OF FINISH FLOOR MATERIALS.
L. PROVIDE WOOD BLOCKING AS REQUIRED. WITHIN METAL STUD WALLS FOR WALL MOUNTED ITEMS.
M. REFER TO CODE PLANS FOR CODE INFORMATION.
N. PROVIDE SPRAY FOAM INSULATION AND THERMAL BARRIER CONTINUOUS AT INTERSECTION OF EXTERIOR WALLS AND DECK.

ARCHITECTURAL PLAN NOTES

(X)

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

—— W### INDICATES WALL TYPE. REFER TO DRAWING ____ FOR WALL THICKNESS, HEIGHT AND COMPOSITION.

NO.	DESCRIPTION
0.001	ALIGN FINISH FACES
0.004	INFILL TO MATCH ADJACENT CONSTRUCTION
0.005	EXISTING, MODIFIED STOREFRONT, 4 SALVAGED WINDOW PANES
0.006	PAINT THE EXISTING/INFILLED BRICK WALL AT THE INTERIOR ONLY - REFER TO FINISH PLANS FOR COLOR
1 0.014	PATCH WALL AT LOCATIONS WHERE CONDUIT HAS BEEN ADDED - REFER TO ELECTRICAL DRAWINGS.
3.122	CONCRETE SLAB ON VAPOR BARRIER ON DRAINAGE FILL - REFER TO STRUCTURAL DRAWINGS
3.123	CONCRETE FROST SLAB - REFER TO STRUCTURAL DRAWINGS
8.003	NEW DOOR FRAME, REINSTALL EXISTING WOOD DOOR. COORDINATE WITH ELECTRICAL AND TECHNOLOGY DRAWINGS. BASE BID.
8.230	ACCESS DOOR AND FRAME 10" x 24"
8.231	ACCESS DOOR AND FRAME 24" X 24"
9.730	SOUND BARRIER MULLION TRIM CAP
10.660	FIRE DEPARTMENT LOCK BOX
10.670	DEFIBRILLATOR CABINET (AED)
10.681	FIRE PROTECTION CABINET, SEMI-RECESSED

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 703
Celina, OH 45822

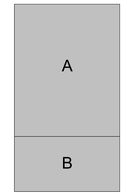
WRIGHT STATE UNIVERSITY

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822



KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO
JENNIFER M. FULLER
1115297
REGISTERED ARCHITECT

JENNIFER M. FULLER, License # 1115297
Expiration Date 12/31/2027

DRAWN BY: EAH

PROJECT NUMBER: FH224102.00/WSU-231035

PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM 2	10.21.2026

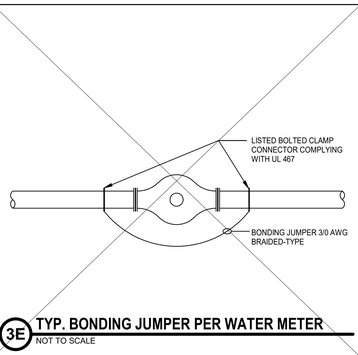
FIRST FLOOR PLAN

A-101

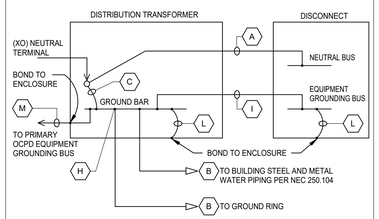
Autodesk Docs://WSU-LLC - Workforce Development Project/2025_ARCH_224102.00.rvt
10/20/2026 11:54:45 AM

GROUNDING CODED NOTES:

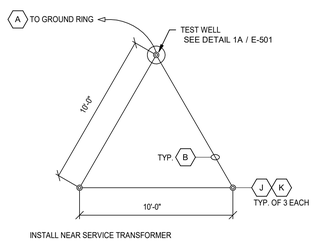
#	NOTE
A	GROUNDING ELECTRODE CONDUCTOR. BARE, TINNED, STRANDED, COPPER-CONDUCTOR. (30 INCHES BELOW GRADE. MIN.) (24 INCHES FROM FOUNDATION, MIN.) FOR ELECTRICAL SERVICE OF 800 AMP OR LESS USE #2/0 AWG. FOR ELECTRICAL SERVICE GREATER THAN 800 AMP USE #4/0 AWG.
B	GROUNDING CONDUCTOR. 2/0 AWG BARE, TINNED, STRANDED, COPPER-CONDUCTOR.
C	IRREVERSIBLE, COPPER, COMPRESSION CONNECTOR. (CABLE TO CABLE)
D	IRREVERSIBLE, COPPER, COMPRESSION CONNECTOR. (CABLE TO TRAY) BOND EACH SECTION, TRANSISTION, RISER, TEE, ETC.
H	PROVIDE UL 467 LISTED COMPRESSION CONNECTORS, TWO-HOLE LUGS.
I	SYSTEM BONDING JUMPER CONDUCTOR. SYSTEM BONDING JUMPER CONDUCTOR TO BE RUN IN EACH CONDUIT CONTAINING PHASE CONDUCTORS BETWEEN TRANSFORMER AND MAIN SECONDARY DISCONNECT. (REFER TO ONE-LINE DIAGRAM FOR CONDUCTOR SIZE)
J	8 FOOT BY 5/8" COPPER WELD GROUND ROD. TOP OF ROD SHALL BE 12" MINIMUM BELOW FINISHED GRADE.
K	PROVIDE EXOTHERMIC WELD FOR ALL CABLE TO ROD, CABLE TO CABLE, OR CABLE TO STEEL CONNECTIONS.
L	EQUIPMENT BONDING JUMPER STRANDED, BARE, COPPER. (<110A USE #6, <410A USE #2, <810A USE #2/0, <2100A USE #4/0) SCREW OF BUSBAR MAY BE USED WHEN PROVIDED AS PART OF LISTED SERVICE EQUIPMENT.
M	EQUIPMENT GROUNDING CONDUCTOR (REFER TO ONE LINE DIAGRAM FOR CONDUCTOR SIZE).
N	TELECOMMUNICATIONS BONDING BACKBONE: #4/0 AWG STRANDED BARE COPPER.
O	BONDING CONDUCTOR: 6 AWG STRANDED BARE COPPER.
P	1" PVC SLEEVE FOR ALL GROUNDING CONDUCTORS THROUGH FLOOR SLABS. NEVER ROUTE GROUNDING CONDUCTORS IN A METAL CONDUIT.
Q	PROVIDE UL 467 LISTED, ELECTRO-TIN-PLATED COPPER BUSBAR, 4" x 20" x 1/4" WITH (2) 2-INCH INSULATED STANDOFF SUPPORTS. PROVIDE ENGRAVED NAMEPLATE, SCREWED TO WALL, 6" ABOVE GROUNDING BUS BAR WHICH READS "IF THESE CONNECTORS OR CABLES ARE LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATIONS MANAGER".
R	PROVIDE UL 467 LISTED, ELECTRO-TIN-PLATED COPPER BUSBAR, 2" x 12" x 1/4" WITH (2) 2-INCH INSULATED STANDOFF SUPPORTS. PROVIDE ENGRAVED NAMEPLATE SCREWED TO WALL, 6" ABOVE GROUNDING BUS BAR WHICH READS, "IF THESE CONNECTORS OR CABLES ARE LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATIONS MANAGER".
T	CONTINUOUS, UNSPLICED BONDING CONDUCTOR FOR TELECOMMUNICATIONS: 2/0 AWG BARE, TINNED, STRANDED, COPPER-CONDUCTOR IN CABLE TRAYS.
U	BRAIDED ALUMINUM CABLE FOR LIGHTING DOWNRUNNER. SUPPORT SPACING PER NFPA 780.
X	WELD A MINIMUM 6" x 3" x 1/4" STEEL PLATE TO UNDERSIDE OF BOTTOM FLANGE OF ROOF JOIST. THE STEEL PLATE SHALL BE WELDED TO THE BOTTOM FLANGE USING A NORMAL WELDING PROCEDURE WITH WELDS PARALLEL TO THE BOTTOM FLANGE ALONG THE EDGE. THEN BOND THE GROUNDING CONDUCTOR TO THE STEEL PLATE AT LEAST 1" AWAY FROM FLANGE, USING AN EXOTHERMIC WELD.
Y	PROVIDE WRAP AROUND PLASTIC LABEL ON EACH CONDUCTOR AT GROUND BAR. IDENTIFY WHAT THE CABLE IS CONNECTED TO.



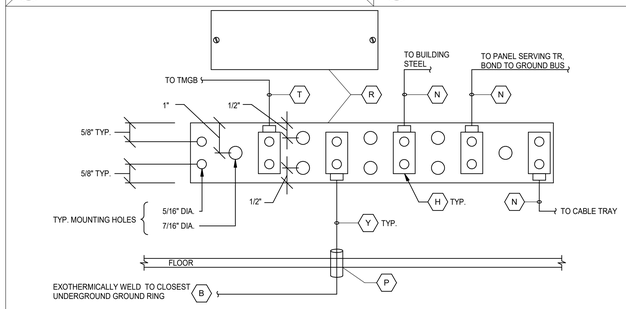
3E TYP. BONDING JUMPER PER WATER METER
NOT TO SCALE



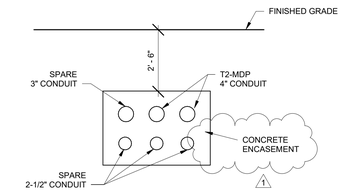
2E DISTRIBUTION TRANSFORMER GROUNDING DETAIL
NOT TO SCALE



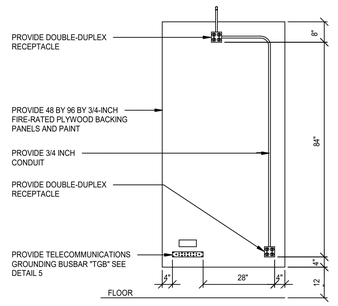
1E TYPICAL GROUNDING TRIANGLE DETAIL
NOT TO SCALE



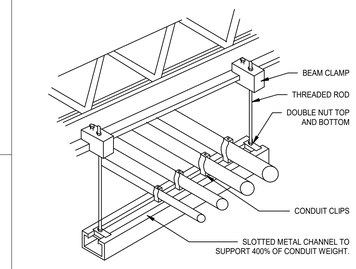
3D TYPICAL TR TELECOMMUNICATIONS GROUNDING BUSBAR (TGB) DETAIL
NOT TO SCALE



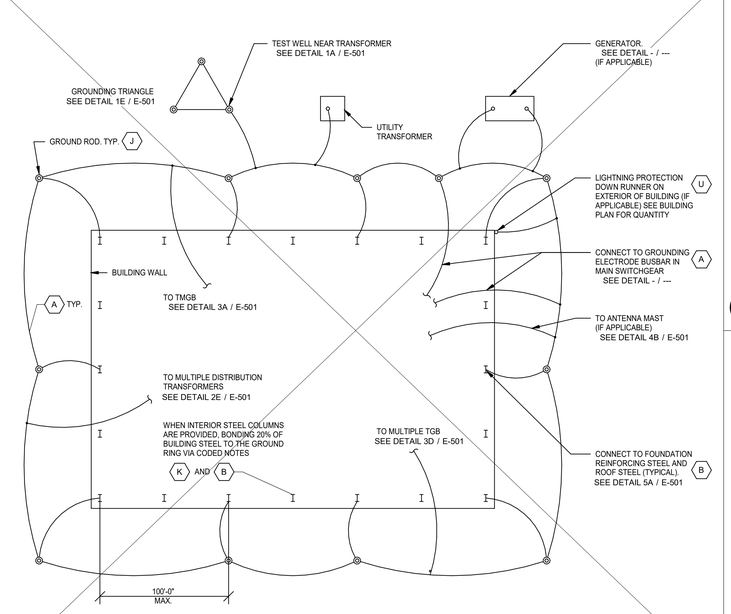
1D ELECTRICAL DUCTBANK
NOT TO SCALE



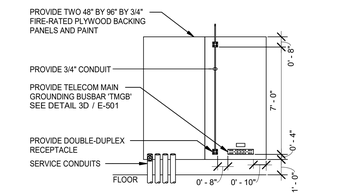
1C TYPICAL TR BACKBOARD
NOT TO SCALE



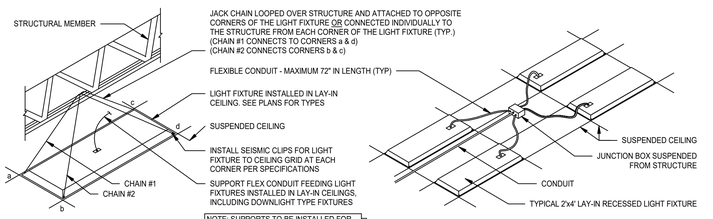
6B 2.5" & UP CONDUIT SUPPORT DETAIL
NOT TO SCALE



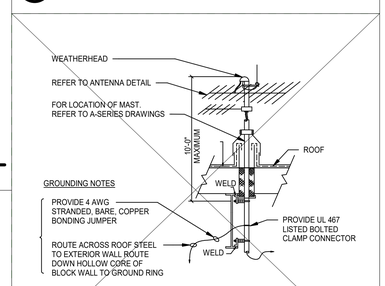
3B TYPICAL MASONRY BUILDING GROUND RING DETAIL
NOT TO SCALE



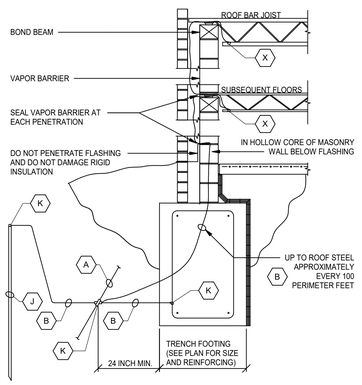
1B TYPICAL MAIN TELEPHONE/MC/ER BACKBOARD
NOT TO SCALE



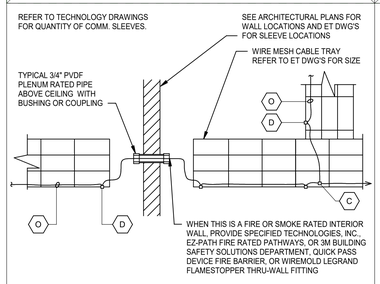
6A RECESSED LIGHT FIXTURE SUPPORT
NOT TO SCALE



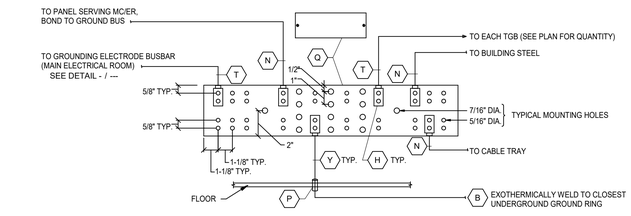
4B ANTENNA MAST GROUNDING DETAIL
NOT TO SCALE



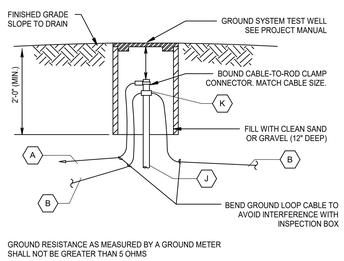
5A TYPICAL GROUND RING AND GROUNDING FOR MASONRY BUILDING STRUCTURE DETAIL
NOT TO SCALE



4A CABLE TRAY GROUNDING AT WALL (PLAN VIEW)
NOT TO SCALE



3A TYPICAL MC/ER TELECOM MAIN GROUNDING BUSBAR (TMGB) DETAIL
NOT TO SCALE



GROUND RESISTANCE AS MEASURED BY A GROUND METER SHALL NOT BE GREATER THAN 5 OHMS

1A GROUND TEST WELL DETAIL
NOT TO SCALE

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

CONSTRUCTION DOCUMENTS

STATE OF OHIO · MARK Z. HOPE · E-79009 · REGISTERED PROFESSIONAL ENGINEER

DRAWN BY: MTT
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

ELECTRICAL DETAILS

E-501

Autodesk Docs://WSU LLC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:21 AM

LUMINAIRE SCHEDULE

PLAN TYPE	MANUFACTURER/CATALOG	MOUNTING	LAMPS NO.	LAMPS WATTS	LAMPS TYPE	LAMPS LUMENS	APPLIED VOLTAGE	DESCRIPTION	VA LOAD
3DCP	NEORAY DEFINE GEO RING SERIES SPI LIGHTING ZYNN RING SERIES LUMOS RM42_UP-DN SERIES OR AN A/E APPROVED LIGHT FROM COOPER LIGHTING	SUSPENDED	1	120 W	LED	10000 lm	277 V	3-FOOT DIAMETER SUSPENEDED RING LIGHT. DIRECT AND INDIRECT SUSPENDED, 4000K, 90 CRI, 0-10VDC DIMMING DRIVER. 8000 LUMENS DIRECT AND 2000 LUMENS INDIRECT	120 VA
4DCP	NEORAY DEFINE GEO RING SERIES SPI LIGHTING ZYNN RING SERIES LUMOS RM42_UP-DN SERIES OR AN A/E APPROVED LIGHT FROM COOPER LIGHTING	SUSPENDED	1	120 W	LED	10000 lm	277 V	4-FOOT DIAMETER SUSPENEDED RING LIGHT. DIRECT AND INDIRECT SUSPENDED, 4000K, 90 CRI, 0-10VDC DIMMING DRIVER. 8000 LUMENS DIRECT AND 2000 LUMENS INDIRECT	120 VA
4DCPX	NEORAY DEFINE GEO RING SERIES SPI LIGHTING ZYNN RING SERIES LUMOS RM42_UP-DN SERIES OR AN A/E APPROVED LIGHT FROM COOPER LIGHTING	SUSPENDED	1	120 W	LED	10000 lm	277 V	4-FOOT DIAMETER SUSPENEDED RING LIGHT. DIRECT AND INDIRECT SUSPENDED, 4000K, 90 CRI, 0-10VDC DIMMING DRIVER. PROVIDE WITH AN EMERGENCY TRANSFER DEVICE. 8000 LUMEN DIRECT AND 2000 LUMENS INDIRECT	120 VA
LAV2	FAIL-SAFE HVL8 LED SERIES KENALL LIGHTING MLHA8S SERIES LUMINARE LED VPF8 SERIES A/E APPROVED EQUAL LAMARLED VANL SERIES	SURFACE	1	54 W	LED	4938 lm	277 V	4-FOOT BY 8-INCH VANDAL RESISTANT LED ARCHITECTURAL FIXTURE, EXTRUDED ALUMINUM CONSTRUCTION, WITH .156" HIGH IMPACT CLEAR RIBBED ACRYLIC LENS, DIE-CAST ROUNDED END CAPS, 0-10VDC DIMMING DRIVER.	54 VA
LAV2X	FAIL-SAFE HVL8 LED SERIES KENALL LIGHTING MLHA8S SERIES LUMINARE LED VPF8 SERIES A/E APPROVED EQUAL LAMARLED VANL SERIES	SURFACE	1	54 W	LED	4938 lm	277 V	4-FOOT BY 8-INCH VANDAL RESISTANT LED ARCHITECTURAL FIXTURE, EXTRUDED ALUMINUM CONSTRUCTION, WITH .156" HIGH IMPACT CLEAR RIBBED ACRYLIC LENS, DIE-CAST ROUNDED END CAPS, 0-10VDC DIMMING DRIVER. PROVIDE WITH EMERGENCY TRANSFER DEVICE.	54 VA
LDW61	FAIL-SAFE FLD6A SERIES PHILIPS BRANDS A/E APPROVED EQUAL GOTHAM EVO SHOWER SERIES PRESCOLITE LF6LEDG4 SERIES	RECESSED	1	15 W	LED	1000 lm	277 V	6-INCH ROUND APERTURE LED SHOWER LIGHT WITH REGRESSED LENS REFLECTOR, WHITE REFLECTOR AND TRIM, SELF-FLANGED, IP65 WET LOCATION LISTED.	15 VA
LDW61X	FAIL-SAFE FLD6A SERIES PHILIPS BRANDS A/E APPROVED EQUAL GOTHAM EVO SHOWER SERIES PRESCOLITE LF6LEDG4 SERIES	RECESSED	1	15 W	LED	1000 lm	277 V	6-INCH ROUND APERTURE LED SHOWER LIGHT WITH REGRESSED LENS REFLECTOR, WHITE REFLECTOR AND TRIM, SELF-FLANGED, IP65 WET LOCATION LISTED. PROVIDE WITH EMERGENCY TRANSFER DEVICE.	15 VA
LE1X	McGRAW-EDISON GWC SEREIS GARDCO PWS SERIES LITHONIA DSXW1 LED SERIES BEACON VIPER WALL VPW SERIES	SURFACE WALL	1	59 W	LED	5286 lm	277 V	EXTERIOR WEDGE SHAPED LED WALLPACK WITH TYPE IV/FORWARD-THROW OPTIC. LUMINAIRE FINISH COLOR SHALL BE DARK BRONZE. EMERGENCY TRANSFER VIA REMOTE WHOLE CIRCUIT EMERGENCY TRANSFER DEVICE.	39 VA
LF2	LITHONIA CPX SERIES DAYBRITE CFI SERIES EATON METALUX CGT SERIES COLUMBIA CFP SERIES	RECESSED	1	32 W	LED	4000 lm	277 V	2 BY 4-FOOT, BACK LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING.	36 VA
LF22	LITHONIA CPX SERIES DAYBRITE CFI SERIES EATON METALUX CGT SERIES COLUMBIA CFP SERIES	RECESSED	1	20 W	LED	3200 lm	277 V	2 BY 2-FOOT, BACK LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING.	20 VA
LF22X	LITHONIA CPX SERIES DAYBRITE CFI SERIES EATON METALUX CGT SERIES COLUMBIA CFP SERIES	RECESSED	1	20 W	LED	3200 lm	277 V	2 BY 2-FOOT, BACK LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING. PROVIDE WITH EMERGNECY TRANSFER DEVICE.	20 VA
LN4	LUMENWERX VIA 4 SERIES MARK ARCHITECTURAL SLOT 4 SERIES LITECONTROL MOD 4 LED SERIES	SUSPENDED	1	39 W	LED	3900 lm	277 V	LENGTH AS INDICATED BY 4" SLOT TYPE INDIRECT/DIRECT PENDANT HUNG FIXTURE. ONE PERCENT DIMMING, HIGH LUMEN OUTPUT, SQUARE CANOPY, AIR CRAFT CABLE SUSPENSION AND WHITE POWER CORD. MOUNT AT 8'-6" ABOVE FINISH FLOOR UNLESS NOTED OTHERWISE.	39 VA
LN4X	LUMENWERX VIA 4 SERIES MARK ARCHITECTURAL SLOT 4 SERIES LITECONTROL MOD 4 LED SERIES	SUSPENDED	1	39 W	LED	3900 lm	277 V	LENGTH AS INDICATED BY 4" SLOT TYPE INDIRECT/DIRECT PENDANT HUNG FIXTURE. ONE PERCENT DIMMING, HIGH LUMEN OUTPUT, SQUARE CANOPY, AIR CRAFT CABLE SUSPENSION AND WHITE POWER CORD. MOUNT AT 8'-6" ABOVE FINISH FLOOR UNLESS NOTED OTHERWISE. PROVIDE AN EMERGENCY TRANSFER DEVICE	39 VA
LSP4DI	NEORAY DEFINE 2 SERIES LEDALITE TRUGROOVE 290 SERIES MARK LIGHTING SLOT 2 LED SERIES LITECONTROL MOD 2 LED SERIES	SUSPENDED	1	30 W	LED	2400 lm	277 V	2-INCH BY 6-FOOT (NO2-INCH BY 6-FOOT (NOMINAL) LINEAR SUSPENDED LED SLOT TYPE LUMINAIRE WITH ~ DIRECT/INDIRECT DISTRIBUTION, FLUSH OPAL ACRYLIC BOTTOM AND TOP LENS, 300 LUMENS/FT. DIRECT. 300 LUMENS/FT. INDIRECT (MINIMUM FOR EACH DISTRIBUTION, OR SUPPLIED MFGR. NEXT-HIGHEST STANDARD LUMEN PACKAGE), AIRCRAFT CABLE SUSPENSION, BLACK FINISH HOUSING, 0-10VDC DIMMING DRIVER.	30 VA
MMS	METALUX MMS SERIES OR AN A/E APPROVED LIGHT FROM COOPER LIGHTING TGS SL SERIES	RECESSED	1	32 W	LED	3000 lm	277 V	6-INCH BY 4-FOOT, BACK LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING.	32 VA
MMSX	METALUX MMS SERIES OR AN A/E APPROVED LIGHT FROM COOPER LIGHTING TGS SL SERIES	RECESSED	1	32 W	LED	3000 lm	277 V	6-INCH BY 4-FOOT, BACK LIT FLAT PANEL WITH ALUMINUM FRAME, 4000K, 80+ CRI, 0-10V DIMMING. PROVIDE WITH AN EMERGENCY TRANSFER DEVICE	32 VA
XC	SURE-LITES CX SERIES CHLORIDE 55 LINE SERIES LITHONIA SIGNATURE SERIES DUAL-LITE SEMPRA SERIES OR A/E APPROVED EQUAL	SURFACE CEILING	1	3 W	RED LED	0 lm	277 V	CAST ALUMINUM AC ONLY EXIT SIGN, SINGLE FACE, DIRECTIONAL ARROWS INDICATED, WHITE HOUSING. REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.	3 VA
XW	SURE-LITES CX SERIES CHLORIDE 55 LINE SERIES LITHONIA SIGNATURE SERIES DUAL-LITE SEMPRA SERIES	SURFACE WALL	1	3 W	RED LED	0 lm	277 V	CAST ALUMINUM AC ONLY EXIT SIGN, SINGLE FACE, DIRECTIONAL ARROWS INDICATED, WHITE HOUSING. REFER TO PROJECT MANUAL FOR ADDITIONAL REQUIREMENTS.	3 VA

LUMINAIRE SCHEDULE - GENERAL NOTES

1. FOR ALL DOWNLIGHTING FIXTURES, PROVIDE REQUIRED MOUNTING HARDWARE FOR MOUNTING IN LAY-IN TYPE CEILINGS.
2. CONTRACTOR TO VERIFY TYPES AND QUANTITY OF LIGHT FIXTURES REQUIRING EMERGENCY TRANSFER DEVICES AND PROVIDE REQUIRED QUANTITY OF EMERGENCY TRANSFER DEVICES, LABOR, MATERIAL, ETC. IN THE PROJECT BID FOR FIELD INSTALLATION OF EMERGENCY TRANSFER DEVICES.
3. LIGHT FIXTURE SUBMITTALS TO INCLUDE DATA SHEETS FOR ALL FIXTURE TYPES, INCLUDING ADDITIONAL DATA SHEETS FOR BALLAST COMBINATIONS REQUIRED TO MEET THE INSTALLATION REQUIREMENTS OF THE VARIOUS FIXTURE TYPES INDICATED IN THE REMARKS COLUMN OF THE FIXTURE SCHEDULES OR ON THE DRAWINGS. SUBMITTALS SHALL ALSO INDICATE COLOR FOR ANY CUSTOM COLOR LIGHT FIXTURES.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

CONSTRUCTION DOCUMENTS

STATE OF OHIO · MARK E. HOPE · E-79009 · REGISTERED PROFESSIONAL ENGINEER

DRAWN BY: MTT
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

LUMINAIRE SCHEDULES

E-601

Autodesk Docs://WSU-LC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:21 AM

Branch Panel: P1-2

Location: ELEC. RM. 141
Supply From: T2-MDP
Mounting: Recessed
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 35k A.I.C
Mains Type: MLO
Mains Rating: 225 A
MCB Rating:

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	ELECTRICAL TRAINER	30 A	3	0 VA	0 VA					3	30 A	ELECTRICAL TRAINER	2
3	--	--	--			0 VA	0 VA			--	--	--	4
5	--	--	--					0 VA	0 VA	--	--	--	6
7	ELECTRICAL TRAINER	30 A	3	0 VA	0 VA					3	30 A	ELECTRICAL TRAINER	8
9	--	--	--			0 VA	0 VA			--	--	--	10
11	--	--	--					0 VA	0 VA	--	--	--	12
13	ELECTRICAL TRAINER	30 A	3	0 VA	3047...					3	20 A	RTU-2	14
15	--	--	--			0 VA	3047...			--	--	--	16
17	--	--	--					0 VA	3047...	--	--	--	18
19	YASKAWA HC10DCT	20 A	3	0 VA	9650...					2	60 A	WELDER	20
21	--	--	--			0 VA	9650...			--	--	--	22
23	--	--	--					0 VA	9650...	2	60 A	WELDER	24
25	WELDER	60 A	2	9650...	9650...					--	--	--	26
27	--	--	--			9650...	4269...			3	20 A	ECUH-2	28
29	WFC-01	20 A	3					2105...	4269...	--	--	--	30
31	--	--	--	2105...	4269...					--	--	--	32
33	--	--	--			2105...	0 VA			1	20 A	Spare	34
35	ECUH-1	20 A	3					1200...	0 VA	1	20 A	Spare	36
37	--	--	--	1200...	0 VA					1	20 A	Spare	38
39	--	--	--			1200...	0 VA			1	20 A	Spare	40
41	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	42
		Total Load:		3957.1 VA		2992.1 VA		2027.1 VA					
		Total Amps:		14.8 A		11.3 A		7.3 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Motor	15457 VA	114.78%	17742 VA		
Other	16407 VA	100.00%	16407 VA	**Total Conn. Load:**	89764 VA
Receptacle - Welding	57900 VA	50.00%	28950 VA	**Total Est. Demand:**	63099 VA
				Total Conn.:	108 A
				Total Est. Demand:	76 A

Notes:

Branch Panel: L1-1

Location: ELECTRICAL 122
Supply From:
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type:
Mains Rating: 200 A
MCB Rating: 200 A

Notes:
EXISTING PANELBOARD - NEW LOADS ARE SHOWN IN BOLD TEXT

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	**RM 125, 126, 127, CORRIDOR 128 LIGHTS (EN)**	20 A	1	2019...	438 VA					1	20 A	**RM 112, 114, 116, 118, 133 LIGHTS (EN)**	2
3	**RM 134 LIGHTS (EN)**	20 A	1			54 VA	0 VA			1	20 A	OFFICE LIGHTS (E)	4
5	ROOM 122 LIGHTS (E)	20 A	1					0 VA	0 VA	1	20 A	OFFICE LIGHTS (E)	6
7	ROOM 127 LIGHTS (E)	20 A	1	0 VA	0 VA					1	20 A	SHOP LIGHTS (E)	8
9	SHOP LIGHTS (E)	20 A	1			0 VA	0 VA			1	20 A	BATHROOM/HALL LIGHTS/RM 121 (E)	10
11	**RM 107 AND 115 LIGHTS**	20 A	1					3 VA	39 VA	1	20 A	**LAB RM 103 LIGHTS (EN)**	12
13	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare (E)	14
15	Spare (E)	20 A	1			0 VA	0 VA			1	20 A	Spare (E)	16
17	Spare (E)	20 A	1					0 VA	--	1	--	Space (E)	18
19	RM 119, 120 & CORRIDOR LIGHTS (E)	20 A	1	0 VA	--					1	--	Space (E)	20
21	RM 115, 117 & MECHANICAL RM LIGHTS (E)	20 A	1			0 VA	--			1	--	Space (E)	22
23	ELECTRICAL RM & BATHROOM LIGHTS (E)	20 A	1					0 VA	0 VA	1	20 A	RM 111, 113 LIGHTS (E)	24
25	Space (E)	--	1	--	--					1	--	Space (E)	26
27	Space (E)	--	1			--	--			1	--	Space (E)	28
29	RM 110, 112, 114, 116, 118 LIGHTS (E)	20 A	1					0 VA	0 VA	1	20 A	LIGHTS (E)	30
31	Spare (E)	30 A	3	0 VA	0 VA					3	30 A	Spare (E)	32
33	--	--	--			0 VA	0 VA			--	--	--	34
35	--	--	--					0 VA	0 VA	--	--	--	36
37	Spare (E)	30 A	3	0 VA	0 VA					3	30 A	Spare (E)	38
39	--	--	--			0 VA	0 VA			--	--	--	40
41	--	--	--					0 VA	0 VA	--	--	--	42
		Total Load:		2457 VA		54 VA		42 VA					
		Total Amps:		9 A		0 A		0 A					

Legend:
Circuit Breaker Legend: "(XX)" after circuit load/room number in Circuit Description column on schedule: (E)=Existing circuit breaker serving existing load to remain. (EN)=Existing circuit breaker to remain and be used for new load as indicated. (N)=New circuit breaker in existing circuit space(s). (NR)= New/replacement circuit breaker (remove circuit breaker(s) as required to install and turn over to...

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	2553 VA	125.00%	3191 VA		
				Total Conn. Load:	2553 VA
				Total Est. Demand:	3191 VA
				Total Conn.:	3 A
				Total Est. Demand:	4 A

Notes:
NEW CIRCUIT BREAKERS ARE TO MATCH THE EXISTING A.I.C. RATING

Branch Panel: T2-MDP

Location: ELEC. RM. 141
Supply From: MSB1
Mounting: SURFACE
Enclosure: TYPE 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 35K A.I.C.
Mains Type: MCB
Mains Rating: 400 A
MCB Rating: 400 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	P1-2	225 A	3	3957...	1738...					3	125 A	T2	2
3	--	--	--			2992...	1681...			--	--	--	4
5	--	--	--					2027...	1369...	--	--	--	6
7	Spare	100 A	3	0 VA	0 VA					3	100 A	Spare	8
9	--	--	--			0 VA	0 VA			--	--	--	10
11	--	--	--					0 VA	0 VA	--	--	--	12
13	Space	--	3	--	--					3	--	Space	14
15	--	--	--			--	--			--	--	--	16
17	--	--	--					--	--	--	--	--	18
19	Space	--	3	--	--					3	--	Space	20
21	--	--	--			--	--			--	--	--	22
23	--	--	--					--	--	--	--	--	24
25													26
27													28
29													30
31													32
33													34
35													36
37													38
39													40
41													42
		Total Load:		56953 VA		46733 VA		33963 VA					
		Total Amps:		213 A		176 A		123 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Motor	32511 VA	107.03%	34796 VA		
Other	18661 VA	100.00%	18661 VA	**Total Conn. Load:**	137649 VA
Receptacle	1170 VA	100.00%	1170 VA	**Total Est. Demand:**	105503 VA
Receptacle - Convenience	27407 VA	80.00%	21926 VA	**Total Conn.:**	166 A
Receptacle - Welding	57900 VA	50.00%	28950 VA	**Total Est. Demand:**	127 A

Notes:

Branch Panel: R1-4

Location: ELEC. RM. 141
Supply From: T2
Mounting: Recessed
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: 10k A.I.C
Mains Type: MCB
Mains Rating: 250 A
MCB Rating: 250 A

Notes:

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	CHANGING TABLE, RECEPT. RM. 138, 139, 141	20 A	1	922 VA	1800...					1	20 A	TITAN CONVEYER BELT RM. 140	2
3	YASKAKA MOTOMAN RM. 140	20 A	1			1800...	1800...			1	20 A	FANU ROBOT RM. 140	4
5	YASKAKA MOTOMAN RM. 140	20 A	1					1800...	1800...	1	20 A	FANU ROBOT RM. 140	6
7	YASKAWA HCDT10 RM. 140	20 A	1	1800...	1800...					1	20 A	YASKAWA HC10 RM. 140	8
9	PLANNED ABB ROBOT	20 A	1			1800...	360 VA			1	20 A	CORD REEL RM. 140	10
11	CORD REEL RM. 140	20 A	1					360 VA	360 VA	1	20 A	CORD REEL RM. 140	12
13	RECEPTS RM. 140	20 A	1	1080...	1127...					1	20 A	GARAGE DOOR RM. 140	14
15	ADO DOOR MOTOR RM. 138	20 A	1			1127...	1127...			1	20 A	GARAGE DOOR RM. 131	16
17	SMC MACHONE SIM. RM. 140	20 A	1					1800...	450 VA	1	20 A	MONITOR QUAD. RM. 140	18
19	FUME EXTRACTER FOR WELD. BOOTH	20 A	2	1373...	1373...					2	20 A	FUME EXTRACTER FOR WELD. BOOTH	20
21	--	--	--			1373...	1373...			--	--	--	22
23	FUME EXTRACTER FOR WELD. BOOTH	20 A	2					1373...	180 VA	1	20 A	ACCESS CONTROL SYSTEM	24
25	--	--	--	1373...	540 VA					1	20 A	WELDER BOOTH RECEPT.	26
27	NTSUNG FU TOOL CUTTER AND GRINDER	20 A	1			1127...	180 VA			1	20 A	WILSON QUAD. RM. 133	28
29	EPUH-1	20 A	2					936 VA	1800...	1	20 A	GLOWFORGE RM. 119	30
31	--	--	--	936 VA	1800...					1	20 A	GLOWFORGE RM. 119	32
33	H-PAK PNUEMATICS TRAINER RM. 140	20 A	1			1800...	1800...			1	20 A	HYDROLICS STATION RM. 140	34
35	WELDER GAS SHUT-OFF CONTROLLER	20 A	1					0 VA	791 VA	2	20 A	EF-5	36
37	EF-6	20 A	1	667 VA	791 VA					--	--	--	38
39	EF-7	20 A	1			230 VA	915 VA			2	20 A	EF-8	40
41	ADO DOOR MOTOR RM. 137	20 A	1					1127...	915 VA	--	--	--	42
43	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	44
45	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	46
47	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	48
49	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	50
51	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	52
53	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	54
55	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	56
57	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	58
59	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	60
61	Spare	20 A	1	0 VA	0 VA					1	20 A	Spare	62
63	Spare	20 A	1			0 VA	0 VA			1	20 A	Spare	64
		Total Load:		17382 VA		16812 VA		13692 VA					
		Total Amps:		149 A		144 A		114 A					

Legend:

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Motor	17054 VA	104.03%	17741 VA		
Other	2254 VA	100.00%	2254 VA	**Total Conn. Load:**	47885 VA
Receptacle	1170 VA	100.00%	1170 VA	**Total Est. Demand:**	43090 VA
Receptacle - Convenience	27407 VA	80.00%	21926 VA	**Total Conn.:**	133 A
				Total Est. Demand:	120 A

Notes:

Branch Panel: R1-1

Location: ELECTRICAL 122
Supply From:
Mounting: Surface
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type:
Mains Rating: 200 A
MCB Rating: 200 A

Notes:
EXISTING PANELBOARD - NEW LOADS ARE SHOWN IN BOLD TEXT

CKT	Circuit Description	Trip	Poles	A		B		C		Poles	Trip	Circuit Description	CKT
1	OUTSIDE 60@ 208V RECEPTACLE WEST SID...	60 A	2	0 VA	0 VA					1	20 A	ELECTRIC RM EF4 (E)	2
3	--	--	--			0 VA	540 VA			1	20 A	**OFFICE RM 112 RECEPT (EN)**	4
5	OUTSIDE 50@ 208V RECEPTACLE WEST SID...	50 A	2					0 VA	900 VA	1	20 A	**OFFICE RM 116, 118 RECEPT (EN)**	6
7	--	--	--	0 VA	0 VA					1	20 A	RECEPTACLE IN ELECTRIC RM (E)	8
9	**OFFICE RM 114 RECEPT (EN)**	20 A	1			720 VA	1000...			1	20 A	**RM 133 REFRIGERATOR (NR)(GFCI)**	10
11	OUTSIDE RECEPT WEST SIDE (E)	20 A	1					0 VA	1500...	1	20 A	**RM 133 COPY MACHINE (EN)**	12
13	OUTSIDE RECEPT WEST SIDE (E)	20 A	1	0 VA	0 VA					3	20 A	Spare (E)	14
15	OUTSIDE RECEPT WEST SIDE (E)	20 A	1			0 VA	0 VA			--	--	--	16
17	OUTSIDE 50@ 208V RECEPTACLE WEST SID...	50 A	2					0 VA	0 VA	--	--	--	18
19	--	--	--	0 VA	0 VA					3	100 A	SHOP WELDER OUTLET (E)	20
21	(E)	20 A	1			0 VA	0 VA			--	--	--	22
23	**RM 133 RECEPT (EN)**	20 A	1					180 VA	0 VA	--	--	--	24
25	**RM 125 RECEPT (EN)**	20 A	1	900 VA	540 VA					1	20 A	**CORRIDOR 128, 137 RECEPT (EN)**	26
27	**RM 126 RECEPT (EN)**	20 A	1			900 VA	1500...			1	20 A	**MICROWAVE RM 129**	28
29	**RM 127 RECEPT (EN)**	20 A	1					180 VA	0 VA	1	20 A	Spare (E)	30
31	JOHNSON CTRLS CABINET & PWR SUPPLY (E)	20 A	1	0 VA	0 VA					1	20 A	Spare (E)	32
33	BOILER (E)	20 A	1			0 VA	0 VA			1	20 A	RECEPTACLES ON UPPER LEVEL (E)	34
35	Spare	20 A	1					0 VA	0 VA	1	20 A	Spare	36
37	BARN PANEL 208V 3PH 100A (E)	100 A	3	0 VA	0 VA					2	30 A	208V 30A RECEPT IN ELECTRIC RM (E)	38
39	--	--	--			0 VA	0 VA			--	--	--	40
41	--	--	--					0 VA	0 VA	1	20 A	Spare (E)	42
		Total Load:		1440 VA		4660 VA		2760 VA					
		Total Amps:		12 A		41 A		25 A					

Legend:
Circuit Breaker Legend: "(XX)" after circuit load/room number in Circuit Description column on schedule: (E)=Existing circuit breaker serving existing load to remain. (EN)=Existing circuit breaker to remain and be used for new load as indicated. (N)=New circuit breaker in existing circuit space(s). (NR)= New/replacement circuit breaker (remove circuit breaker(s) as required to install and turn over to Owner) (GFCI)=5mA GFCI type circuit breaker

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Receptacle	2340 VA	100.00%	2340 VA		
Kitchen Equipment	1500 VA	50.00%	750 VA	**Total Conn. Load:**	6860 VA
Receptacle - Convenience	2520 VA	80.00%	2016 VA	**Total Est. Demand:**	7106 VA
Receptacle - Refrigerator	1000 VA	80.00%	800 VA	**Total Conn.:**	25 A
Receptacle - Copy Machine	1500 VA	80.00%	1200 VA	**Total Est. Demand:**	20 A

Notes:
NEW CIRCUIT BREAKERS ARE TO MATCH THE EXISTING A.I.C. RATING

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

CONSTRUCTION DOCUMENTS

STATE OF OHIO
MARK
Z.
HOPE
E-79009
REGISTERED
PROFESSIONAL ENGINEER

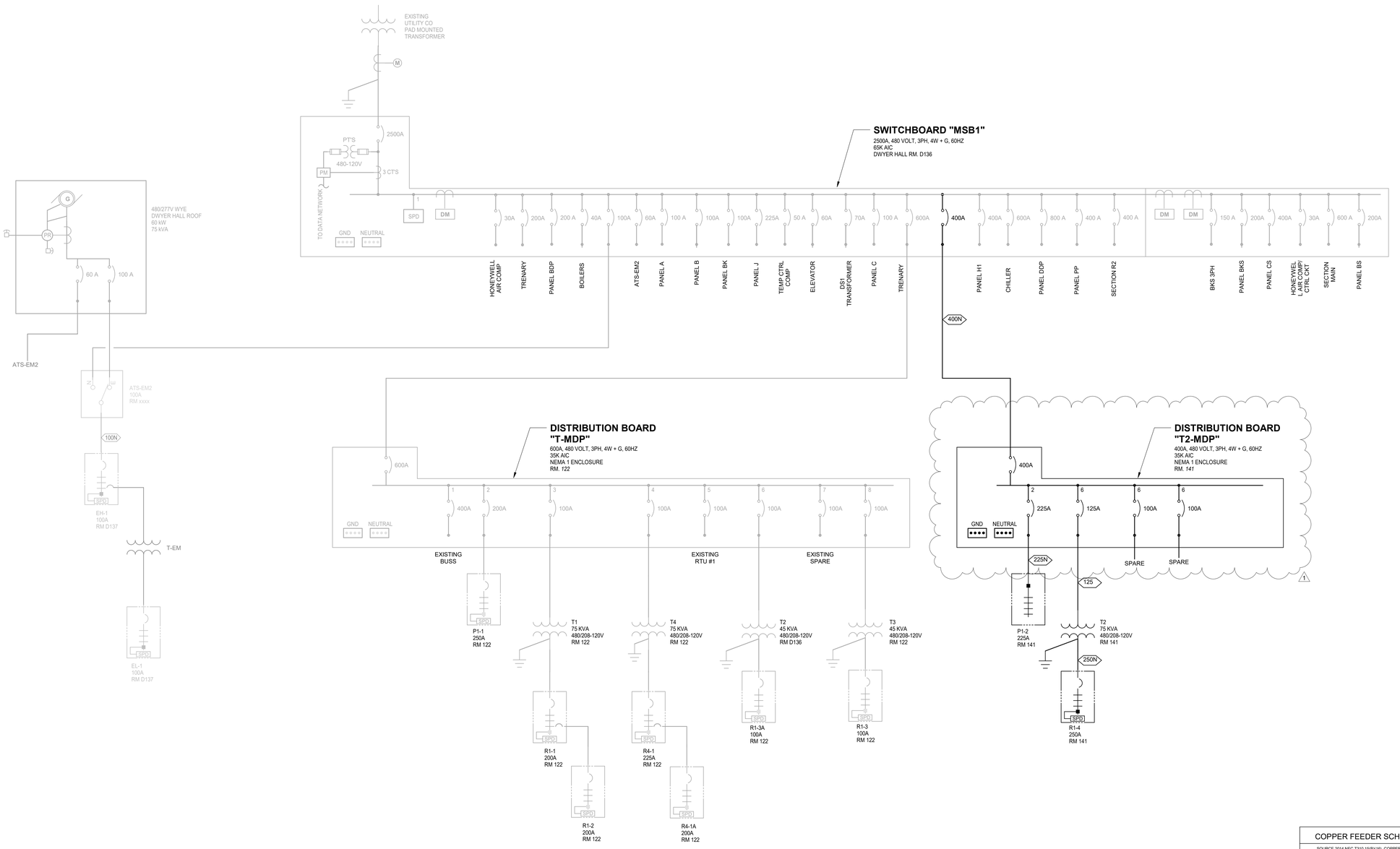
DRAWN BY: MTT
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

PANELBOARD SCHEDULES

E-602

Autodesk Docs://WSU-LC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/27/2026 9:27:25 AM



GENERAL NOTES:
1. ALL ITEMS DEPICTED WITH A LIGHTER LINE-WEIGHT ARE EXISTING TO REMAIN

PANEL L1-1 LOADS:		
EXISTING LOAD	21.9 KVA	
	X 1.25	
	27.375 KVA	
PLUS		
NEW LOADS	3.081 KVA	
TOTAL	30.456 KVA	
TOTAL	63.45 AMPS	

PANEL R1-1 LOADS:		
EXISTING LOAD	20.12 KVA	
	X 1.25	
	25.15 KVA	
PLUS		
NEW LOADS	8.860 KVA	
TOTAL	34.01 KVA	
TOTAL	163.5 AMPS	

SWITCHBOARD LOADS:		
EXISTING LOAD	397.3 KVA	
	X 1.25	
	496.625 KVA	
PLUS		
NEW LOADS	142.4 KVA	
TOTAL	639.025 KVA	
TOTAL	1331.3 AMPS	

ONE LINE DIAGRAM SYMBOLS

1AL1	MAIN LUG ONLY CIRCUIT BREAKER PANELBOARD, REFER TO E8 SERIES DRAWINGS FOR PANELBOARD SCHEDULES	DM	DIGITAL ELECTRONIC POWER METER	MCP	COMBINATION MAGNETIC MOTOR STARTER WITH FUSED SWITCH		FUSED SWITCH IN SWITCHBOARD, 3P UNO
		K	KIRK KEY INTERLOCK				DISCONNECT SWITCH IN SWITCHBOARD, 3P UNO
		M	UTILITY METER			SPD G	FUSED BOLTED PRESSURE SWITCH WITH GROUND FAULT AND SINGLE PHASE PROTECTION, 3P UNO
2AL1	MAIN BREAKER IN CIRCUIT BREAKER PANELBOARD, REFER TO E8 SERIES DRAWINGS FOR PANELBOARD SCHEDULES	XXXA 5AL1	MAIN BREAKER IN CIRCUIT BREAKER PANELBOARD WITH SUB-FEED BREAKER, REFER TO E8 SERIES DRAWINGS FOR PANELBOARD SCHEDULES	MCP	COMBINATION MAGNETIC MOTOR STARTER WITH CIRCUIT BREAKER	E N	TRANSFER SWITCH
3AL1	THROUGH FEED LUGS CIRCUIT BREAKER PANELBOARD, REFER TO E8 SERIES DRAWINGS FOR PANELBOARD SCHEDULES	SPD 6AL1	MAIN BREAKER IN CIRCUIT BREAKER PANELBOARD WITH INTEGRAL BUS CONNECTED SPD, REFER TO E8 SERIES DRAWINGSFOR PANELBOARD SCHEDULES	MCP	COMBINATION MAGNETIC MOTOR STARTER WITH MOTOR CIRCUIT PROTECTOR		DISCONNECT, 3P UNO
							MOLDED CASE CIRCUIT BREAKER, 3P UNO
				VSC	COMBINATION MAGNETIC MOTOR STARTER WITH VARIABLE SPEED CONTROLLER		CIRCUIT BREAKER IN SWITCHBOARD, 3P UNO
							INSULATED CASED POWER CIRCUIT BREAKER WITH L.I.S.G. PROTECTION FEATURES, 3P UNO
4AL1	MAIN DOUBLE LUG CIRCUIT BREAKER PANELBOARD, REFER TO E8 SERIES DRAWINGS FOR PANELBOARD SCHEDULES	SPD 7AL1	MAIN BREAKER IN CIRCUIT BREAKER PANELBOARD WITH SPD MOUNTED ADJACENT WITH CLOSED NIPPLE, REFER TO E8 SERIES DRAWINGS FOR PANELBOARD SCHEDULES	EO	COMBINATION MAGNETIC MOTOR STARTER WITH ELECTRONIC OVERLOADS		DRAWOUT CIRCUIT BREAKER, 3P UNO
						S	SHUNT TRIP OPERATED CIRCUIT BREAKER

	FUSED POTENTIAL TRANSFORMER
	CURRENT TRANSFORMERS, 3 UNO
	CAPACITOR
	EARTH GROUND
LA	LIGHTNING ARRESTER
	PLUG AND RECEPTACLE OR DRAWOUT DEVICE
	POWER TRANSFORMER
X	3 PHASE MOTOR. X INDICATES HORSEPOWER OR KILOWATTS
CP	CONTROL PANEL FURNISHED UNDER DIVISION 25
G	GENERATOR

COPPER FEEDER SCHEDULE

SOURCE 2014 NEC T310.15(B)(16), COPPER 75C. (THHW, THW, THWN, XHHW)

X	NO.	CONDUCTOR SIZE			CONDUIT
FEEDER	OF	PHASE	NEUTRAL	GROUND	SIZE
LEGEND	SETS	QTY	(1)	(1)	Inches
15	1	3 # 14		#14	3/4
15N	1	3 # 14		#14	3/4
20	1	3 # 12		#12	3/4
20N	1	3 # 12	#12	#12	3/4
30	1	3 # 10		#10	3/4
30N	1	3 # 10	#10	#10	3/4
40	1	3 # 8		#10	3/4
40N	1	3 # 8	#8	#10	3/4
60	1	3 # 6		#10	1
60N	1	3 # 6	#6	#10	1
80	1	3 # 4		#8	1 1/4
80N	1	3 # 4	#4	#8	1 1/4
100	1	3 # 3		#6	1 1/2
100N	1	3 # 3	#3	#8	1 1/2
125	1	3 # 1		#6	2
125N	1	3 # 1	#1	#6	2
150	1	3 # 1/0		#6	2
150N	1	3 # 1/0	#1/0	#6	2
175	1	3 # 2/0		#6	2
175N	1	3 # 2/0	#2/0	#6	2
200	1	3 # 3/0		#6	2
200N	1	3 # 3/0	#3/0	#6	2
225	1	3 # 4/0		#4	2 1/2
225N	1	3 # 4/0	#4/0	#4	2 1/2
250	1	3 # 250		#4	2 1/2
250N	1	3 # 250	#250	#4	2 1/2
300	1	3 # 350		#3	3
300N	1	3 # 350	#350	#3	3
350	1	3 # 500		#3	4
350N	1	3 # 500	#500	#3	4
400	1	3 # 600		#3	4
400N	1	3 # 600	#600	#3	4
500	2	3 # 250		#2	2 1/2
500N	2	3 # 250	#250	#2	2 1/2
600	2	3 # 350		#1	3
600N	2	3 # 350	#350	#1	3
800	2	3 # 600		#1/0	4
800N	2	3 # 600	#600	#1/0	4
1000	3	3 # 400		#2/0	3
1000N	3	3 # 400	#400	#2/0	3
1200	3	3 # 600		#3/0	4
1200N	3	3 # 600	#600	#3/0	4
1600	4	3 # 600		#4/0	4
1600N	4	3 # 600	#600	#4/0	4
2000	5	3 # 600		#250	4
2000N	5	3 # 600	#600	#250	4
2500	6	3 # 600		#350	4
2500N	6	3 # 600	#600	#350	4
3000	7	3 # 600		#400	4
3000N	7	3 # 600	#600	#400	4
3300	8	3 # 600		#400	4
3300N	8	3 # 600	#600	#400	4
3700	9	3 # 600		#400	4
3700N	9	3 # 600	#600	#400	4

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

CONSTRUCTION DOCUMENTS

STATE OF OHIO · MARK Z. HOPE · E-79009 · REGISTERED · PROFESSIONAL ENGINEER

DRAWN BY: RJG

PROJECT NUMBER: 224102.00

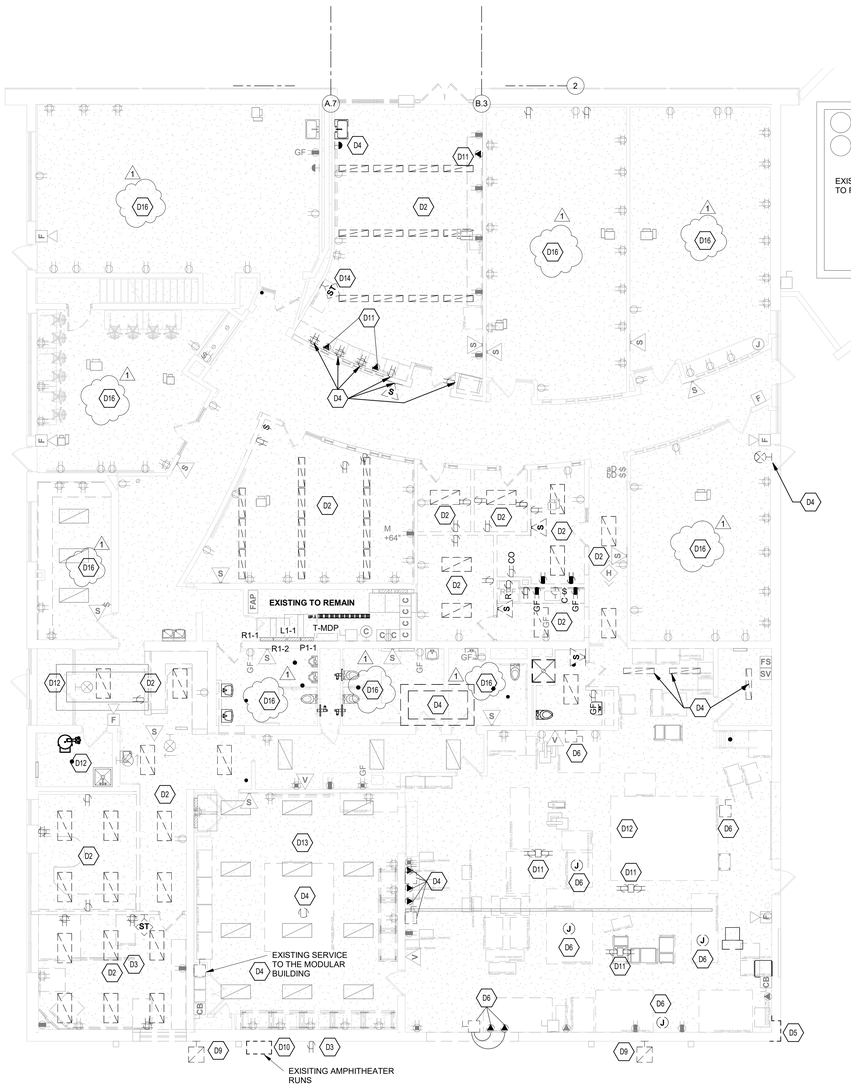
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

ELECTRICAL SCHEMATICS

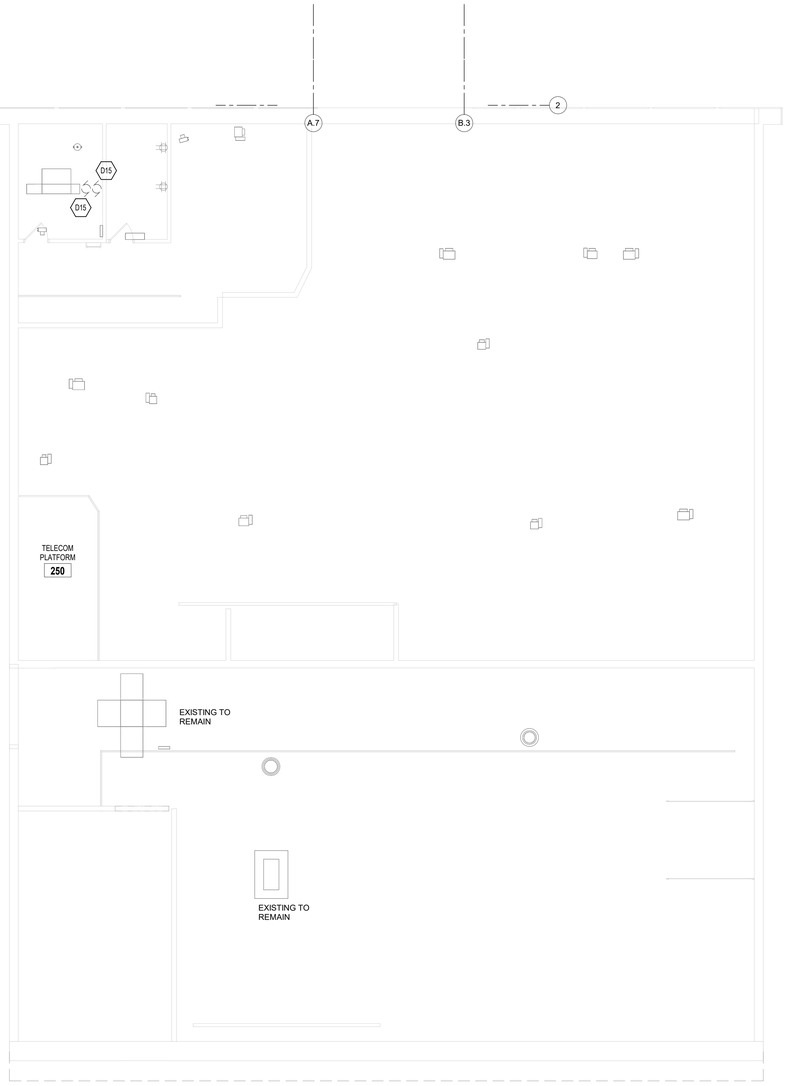
E-701

Autodesk Docs://WSU LC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:28 AM



FIRST FLOOR DEMOLITION PLAN

SCALE: 1/8" = 1'-0"



SECOND FLOOR DEMOLITION PLAN

SCALE: 1/8" = 1'-0"

DEMOLITION PLAN GENERAL NOTES

1. ALL EQUIPMENT REPRESENTED WITH A DASHED-LINE AND/OR SOLID BLACK LINE INDICATES 'FOR DEMOLITION'. REMOVE EQUIPMENT AND BRANCH CIRCUITS BACK TO EXISTING TO REMAIN.
2. ASSUME ELECTRICAL EQUIPMENT IS TO REMAIN AS EXISTING IF SHOWN HALFTONE OR NOT SHOWN ON PLAN, UNLESS NOTED OTHERWISE.

SHEET KEYNOTES

D2	REMOVE ALL LIGHTING FIXTURES AND LIGHTING DEVICES IN THIS SPACE. TIE BACK EXISTING LIGHTING CIRCUIT FOR REUSE. PROVIDE BLANK COVERS AS NECESSARY.
D3	REMOVE ALL EQUIPMENT CONNECTIONS AND CIRCUITS BACK TO SOURCE COMPLETE. PROVIDE BLANK COVERS IF NECESSARY.
D4	REMOVE EQUIPMENT AND CONNECTIONS BACK TO SOURCE COMPLETE.
D5	REMOVE EXTERIOR EXISTING FEED BACK TO THE BREAKER BOX.
D6	REMOVE EQUIPMENT, CONDUIT, WIRE ETC. BACK TO BUSPLUG AND SEE SHEET "EP11" FOR NEW LOCATION.
D9	REMOVE EXTERIOR LIGHT FIXTURE, WIRE, CONDUIT ETC FOR MOWING. SEE SHEET "EL11" FOR NEW LOCATION.
D10	PULL BACK THE AMPHITHEATER POWER RUN AND EXTEND TO BE RELOCATED TO THE SOUTH ADDITION ELECTRICAL ROOM AFTER CONSTRUCTION.
D11	SALVAGE ALL EQUIPMENT CONNECTIONS, WIRE, CONDUITS ETC. FOR RELOCATION.
D12	EXISTING LIGHTING TO REMAIN, UNO.
D13	EXISTING LIGHTING IS TO BE REMOVED AND RE-INSTALLED AT EXISTING LOCATIONS IN NEW CEILING. SALVAGE ALL CONNECTIONS WIRE AND CONDUIT FOR REUSE AFTER THE CONSTURUCTION OF THE NEW CEILING.
D14	REMOVE ALL EQUIPMENT CONNECTIONS AND CIRCUITS BACK TO SOURCE COMPLETE. PATCH THE WALL
D15	EXISITNG PUMPS TO BE REMOVED. DISCONNECT THE ELECTRICAL EQUIPMENT FROM OLD PUMPS IN PREPARATION FOR NEW PUMPS.
D16	EXISTING TO REMAIN UNO.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

A

B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO
MARK
E.
HOPE
E-79009
REGISTERED
PROFESSIONAL ENGINEER

DRAWN BY: RJG

PROJECT NUMBER: 224102.00

PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

DEMOLITION PLANS

ED11

Autodesk Docs://WSU-LC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:26:47 AM



FIRST FLOOR FIRE ALARM PLAN

SCALE: 1/8" = 1'-0"

FIRE ALARM PLAN GENERAL NOTES

1. THIS IS DELEFATED DESIGN. FIRE ALARM CONTRACTOR TO PROVIDE DESIGN AND SUBMISSION TO AHJ FOR APPROVAL.
2. CONNECT TO AND BE AN EXTENSION OF THE EXISTING SIMPLEX FIRE ALARM SYSTEM.

SHEET KEYNOTES	
F1	CONNECT FIRE ALARM DEVICE TO THE SERCURITY DOOR.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

A
B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO · MARK Z. HOPE · E-79009 · REGISTERED PROFESSIONAL ENGINEER

DRAWN BY: MTT
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

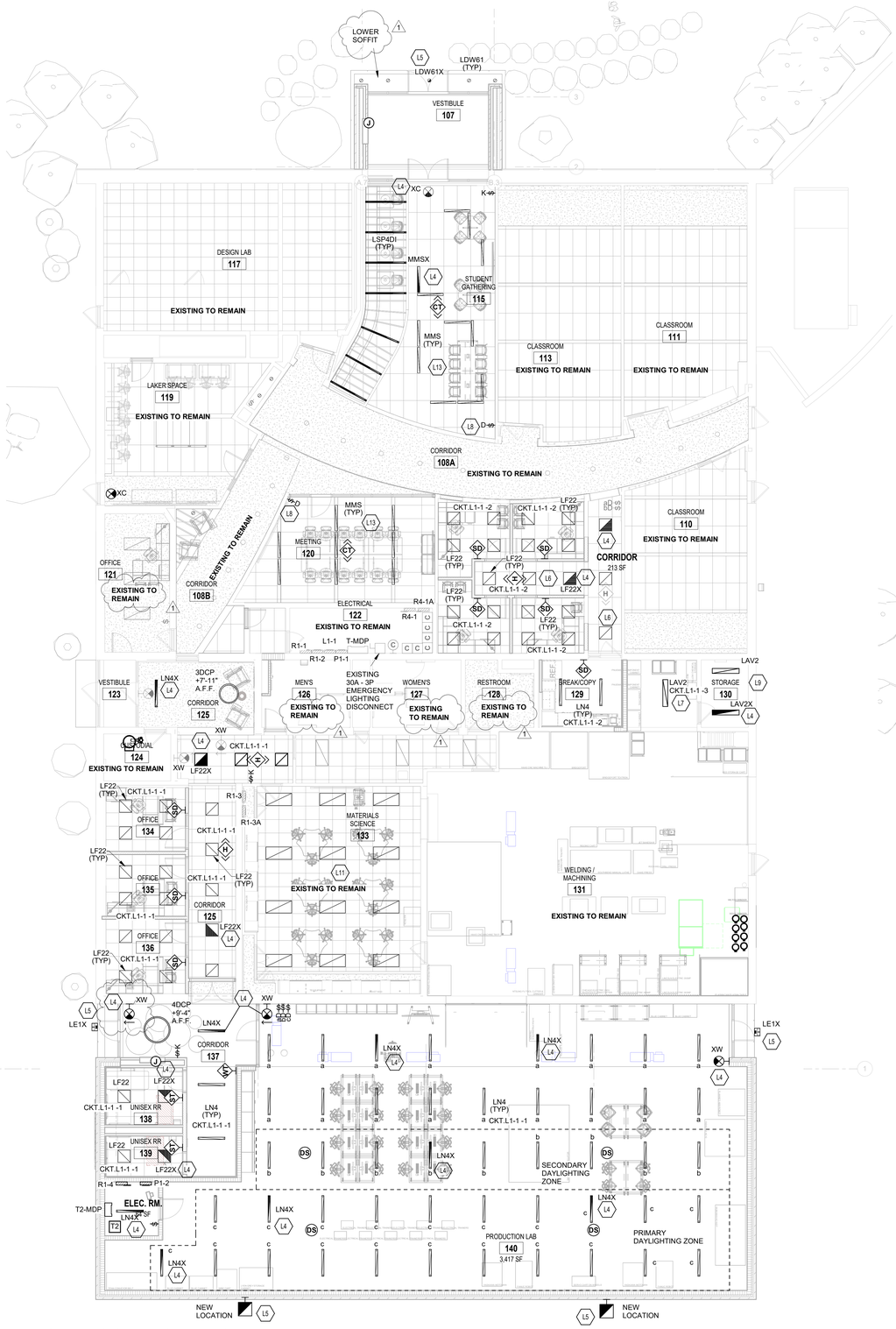
REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

FIRST FLOOR - FIRE ALARM SYSTEM PLAN

EF101

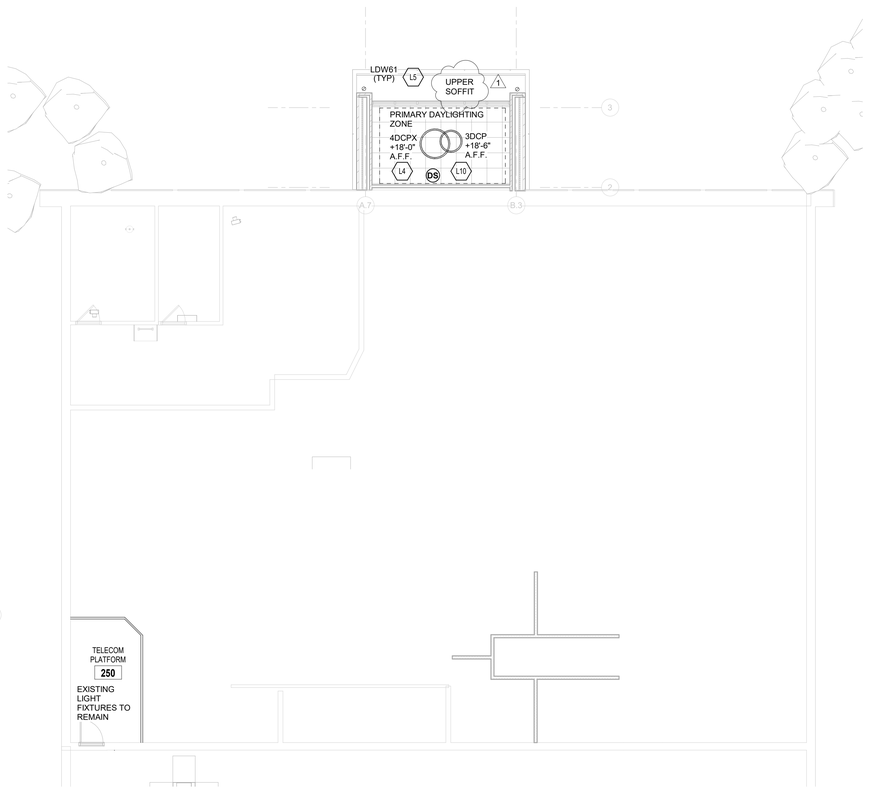
Autodesk Docs://WSU-LLC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:17 AM

ROOM LEGEND			
ROOM NO.	OWNER ROOM NO.	ROOM NAME	AREA (SF)



FIRST FLOOR LIGHTING PLAN

SCALE: 1/8" = 1'-0"



SECOND FLOOR LIGHTING PLAN

SCALE: 1/8" = 1'-0"

LIGHTING PLAN GENERAL NOTES

1. GENERATOR TRANSFER DEVICE TO TAKE FIXTURE TO 100% IN EMERGENCY CONDITION.
2. FINALCONNECTION TO RECESSED LUMINAIRES SHALL BE WITH FLEXIBLE METALLIC CONDUIT OR MC CABLE
3. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR LOCATION OF LUMINAIRES. COORDINATE LOCATION OF LUMINAIRES, LOUDSPEAKERS, DIFFUSERS, GRILLES, AND OTHER CEILING INSTALLED ELEMENTS WITH THEIR RESPECTIVE INSTALLERS.
4. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND ROOM FINISH SCHEDULE TO DETERMINE PROPER TYPE OF LUMINAIRE TRIM REQUIRED FOR CEILING TYPE PRIOR TO ORDERING LUMINAIRES. PROVIDE LUMINAIRES COMPATIBLE WITH CEILING TYPE.
5. RECESSED LUMINAIRE IN GRID CEILING SYSTEMS SHALL BE PROVIDED WITH SEISMIC CLIPS OR PROVIDE ATTACHMENT TO CEILING GRID SYSTEM AND SUPPORTED PER PROJECT MANUAL AND DETAIL **"6A/E-501"**.
6. LUMINAIRE TYPE IS SHOWN ONLY ONCE, AS "TYP." IN EVERY ROOM. PROVIDE SAME TYPE OF LUMINAIRE THROUGH-OUT SAME ROOM UNLESS OTHERWISE INDICATED.
7. PROVIDE NO. 10 AWG, MINIMUM, CONDUCTORS FOR EXIT SIGNS AND SECURITY LIGHT CIRCUITS.

SHEET KEYNOTES

L4	CONNECT TO EXISITNG EMERGENCY CIRCUIT.
L5	CONNECT TO EXISTING EXTERIOR EMERGENCY CIRCUIT AND EXTERIOR LIGHTING CONTROLS.
L6	TIE IN NEW LIGHTS TO THE EXISTING CORRIDOR LIGHTING CONTROLS.
L7	TIE IN NEW LIGHTS INTO WELDING LAB CONTROLS.
L8	REWORK OCCUPANCY CONTROLS TO SWITCH TO A DIMMER SWITCHED CONNECTED TO AN OCCUPANCY SENSOR IN THE ROOM.
L9	RECONNECT NEW LIGHTS TO EXISTING LIGHTING CIRCUIT AND LIGHTING CONTROLS.
L10	TIE IN NEW LIGHTS WITH THE EXISTING CIRCUIT IN ROOM 115. CONNECT LIGHTS WITH THE KEYED SWITCH IN ROOM 115.
L11	EXISTING LIGHTS TO BE PLACED IN THE NEW CEILING IN THEIR EXISTING LOCATIONS. RECONNECT TO EXISTING LIGHTING CIRCUIT AND LIGHTING CONTROLS.
L13	RECONNECT NEW LIGHTS TO EXISTING LIGHTING CIRCUIT AND NEW LIGHTING CONTROLS.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

A

B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO · MARK Z. HOPE · E-79009 · REGISTERED PROFESSIONAL ENGINEER

DRAWN BY: RJG
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

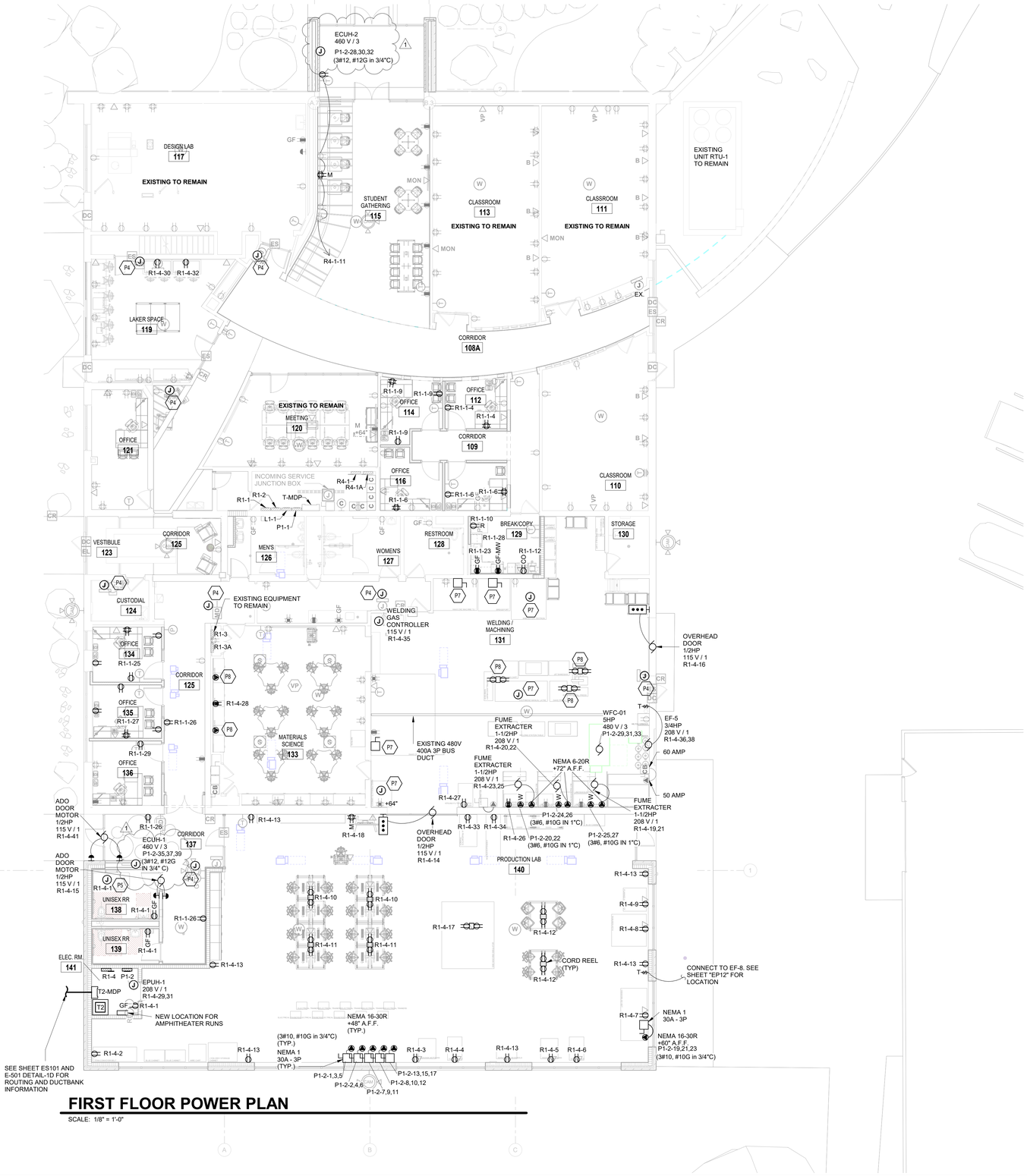
REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

LIGHTING PLAN

EL11

Autodesk Docs://WSU-L.C. - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:01 AM

ROOM LEGEND			
ROOM NO.	OWNER ROOM NO.	ROOM NAME	AREA (SF)



FIRST FLOOR POWER PLAN

SCALE: 1/8" = 1'-0"

POWER PLAN GENERAL NOTES

1. PROVIDE REVISED TYPED PANELBOARD DIRECTORIES FOR EACH PANELBOARD ADDED OR MODIFIED DURING CONSTRUCTION. FIELD VERIFY EXISTING CIRCUIT INFORMATION WITH OWNER'S ASSISTANCE TO ENSURE FINAL DIRECTORY IS ACCURATE. UNUSED SPARE BREAKERS SHALL BE IN THE OFF POSITION.
2. VIDEO PROJECTOR RECEPTACLE TO BE MOUNTED ABOVE WALL MOUNTED PROJECTOR BRACKET, 96" A.F.F. UNO.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS. SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.
4. LABEL EACH RECEPTACLE WITH THE PANEL NAME AND CIRCUIT NUMBER ON THE FACE OF EACH COVER PLATE WITH A TYPED LAMINATED LABEL.
5. PROVIDE "GFCI PROTECTED" LABEL ON COVER PLATE FOR ANY GFCI PROTECTED DEVICE.
6. CONTRACTOR SHALL INCREASE CIRCUIT CONDUCTOR SIZE TO COMPENSATE FOR VOLTAGE DROP DUE TO EXCESSIVE CIRCUIT LENGTHS. IN NO CASE SHALL VOLTAGE DROP EXCEED NFPA 70 /N.E.C.) REQUIREMENTS.
7. REFER TO MECHANICAL PLANS FOR LOCATION OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES PER NEC.
8. REFER TO "CONTROL SCHEMATICS" MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
9. ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE, SHALL BE BONDED WITH A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR. MAINTAIN MECHANICAL/ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEM.

SHEET KEYNOTES

P4	PROVIDE 120 VOLT CONNECTION TO ELECTRIC DOOR LOCK POWER SUPPLY UNIT(S). DIVISION 26 CONTRACTOR TO INSTALL AND MAKE FINAL CONNECTION TO ELECTRIC LOCK POWER SUPPLY UNIT(S) SUPPLIED BY DOOR HARDWARE SUPPLIER AND ANY 120 VOLT ACCESS CONTROL SYSTEM HARDWARE. INSTALL ABOVE ACCESSIBLE CEILING (OR AT ROOF DECK LEVEL FOR ROOMS/SPACES WITH EXPOSED STRUCTURE). COORDINATE INSTALLATION WITH GENERAL TRADES AND SECURITY CONTRACTORS PRIOR TO ROUGH-IN. CONNECT DEVICE TO EXISTING DOOR SECURITY CIRCUIT. FIELD VERIFY EXISTING CIRCUIT AS REQUIRED.
P5	PROVIDE A HARDWIRED CONNECTION FOR MOVABLE TABLE. COORDINATE MOUNTING HEIGHT AND LOCATION WITH ROUGH-IN FROM MANUFACTURER, ALONG WITH AN EMPTY BOX AND CONDUIT BETWEEN THE POWERED TABLE AND THE EMERGENCY SHUTOFF SWITCH.
P7	NEW LOCATION FOR EXISTING EQUIPMENT. RECONNECT TO EXISTING BUS PLUG.
P8	NEW LOCATION FOR EXISTING EQUIPMENT. RECONNECT TO THE EXISTING CIRCUIT.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

A
B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO MARK E. HOPE E-79009 REGISTERED PROFESSIONAL ENGINEER

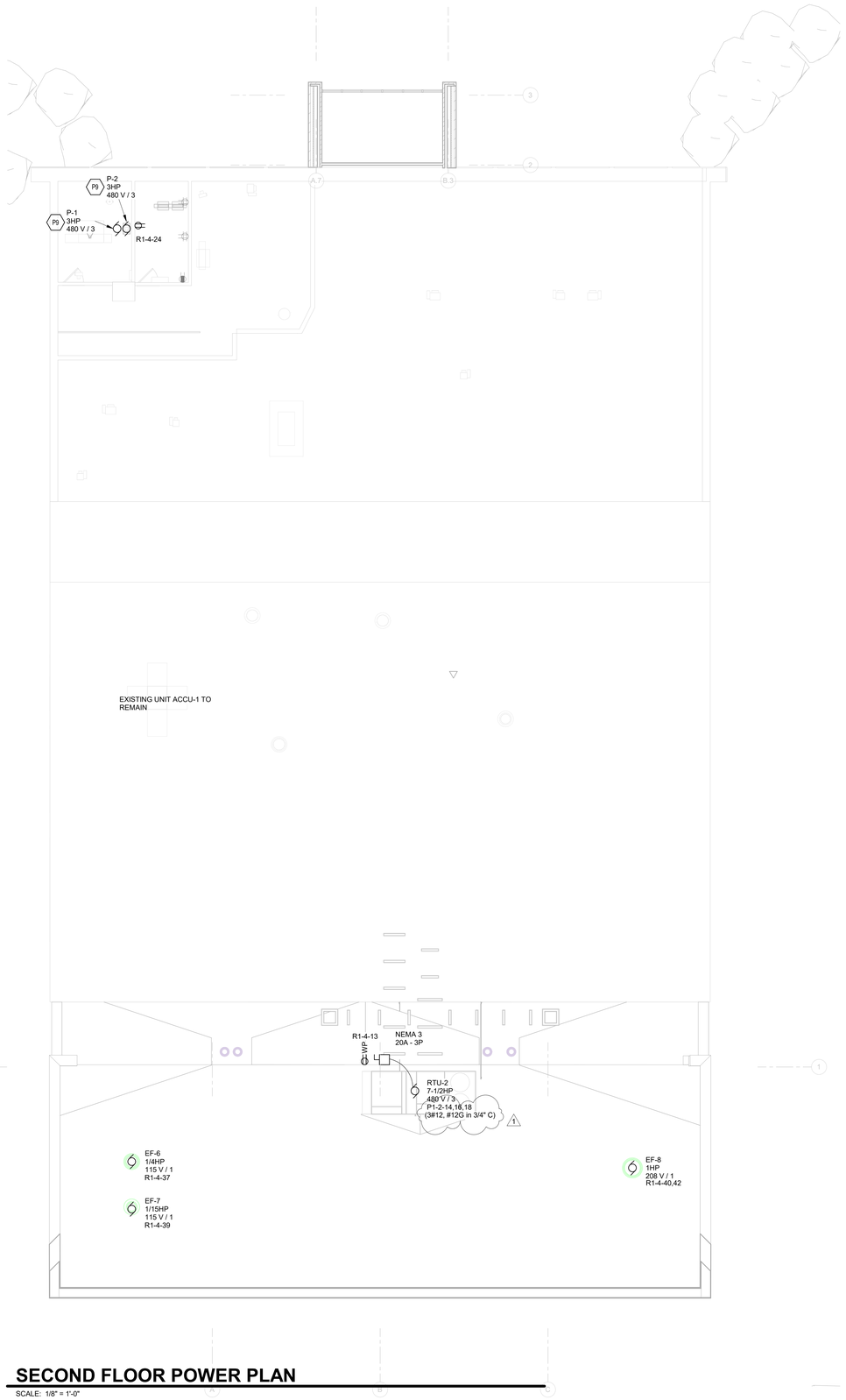
DRAWN BY: RJG
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

FIRST FLOOR POWER PLAN

EP11

Autodesk Docs://WSU-LC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:09 AM



SECOND FLOOR POWER PLAN

SCALE: 1/8" = 1'-0"

ROOM LEGEND

ROOM NO.	OWNER ROOM NO.	ROOM NAME	AREA (SF)

POWER PLAN GENERAL NOTES

1. PROVIDE REVISED TYPED PANELBOARD DIRECTORIES FOR EACH PANELBOARD ADDED OR MODIFIED DURING CONSTRUCTION. FIELD VERIFY EXISTING CIRCUIT INFORMATION WITH OWNER'S ASSISTANCE TO ENSURE FINAL DIRECTORY IS ACCURATE. UNUSED SPARE BREAKERS SHALL BE IN THE OFF POSITION.
2. VIDEO PROJECTOR RECEPTACLE TO BE MOUNTED ABOVE WALL MOUNTED PROJECTOR BRACKET, 96" A.F.F. UNO.
3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS. SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.
4. LABEL EACH RECEPTACLE WITH THE PANEL NAME AND CIRCUIT NUMBER ON THE FACE OF EACH COVER PLATE WITH A TYPED LAMINATED LABEL.
5. PROVIDE "GFCI PROTECTED" LABEL ON COVER PLATE FOR ANY GFCI PROTECTED DEVICE.
6. CONTRACTOR SHALL INCREASE CIRCUIT CONDUCTOR SIZE TO COMPENSATE FOR VOLTAGE DROP DUE TO EXCESSIVE CIRCUIT LENGTHS. IN NO CASE SHALL VOLTAGE DROP EXCEED NFPA 70 (N.E.C.) REQUIREMENTS.
7. REFER TO MECHANICAL PLANS FOR LOCATION OF MECHANICAL EQUIPMENT. LOCATE DISCONNECT SWITCHES PER NEC.
8. REFER TO "CONTROL SCHEMATICS" MECHANICAL DRAWINGS FOR ADDITIONAL CONTROL WIRING AND CONTROL CONNECTIONS.
9. ALL DEVICES, EQUIPMENT, FIXTURES, AND THE LIKE, SHALL BE BONDED WITH A PROPERLY SIZED EQUIPMENT GROUNDING CONDUCTOR. MAINTAIN MECHANICAL/ELECTRICAL BONDS OF METALLIC RACEWAY SYSTEM.

SHEET KEYNOTES

P9	CONNECT THE NEW PUMPS TO THE EXISTING CIRCUITS AND EXISTING CONTROLS. COORDINATE WITH MECH. DRAWINGS FOR EXACT LOCATION OF PUMPS.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 73
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W Market St, Celina, OH 45822

A
B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO
MARK
Z.
HOPE
E-79009
REGISTERED
PROFESSIONAL ENGINEER

DRAWN BY: MTT

PROJECT NUMBER: 224102.00

PROJECT ISSUE DATE: 09.04.2026

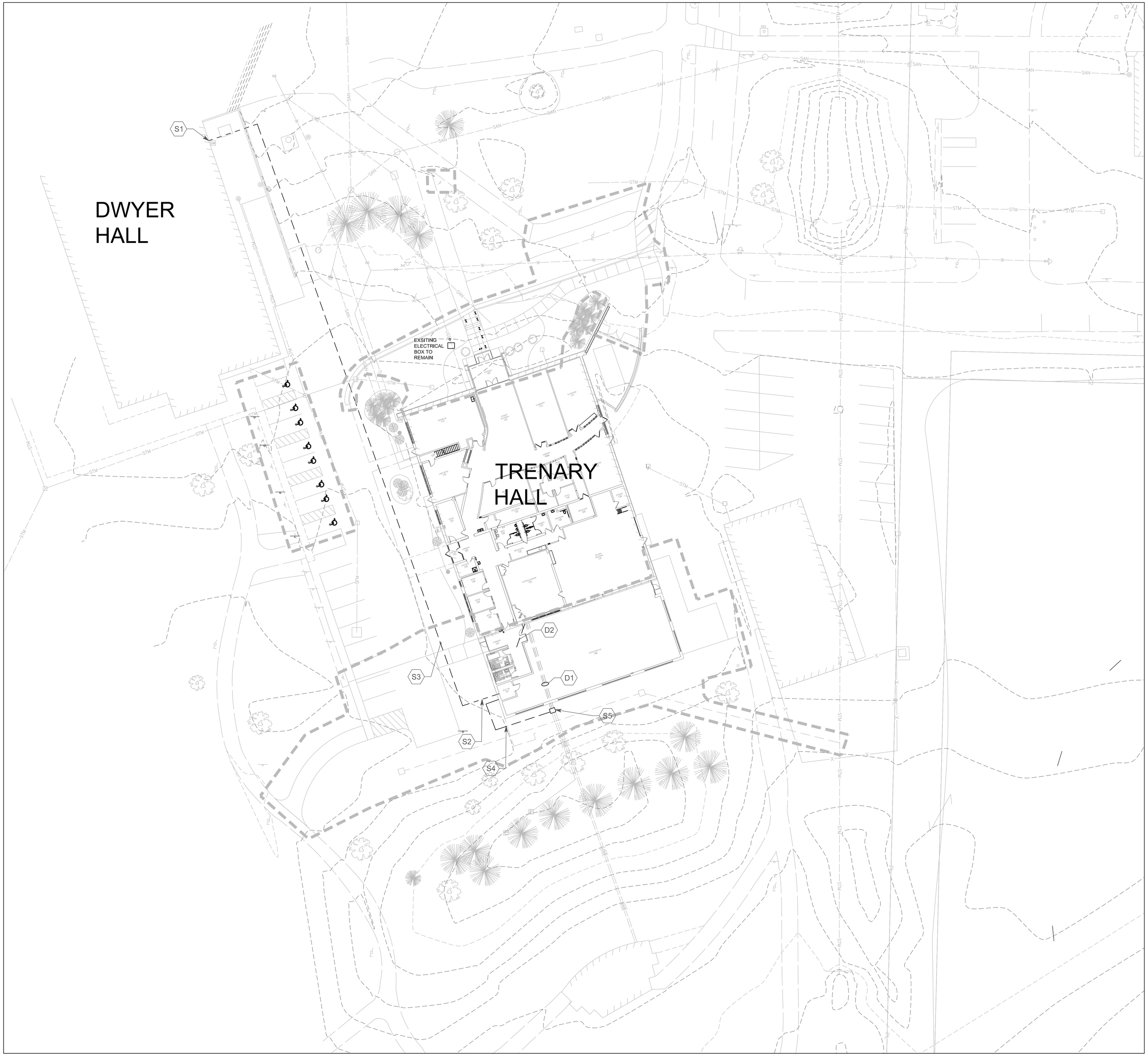
REV. NO.	DESCRIPTION	DATE
1	ADDENDUM#2	10/21/2026

SECOND FLOOR POWER PLAN

EP12

Autodesk Docs://WSU LC - Workforce Development Project/2025_ELEC_224102.00.rvt
10/21/2026 9:27:11 AM

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.



PLAN NOTES:

- S1 CONNECTION TO MAIN DISTRIBUTION SYSTEM FOR TRENARY HALL ADDITIONS, LOCATED IN DWYER HALL RM 136. REFER TO SHEET E-701 FOR CONDUIT AND WIRING INFORMATION.
- S2 CONNECTION FROM MAIN DISTRIBUTION SYSTEM TO NEW DISTRIBUTION EQUIPMENT FOR TRENARY HALL. EQUIPMENT LOCATED IN TRENARY HALL RM 141. REFER TO SHEET E-701 FOR CONDUIT AND WIRING INFORMATION.
- S3 REFER TO SHEET E-501 DETAIL 1D FOR DUCT BANK INFORMATION.
- S4 NEW ROUTING OF CONDUITS. PROVIDE EVERYTHING NEEDED FOR THE REROUTING OF THE CONDUITS TO THE AMPHITHEATER AND THE POWER AND DATA RECEPTACLES IN THE TREES AND CONNECTING IT TO THE EXISTING CONDUIT.
- S5 PROVIDE A 30" X 42", 36" DEEP IN-GRADE HANDHOLE. 1
- D1 EXISTING CONDUIT TO BE DUG UP AND REROUTED. PULL WIRE BACK AS NECESSARY FOR THE REROUTING. SEE SHEET "EP11" FOR WHERE THE CONDUIT IS SUPPOSE TO BE REROUTED IN THE BUILDING. SEE SHEET "ES101" FOR THE REROUTING OF THE FEED.
- D2 EXISTING CONDUIT TO THE BUILDING TO BE DUG UP AND DEMOLISHED

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 STATE ROUTE 73
CELINA, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419-586-7771 WWW.FHAI.COM
128 W MARKET ST, CELINA, OH 45822

KEY PLAN

N

CONSTRUCTION DOCUMENTS

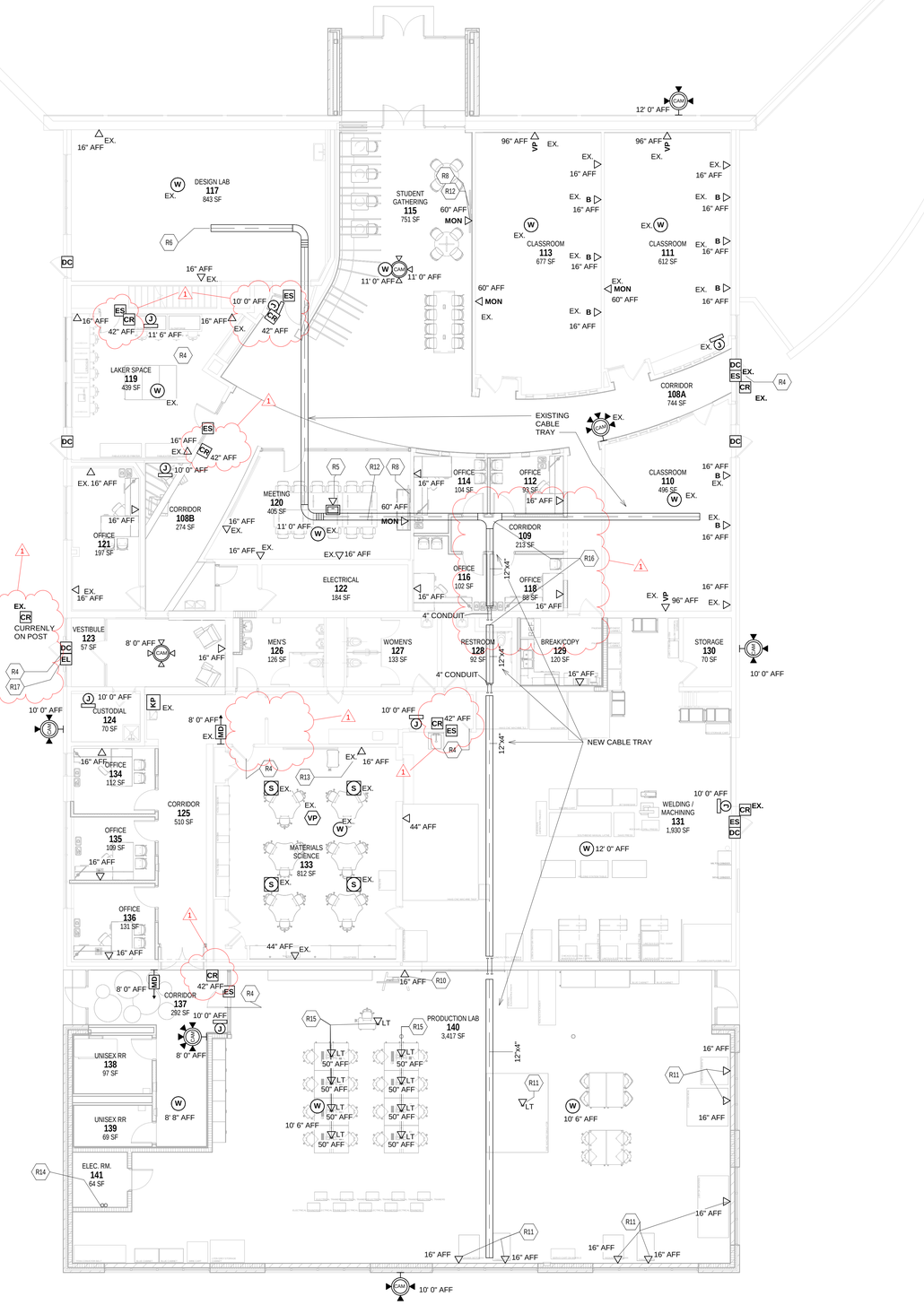
STATE OF OHIO
MARK Z. HOPF
E-79009
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY: RJG
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09/03/2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM #2	10/21/2026

ELECTRICAL SITE PLAN

ES101



1 TECHNOLOGY ROUGH-IN PLAN

SCALE: 1/8" = 1'-0"

ROOM LEGEND

ROOM NO.	OWNER ROOM NO.	ROOM NAME	AREA (SF)
FIRST FLOOR			
107	107	VESTIBULE	230 SF
108A	COR100	CORRIDOR	744 SF
108B	COR101	CORRIDOR	274 SF
109	COR102	CORRIDOR	213 SF
110	110	CLASSROOM	496 SF
111	111	CLASSROOM	612 SF
112	114D	OFFICE	93 SF
113	113	CLASSROOM	677 SF
114	114C	OFFICE	104 SF
115	115	STUDENT GATHERING	751 SF
116	114B	OFFICE	102 SF
117	117	DESIGN LAB	843 SF
118	114A	OFFICE	88 SF
119	119	LAKER SPACE	439 SF
120	120	MEETING	405 SF
121	121	OFFICE	197 SF
122	122A	ELECTRICAL	184 SF
123	123	VESTIBULE	57 SF
124	125	CUSTODIAL	70 SF
125	COR104	CORRIDOR	510 SF
126	124M	MEN'S	126 SF
127	124W	WOMEN'S	133 SF
128	126	RESTROOM	92 SF
129	112	BREAK/COPY	120 SF
130	133A	STORAGE	70 SF
131	133	WELDING / MACHINING	1930 SF
132	128	BREAK ROOM	190 SF
133	130	MATERIALS SCIENCE	812 SF
134	127	OFFICE	112 SF
135	129	OFFICE	109 SF
136	131	OFFICE	131 SF
137	COR105	CORRIDOR	292 SF
138	138	UNISEX RR	97 SF
139	139	UNISEX RR	69 SF
140	140	PRODUCTION LAB	3417 SF
141	140A	ELEC. RM.	64 SF

TECHNOLOGY ROUGH-IN GENERAL NOTES

A. DEVICES SHALL BE INSTALLED AT LOCATIONS SHOWN ON DRAWINGS. LOCATIONS OF DEVICES SHALL BE COORDINATED WITH OTHER ELECTRICAL DEVICES/ CASEWORK/ ARCHITECTURAL FEATURES AND OTHER TRADES PRIOR TO ROUGH-IN. IF RELOCATION OF DEVICES IS REQUIRED DUE TO LACK OF COORDINATION BETWEEN ELECTRICAL DRAWINGS AND OTHER TRADES, ANY ASSOCIATED COSTS SHALL BE RESPONSIBILITY OF ELECTRICAL CONTRACTOR.

B. CABLE TRY SHALL BE A CONTINUOUS ALUMINUM CABLE TRAY SYSTEM AND SHALL BE INSTALLED ON EACH FLOOR. TRAY SIZE SHALL BE 12" WIDE BY 4" DEEP WITH 1" RUNGS SPACED EVERY 9". WHEN MAKING TURNS AND ELEVATION CHANGES THE APPROPRIATE TRAY ACCESSORIES, HAVING THE PROPER BEND RADIUS, SHALL BE USED. THIS TRAY SYSTEM SHALL HAVE 6" MIN. UNOBSTRUCTED CLEARANCE ABOVE THE TRAY MEASURED FROM THE TOP MOST SURFACE OF THE TRY AND A 12' MIN. CLEARANCE ALONG THE SIDE. THERE SHALL BE NO OTHER EQUIPMENT, DUCTWORK, LIGHTS, CONDUITS, FIXTURES, ETC. ATTACHED TO, MOUNTED ON, RUNNING THROUGH OR ON THE TRAYS. CABLE TRAY SHALL NOT RUN THROUGH WALLS.

C. REFER TO PAGE 3 I Part FOUR 26 OF THE WRIGHT STATE UNIVERSITY CONSTRUCTION ELECTRICAL SPECIFICATIONS FOR COLOR IDENTIFICATION OF ALL CONDUITS.

D. CONDUIT FROM THE CABLE TRAY TO A TYPICAL WALL OUTLET SHOULD BE A MINIMUM OF 1-1/4". EACH 1-1/4" CONDUIT WILL SERVICE ONLY ONE WALL OUTLET LOCATION. THE CONDUIT WILL BE TERMINATED IN A 5" X 5" X 2.75" DEEP BOX WITH A PULL STRING. THE BOX SHALL BE FITTED WITH A DOUBLE GANG MUD RING. OUTLETS ARE TYPICALLY LOCATED AT THE FOLLOWING HEIGHTS TO CENTER:
☐ Desks 18" AFF ☐ Wall Phones 48" AFF ☐ Pay Phones 48" AFF

E. CONDUITS RUN TO THE CABLE TRAY SHOULD END APPROXIMATELY 4"-6" AWAY FROM THE TOP OR BOTTOM EDGE OF THE CABLE TRAY TO MAINTAIN A PROPER BEND RADIUS. FLEXIBLE CONDUIT SHALL NOT BE PERMITTED UNLESS PRIOR APPROVAL HAS BEEN GIVEN BY WSU CATS PERSONNEL.

F. EACH STANDARD OFFICE SHALL HAVE A MINIMUM OF ONE (1) WORK STATION LOCATIONS. THE WORK STATION LOCATIONS SHOULD BE THREE (3) FEET FROM THE BACK WALL (THE WALL OPPOSITE FROM THE WALL WITH THE DOOR IN IT).

G. EXTERIOR CAMERAS SHALL HAVE A FLUSH MOUNTED 4" SQUARE BOX 2-1/8" DEEP AT THE CAMERA LOCATION WITH A 1" CONDUIT TO THE NEAREST CABLE TRAY.

H. EACH CLASSROOM WILL VARY ON A CASE BY CASE BASIS.
☐ Conduits for data cabling to be 1-1/4".
☐ WALL PHONE LOCATION 48" AFF WITH 4" SQUARE BOX 2 1/8" DEEP WITH A SINGLE-GANG MUD RING AND 1-1/4" CONDUIT TO CABLE TRAY.
☐ PREFERRED FLOOR BOX IS FSR FL-2000 SERIES.

ROUGH-IN PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

#	NOTE
R4	ROUGH IN DOOR CONTROL CABLE PATHWAY FOR ALL CONTROL/MONITORING HARDWARE TO ALL EXTERIOR DOORS ACCORDING TO WSU STANDARDS. REFER TO ET DETAILS FOR MORE INFORMATION.
R5	PROVIDE 1-1/2" CONDUIT FROM FSR FL-640P-8" FLOOR BOX WALL UP TO CABLE TRAY. REFER TO DETAILS FOR INFO.
R6	TWO EXISTING 4" CONDUITS GOING FROM THE EXISTING SECOND FLOOR TECH ROOM TO ABOVE FIRST FLOOR CEILING SPACE TO REMAIN IN PLACE.
R8	PROVIDE WALL BLOCKING, POWER, AND TECH ROUGHIN FOR A LARGE VIDEO MONITOR.
R10	LOCATION FOR MOBILE MONITOR SHALL INCLUDE POWER AND TECH ROUGHIN.
R11	PLC LOCATIONS WILL NEED POWER AND TECH ROUGHIN PATHWAYS. TECH SHALL FOLLOW THE SAME ROUTE AS POWER IN A SEPERATE PATHWAY. CONFIRM NEEDS WITH MANUFACTURER SPECS.
R12	PROVIDE POWER AND TECH ROUGHIN FOR 86" MONITOR.
R13	ANY LOCATIONS MARKED WITH THE EX (EXISTING) ARE TO REMAIN UNCHANGED DURING CONSTRUCTION.
R14	LOCATION OF THE NEW AMPHITHEATER CONDUIT FEED FOR DATA TO BE REROUTED. REFER TO DRAWING ES101 FOR DETAILS.
R15	THIS LOCATION SHALL BE 1" LIQUIDTIGHT FLEXIBLE CONDUIT, NON-METALLIC, GRAY. SECURED TO STRUCTURE AND DROPPED DOWN TO WORKSTATION HEIGHT (50" AFF). WORKSTATION END SHALL CONTAIN ALUMINUM, RECTANGULAR, 1 GANG, 1 in HUB SIZE, GRAY BOX ATTACHED BY A LIQUIDTIGHT BOX CONNECTOR. INTENT IS FOR LOCATION TO BE CAPABLE OF BEING COILED IN CEILING WHEN NOT IN USE.
R16	ADD 12"X4" CABLE TRAY INTERSECTION AND EXTEND EXISTING CONTINUOUS ALUMINUM CABLE TRAY SYSTEM TO THE SOUTH AS SHOWN.
R17	ONLY EXISTING ENHANCED SECURITY DOOR LOCATION. CONFIRM PATHWAYS AND SYSTEM IS INSTALLED PER WSU STANDARD AS SHOWN ON ET51.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 STATE ROUTE 703
CELINA, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W MARKET STREET, CELINA, OH 45822

A
B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO MARK Z. HOPE E-79009 REGISTERED PROFESSIONAL ENGINEER

PROJECT MANAGER: RW
DRAWN BY: CDT
PROJECT NUMBER: FH224102.00/WSU-231035
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	Addendum #2	10/21/2026

FIRST FLOOR TECHNOLOGY ROUGH-IN PLAN

ET11

Autodesk Docs://WSU-L.C. - Workforce Development Project/2025_TECH_224102.00.rvt
10/21/2026 8:46:47 AM

COMMUNICATIONS ROUGH-IN SYMBOLS

SYMBOL	DESCRIPTION	MH UNO	ROUGH-IN DETAIL #
EX.	**ANY LOCATION SHOWN ON ETD1 WITH THE "EX." REFERENCE DEPICTS EXISTING LOCATIONS, EQUIPMENT THAT SHALL REMAIN DURING CONSTRUCTION. THIS CONTRACTOR SHALL BE RESPONSIBLE IF THESE LOCATIONS/EQUIPMENT NEED TO BE REMOVED/REINSTALLED FOR SAFETY DURING CONSTRUCTION.**		ET11
◁	COMMUNICATIONS OUTLET. 1-1/4" CONDUIT WILL SERVICE ONLY ONE WALL OUTLET LOCATION. THE CONDUIT WILL BE TERMINATED IN A 5" X 5" X 2.75" DEEP BOX WITH A PULL STRING. THE BOX SHALL BE FITTED WITH EITHER A SINGLE OR DOUBLE GANG MUD RING TO SUIT THE OUTLET CONFIGURATION REQUIRED.	MIN HEIGHT TO CENTER DESK - 18"	ET51
◁B	COMMUNICATIONS OUTLET WITH A BLANK COVER. 1-1/4" CONDUIT WILL SERVICE ONLY ONE WALL OUTLET LOCATION. THE CONDUIT WILL BE TERMINATED IN A 5" X 5" X 2.75" DEEP BOX WITH A PULL STRING. THE BOX SHALL BE FITTED WITH A SINGLE OR DOUBLE GANG MUD RING TO SUIT THE OUTLET CONFIG. REQUIRED.		
◁W	WALL MOUNTED COMMUNICATIONS OUTLET. 2 GANG, 3.5" DEEP BOX WITH 1 GANG MUD RING. WITH 1 (ONE) 1" CONDUIT STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	MIN HEIGHT TO CENTER WP - 48"	ET51
◁MON	WALL MOUNTED MONITOR. SHALL HAVE A FSR PWB-100 WALL BOX WITH A 120 VOLT TVSS RECEPTACLE ON A DEDICATED 20 AMP CIRCUIT WITH A 1" CONDUIT FROM THE LOW VOLTAGE COMPARTMENT TO THE NEAREST CABLE TRAY AND SUFFICIENT BLOCKING TO SUPPORT THE DISPLAY (REFER TO ELECTRICAL SPECIFICATIONS), FINAL LOCATION HEIGHT WILL BE DETERMINED BY WSU.	-	ET52
◁VP	WALL MOUNTED VIDEO PROJECTOR. (REFER TO ELECTRICAL SPECIFICATIONS), FINAL LOCATION HEIGHT WILL BE DETERMINED BY WSU. ALL A/V EQUIPMENT TO BE PROVIDED AND INSTALLED BY WSU-CaTS.	-	ET51
VP	CEILING MOUNTED PROJECTOR. PROVIDE AND INSTALL VIDEO PROJECTOR MOUNTING PIPE AND ACCESSORIES, FINAL LOCATION HEIGHT WILL BE DETERMINED BY WSU. ALL A/V EQUIPMENT TO BE PROVIDED AND INSTALLED BY WSU-CaTS.	-	ET52
S	CEILING MOUNTED DISTRIBUTED SOUND SYSTEM SPEAKERS. ALL A/V EQUIPMENT TO BE PROVIDED AND INSTALLED BY WSU-CaTS.	-	-
	MULTI CAPACITY FLOOR BOX (FSR FL-640P-8") WITH 1 (ONE) 1-1/2" CONDUIT STUBBED ABOVE ACCESSIBLE CEILING TO CABLE TRAY AND ONE (1) 1-1/2" CONDUIT TO MONITOR FSR WALL BOX. PROVIDE PLASTIC BUSHINGS AND PULL STRINGS.	F	ET51
W	WALL MOUNTED WIRELESS ACCESS POINT. 2 GANG, 3.5" DEEP BOX WITH 1 GANG MUD RING. WITH 1 (ONE) 1" CONDUIT STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	10'-0"	-
W	CEILING MOUNTED WIRELESS ACCESS POINT. 2 GANG, 3.5" DEEP BOX WITH 1 GANG MUD RING. WITH 1 (ONE) 1" CONDUIT STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	C	-
LT	CEILING MOUNTED 1" LIQUIDTIGHT FLEXIBLE CONDUIT, NON-METALLIC, GRAY. SECURED TO STRUCTURE AND DROPPED DOWN TO WORKSTATION HEIGHT. WORKSTATION END SHALL CONTAIN ALUMINUM, RECTANGULAR, 1 GANG, 1 in HUB SIZE, GRAY BOX ATTACHED BY A LIQUIDTIGHT BOX CONNECTOR.		
	CABLE TRAY - MINIMUM TRAY SIZE SHALL BE 12" x 4" DEEP WITH 1" RUNGS EVERY 9" - UNLESS OTHERWISE NOTED	-	ET51
	1-1/2" CONDUIT SLEEVES BETWEEN WALLS, UNLESS OTHERWISE NOTED. SLEEVES USED AT WALL TRANSITION POINTS FOR CABLE TRAY SYSTEMS SHALL BE 4".	-	-
○ ○	2 (TWO) 4" CONDUIT SLEEVES BETWEEN FLOORS	-	-
	4' x 8' x 3/4" FIRE RATED PLYWOOD	-	-
	REFERENCE SPECIFICATION SECTION 260533 FOR COLOR IDENTIFICATION FOR ALL CONDUITS. CONDUITS RUN TO THE CABLE TRAY SHALL END 4"-6" AWAY FROM THE TOP OR BOTTOM EDGE OF CABLE TRAY. Voice/Data/video/security Blue! (PPG#12809)	-	-
	WSU CaTS installs all of the Structured Cabling (Voice/Data/CATV), Phone System (Headend & Handsets), Network Electronics, WLAN (Headend and AP's) & Audio/Visual Equipment. The Contractor should only install Infrastructure (Box, Conduit & Power) to support the Owner Furnished Equipment	-	-

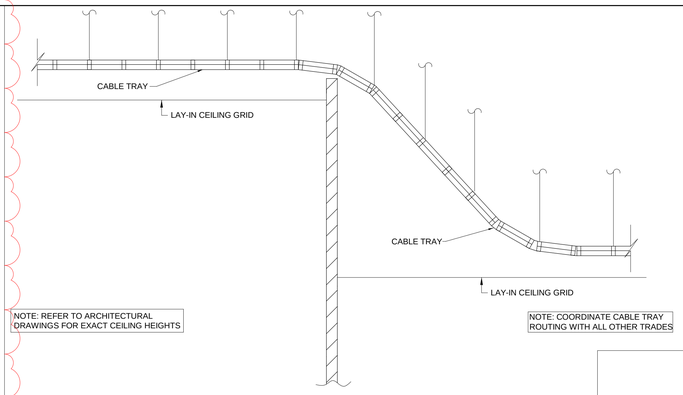
ACCESS CONTROL ROUGH-IN SYMBOLS

SYMBOL	DESCRIPTION	MH UNO	ROUGH-IN DETAIL #
CR	CARD READER. 3/4" CONDUIT FROM JUNCTION BOX SHALL TERMINATE IN A 4" SQUARE BOX 2-1/8" DEEP WITH A SINGLE GANG MUD RING.	42" AFF	ET51
ES	ELECTRONIC STRIKE. 3/4" CONDUIT FROM JUNCTION BOX SHALL TERMINATE IN THE DOOR FRAME BEHIND THE STRIKE POCKET AND LEAVE ADEQUATE ROOM FOR CABLING CONNECTIONS AND ELECTRIC DOOR STRIKE HARDWARE.	-	ET51
EL	ELECTRONIC LATCH. 3/4" CONDUIT FROM JUNCTION BOX SHALL TERMINATE IN THE DOOR FRAME BEHIND THE CENTER HINGE AND LEAVE ADEQUATE ROOM FOR CABLING CONNECTIONS TO THE WIRED HINGE.	-	ET51
J	6" W x 6" H x 4" D JUNCTION BOX ABOVE DOOR WITH A 1" CONDUIT TO THE NEAREST CABLE TRAY FOR ACCESS CONTROL. FROM THIS BOX 3/4" CONDUITS WILL FEED THE DOOR STRIKE, CENTER DOOR HINGE, DOOR CONTACT AND CARD READER.	ABOVE CLG.	ET51
ADO	AUTOMATIC DOOR OPERATOR, 3/4" CONDUIT TO JUNCTION BOX ABOVE DOOR	-	-
DC	DOOR CONTACT. 3/4" SHALL TERMINATE IN THE TOP OF THE DOOR FRAME APPROXIMATELY 3" FROM THE STRIKE SIDE OF THE JAMB WITH A 3/4" HOLE IN THE JAM FOR A RECESSED DOOR CONTACT. DOUBLE DOOR LOCATIONS SHALL BE DOOR CONTRACT LOCATIONS ON EACH DOOR.	-	ET51
KP	KEYPAD. 2 GANG, 3.5" DEEP BOX WITH 1 GANG MUD RING. 1" CONDUIT STUBBED ABOVE ACCESSIBLE CEILING WITH PLASTIC BUSHING AND PULL STRING.	44"	-
MD	WALL MOUNTED MOTION DETECTOR. 2 GANG, 3.5" DEEP BOX WITH 1 GANG MUD RING. 1" CONDUIT STUBBED TO NEAREST CABLE TRAY	NOTED ON DWGS	-
MD	CEILING MOUNTED MOTION DETECTOR. 2 GANG, 3.5" DEEP BOX WITH 1 GANG MUD RING. 1" CONDUIT STUBBED TO NEAREST CABLE TRAY	NOTED ON DWGS	-

VIDEO SURVEILLANCE CAMERA ROUGH-IN SYMBOL

SYMBOL	DESCRIPTION	MH UNO	ROUGH-IN DETAIL #
CAM	CEILING MOUNTED VIDEO SURVEILLANCE CAMERA. SHALL HAVE A 1" CONDUIT WITH PLASTIC BUSHING INSTALLED ABOVE CEILING AT THE CAMERA LOCATION TO THE NEAREST CABLE TRAY.	-	-
CAM	WALL MOUNTED VIDEO SURVEILLANCE CAMERAS. SHALL HAVE A FLUSH MOUNTED 4" SQUARE BOX 2-1/8" DEEP AT THE CAMERA LOCATION WITH A 1" CONDUIT TO THE NEAREST CABLE TRAY. (MOUNT WITHIN 12" OF CORNER WHEN APPLICABLE)	+144"	-

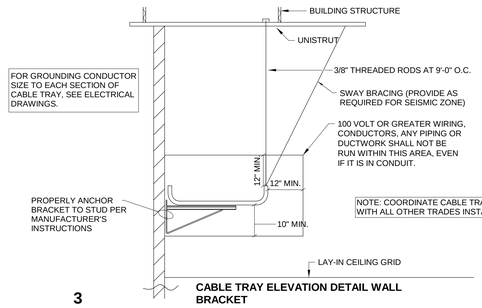
1 TECHNOLOGY ROUGH-IN SYMBOLS (ET)
N.T.S.



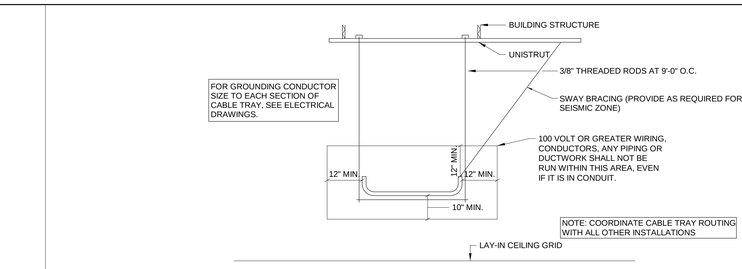
NOTE: REFER TO ARCHITECTURAL DRAWINGS FOR EXACT CEILING HEIGHTS

NOTE: COORDINATE CABLE TRAY ROUTING WITH ALL OTHER TRADES

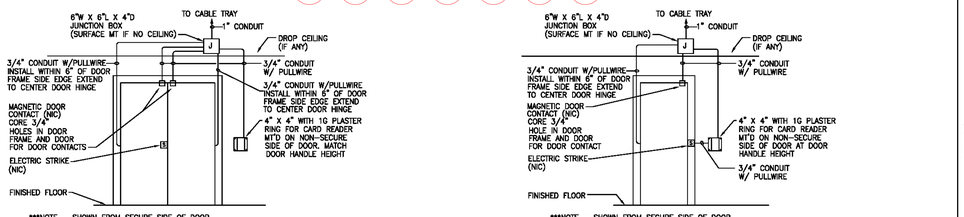
2 CABLE TRAY SECTION WITH MULTIPLE CEILING HEIGHTS DETAIL
N.T.S.

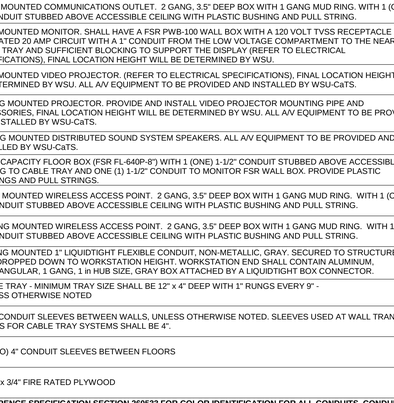


3 CABLE TRAY ELEVATION DETAIL WALL BRACKET
N.T.S.

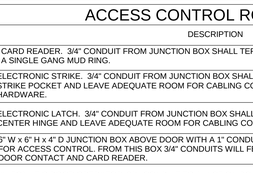


4 CABLE TRAY ELEVATION DETAIL SUSPENDED
N.T.S.



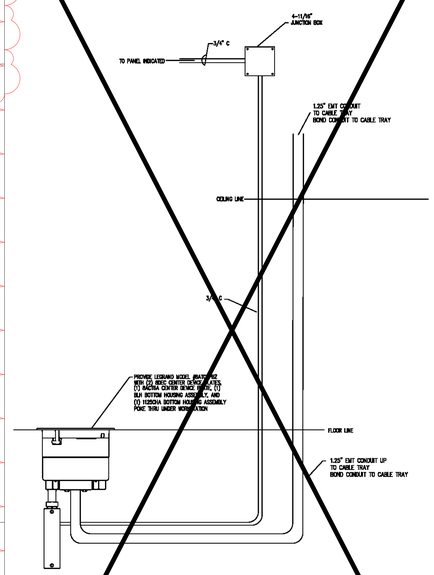


WORKSTATION OUTLET RACEWAY DETAIL
SCALE: NONE



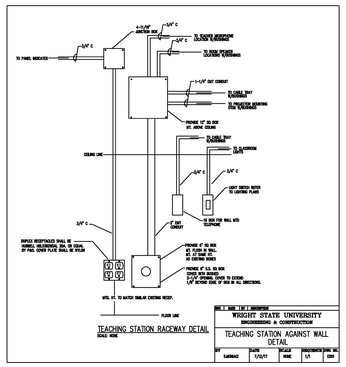
WAP/CAMERA RACEWAY DETAIL
SCALE: NONE

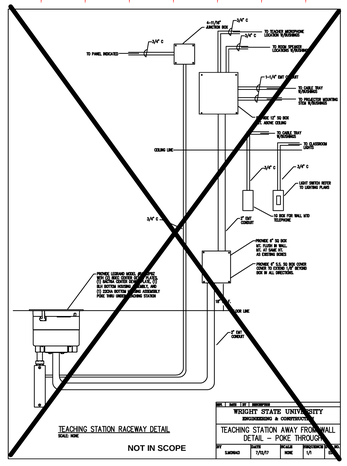
Security Cameras
• Interior
a. CCTV locations shall have a bushed 1" conduit installed above accessible ceiling at the camera location to the nearest cable tray.
• Exterior
a. CCTV locations shall have a flush mounted 4" square box 2 1/8" deep at the camera location with a 1" conduit to the nearest cable tray. Final CCTV locations to be determined by WSU.
b. All panic buttons shall be hardwired to the Simplex fire alarm system, refer to electrical specifications.

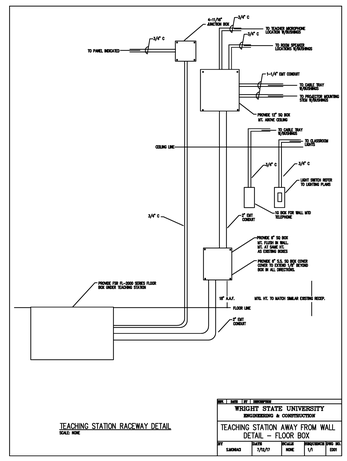


WORKSTATION FLOORBOX DETAIL
SCALE: NONE

NOT IN SCOPE







COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 STATE ROUTE 703
CELINA, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT
FANNING HOWEY
419.586.7771 WWW.FHAI.COM
128 W MARKET STREET, CELINA, OH 45822

CONSTRUCTION DOCUMENTS

STATE OF OHIO MARK J. HOPE E-79009 REGISTERED PROFESSIONAL ENGINEER

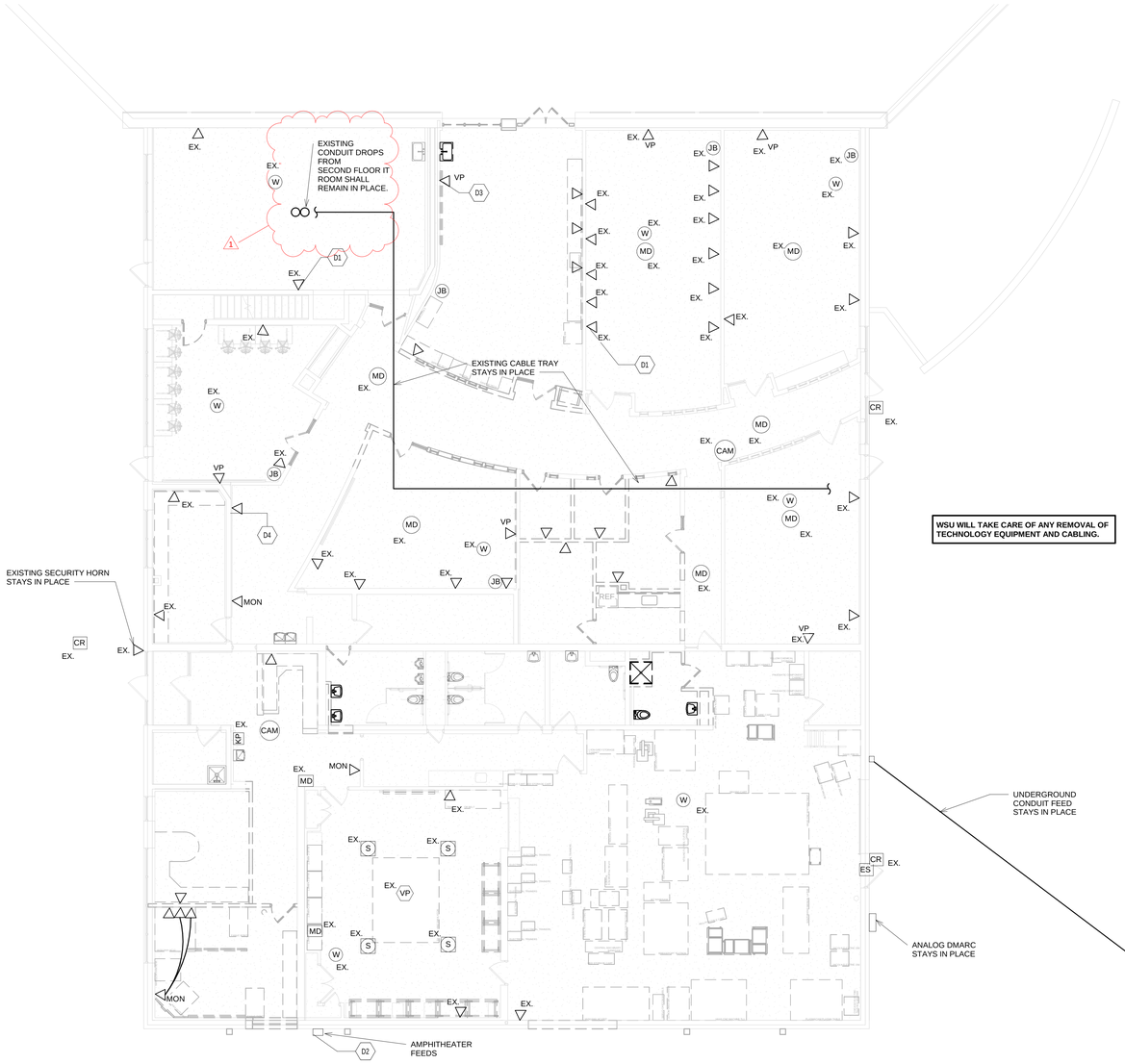
PROJECT MANAGER: RW
DRAWN BY: CDT
PROJECT NUMBER: FH224102.00/WSU-231035
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	Addendum #2	10/21/2026

TECHNOLOGY ROUGH-IN DETAILS

ET51

Autodesk Docs://WSU-LC - Workforce Development Project/2025_TECH_224102.00.rvt
10/23/2026 8:46:53 AM



1 TECHNOLOGY ROUGH-IN DEMO PLAN

SCALE: 1/8" = 1'-0"

TECHNOLOGY ROUGH-IN DEMO GENERAL NOTES

A. DEVICES SHALL BE INSTALLED AT LOCATIONS SHOWN ON DRAWINGS. LOCATIONS OF DEVICES SHALL BE COORDINATED WITH OTHER ELECTRICAL DEVICES/ CASEWORK/ ARCHITECTURAL FEATURES AND OTHER TRADES PRIOR TO ROUGH-IN. IF RELOCATION OF DEVICES IS REQUIRED DUE TO LACK OF COORDINATION BETWEEN ELECTRICAL DRAWINGS AND OTHER TRADES, ANY ASSOCIATED COSTS SHALL BE RESPONSIBILITY OF ELECTRICAL CONTRACTOR.

B. CABLE TRY SHALL BE A CONTINUOUS ALUMINUM CABLE TRAY SYSTEM AND SHALL BE INSTALLED ON EACH FLOOR. TRAY SIZE SHALL BE 12" WIDE BY 4" DEEP WITH 1" RUNGS SPACED EVERY 9". WHEN MAKING TURNS AND ELEVATION CHANGES THE APPROPRIATE TRAY ACCESSORIES, HAVING THE PROPER BEND RADIUS, SHALL BE USED. THIS TRAY SYSTEM SHALL HAVE 6" MIN. UNOBSTRUCTED CLEARANCE ABOVE THE TRAY MEASURED FROM THE TOP MOST SURFACE OF THE TRY AND A 12' MIN. CLEARANCE ALONG THE SIDE. THERE SHALL BE NO OTHER EQUIPMENT, DUCTWORK, LIGHTS, CONDUITS, FIXTURES, ETC. ATTACHED TO, MOUNTED ON, RUNNING THROUGH OR ON THE TRAYS. CABLE TRAY SHALL NOT RUN THROUGH WALLS.

C. REFERENCE WRIGHT STATE UNIVERSITY CONSTRUCTION ELECTRICAL SPECIFICATIONS FOR COLOR IDENTIFICATION OF ALL CONDUITS.

D. CONDUIT FROM THE CABLE TRAY TO A TYPICAL WALL OUTLET SHOULD BE A MINIMUM OF 1-1/4". EACH 1-1/4" CONDUIT WILL SERVICE ONLY ONE WALL OUTLET LOCATION. THE CONDUIT WILL BE TERMINATED IN A 5" X 5" x 2.75" DEEP BOX WITH A PULL STRING. THE BOX SHALL BE FITTED WITH A DOUBLE GANG MUD RING. OUTLETS ARE TYPICALLY LOCATED AT THE FOLLOWING HEIGHTS TO CENTER:
□ Desks 18" AFF □ Wall Phones 48" AFF □ Pay Phones 48" AFF

E. CONDUITS RUN TO THE CABLE TRAY SHOULD END APPROXIMATELY 4"-6" AWAY FROM THE TOP OR BOTTOM EDGE OF THE CABLE TRAY TO MAINTAIN A PROPER BEND RADIUS. FLEXIBLE CONDUIT SHALL NOT BE PERMITTED UNLESS PRIOR APPROVAL HAS BEEN GIVEN BY WSU CaTS PERSONNEL.

F. EACH STANDARD OFFICE SHALL HAVE A MINIMUM OF TWO (2) WORK STATION LOCATIONS, ONE ON EACH WALL PERPENDICULAR TO THE WALL THAT HAS THE DOOR IN IT. THE WORK STATION LOCATIONS SHOULD BE THREE (3) FEET FROM THE BACK WALL (THE WALL OPPOSITE FROM THE WALL WITH THE DOOR IN IT).

G. EXTERIOR CAMERAS SHALL HAVE A FLUSH MOUNTED 4" SQUARE BOX 2-1/8" DEEP AT THE CAMERA LOCATION WITH A 1" CONDUIT TO THE NEAREST CABLE TRAY.

H. EACH CLASSROOM WILL VARY ON A CASE BY CASE BASIS.
□ Conduits for data cabling to be 1-1/4".
□ WALL PHONE LOCATION 48" AFF WITH 4" SQUARE BOX 2 1/8" DEEP WITH A SINGLE-GANG MUD RING AND 1-1/4" CONDUIT TO CABLE TRAY.
□ PREFERRED FLOOR BOX IS FSR FL-2000 SERIES.

ROUGH-IN DEMO PLAN NOTES

(ALL NOTES MAY NOT BE INDICATED ON THIS SHEET)

#	NOTE
D1	ALL DATA WIRING AND CONNECTIONS THAT ARE NOT MARKED WITH THE LETTERS EX WILL BE REMOVED BY THE OWNER. EXISTING DATA LOCATIONS THAT ARE MARKED WITH EX SHALL REMAIN IN PLACE.
D2	PULL BACK ANY EXISTING NETWORK, PAGING OR CAMERA CABLING FROM THE EXISTING AMPHITHEATER CONDUIT LOCATIONS AND THEN EXTEND TO RELOCATE TO SOUTH ADDITION #141 ELECTRICAL ROOM FEED AFTER CONSTRUCTION. REFER TO SHEETS ET11 AND ES101.
D3	OWNER WILL REMOVE EXISTING SHORT THROW PROJECTOR AND ASSOCIATED EQUIPMENT/CABLING.
D4	WSU WILL TAKE CARE OF ANY IT EQUIPMENT AND CABLING REMOVAL.

VERIFICATION NOTE

CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CLEARANCES AND ALL EXISTING FIELD CONDITIONS BEFORE STARTING CONSTRUCTION. COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.

SHOULD DIFFERENT CONDITIONS BE ENCOUNTERED, CONTACT THE ARCHITECT BEFORE PROCEEDING WITH WORK.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 STATE ROUTE 703
CELINA, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT

FANNING HOWEY

419.586.7771 WWW.FHAI.COM
128 W MARKET STREET, CELINA, OH 45822

A
B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO · MARK Z. HOFE · E-79009 · REGISTERED PROFESSIONAL ENGINEER

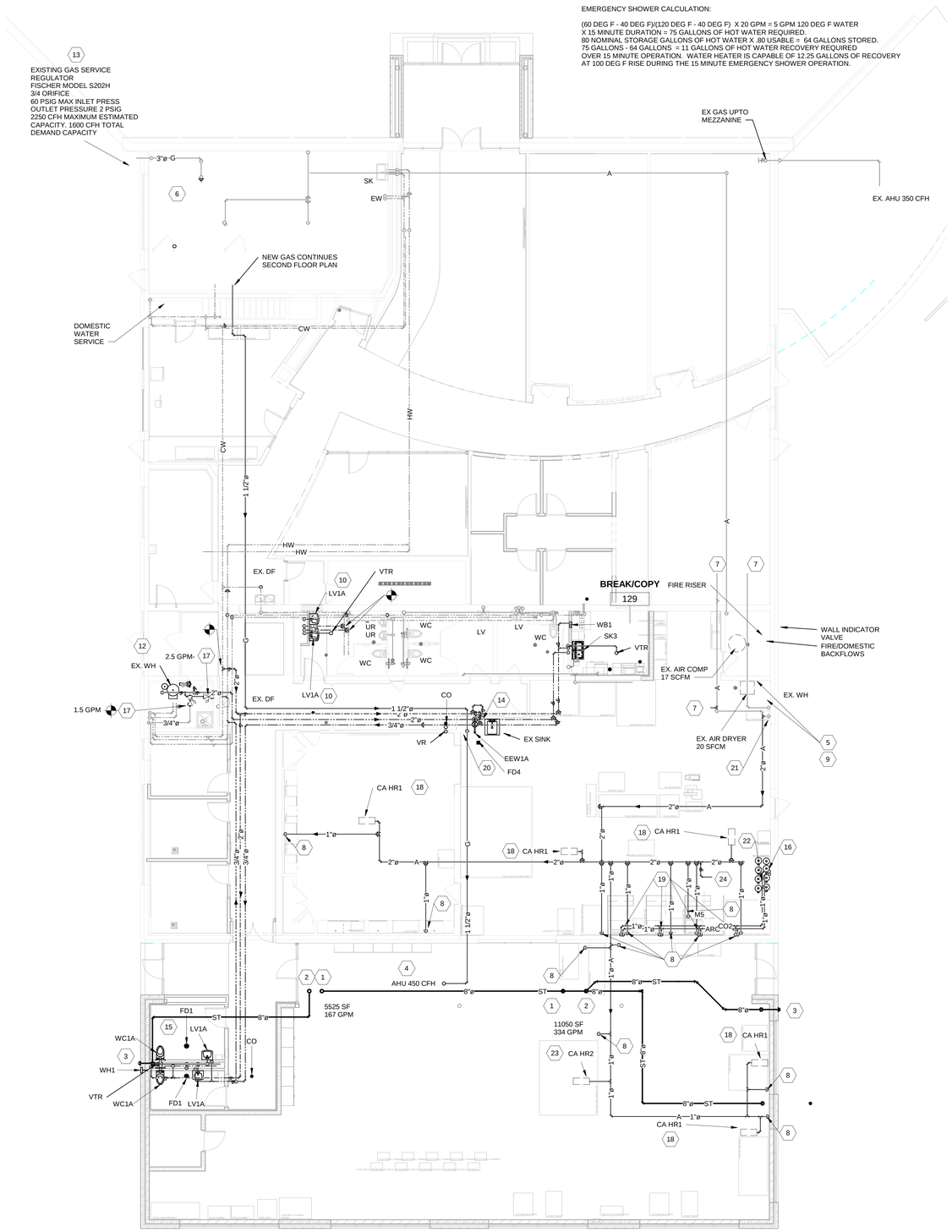
PROJECT MANAGER: RW
DRAWN BY: CDT
PROJECT NUMBER: FH224102.00WSU-231035
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	Addendum #2	10/21/2026

TECHNOLOGY ROUGH-IN DEMO PLAN

ETD1

Autodesk Docs://WSU-LLC - Workforce Development Project/2025_TECH_Z24102.00.rvt
10/21/2026 8:46:56 AM



1 FIRST FLOOR PLUMBING PLAN - UNIT A

SCALE: 1/8" = 1'-0"

CODED NOTES

1. ROOF DRAIN ABOVE.
2. SECONDARY ROOF DRAIN ABOVE.
3. SECONDARY ROOF DRAINAGE OUTLET. MOUNT AT 18" AFG. BASIS OF DESIGN ZURN Z199SS. PLAIN BRONZE FINISH, INCLUDE BIRD SCREEN OPTION.
4. NATURAL GAS SUPPLY TO ROOF TOP UNIT. PROVIDE NATURAL GAS PRESSURE REGULATOR, 2PSIG INLET, 7" W.C. OUTLET, CAPACITY AS INDICATED. EXTEND REGULATOR RELIEF PIPED THROUGH THE BUILDING ROOF.
5. EXISTING COMPRESSED AIR PRESSURE REGULATORS TO REMAIN.
6. NATURAL GAS SUPPLY TO BOILER ON MEZZANINE.
7. 2" COMPRESSED AIR SUPPLY TO BACKFEED THE EXISTING LABS COMPRESSED AIR RUNS LOCATED IN THE SERVICE MEZZANINE.
8. COMPRESSED AIR SUPPLY DROP. EXTEND DOWN AND TERMINATE AT 18" AFF. PROVIDE ISOLATION VALVE COMBINATION PRESSURE REGULATOR AND AIR FILTER EQUAL TO PARKER P3YRA96BNFN.
9. COMPRESSED AIR LAB MAIN SHUTOFF VALVE.
10. PLUMBING FIXTURE REMOVED UNDER DEMOLITION SCOPE. MODIFY THE EXISTING WATER, DRAIN, CARRIER AS NEEDED TO ACCOMMODATE NEW FIXTURES, CARRIERS AT REVISED LOCATIONS AND HEIGHTS. PIPING SHOWN IN THIS SPACE IS EXPOSED AT THE UNDERSIDE OF MEZZANINE PRECAST DECK. INSTALL PIPE AS TIGHT TO DECK AS POSSIBLE. PAINT PIPING TO MATCH ADJACENT.
12. EXISTING WATER HEATER. REFER TO DETAIL. PROVIDE NEW THERMAL EXPANSION TANK, RECIRCULATION PUMP, T/P RELIEF VALVE, RECIRC PUMP CONTROL AQUASTAT AND DIELECTRIC CONNECTORS AT HEATER.
13. GAS SERVICE METER AND REGULATOR SETTING.
14. MOUNT EMERGENCY THERMOSTATIC MIXING VALVE ABOVE 7' AFF.
15. PROVIDE 1-1/2" COLD WATER SUPPLY AND SERVE WATER CLOSET AND LAVATORY. PROVIDE WATER HAMMER ARRESTOR MOUNTED ABOVE ACCESSIBLE CEILING.
16. WELDING GAS SWITCHOVER MANIFOLD WITH PRESSURE REGULATOR. MOUNT TO WALL AND MAKE ALL FINAL CONNECTIONS. PROVIDE HARD BACKER BOARD AND LAGGED CHAIN RESTRAINTS FOR CONNECTED CYLINDERS. 4 ARGON CONNECTIONS, 4 AR/CO2 MIX (75% ARGON 25% CO2) CONNECTIONS TOTAL. REXARC MODEL 4-04-0136SHP-8
17. PROVIDE DOMESTIC HOT WATER RETURN BALANCING STATION PER DETAIL, SET TO FLOW PER PLAN.
18. COMPRESSED AIR HOSE REEL. REFER TO MOUNTING DETAIL AND SUPPLY DIAGRAM. HOSE REEL WITH 50' OF 1/2" HOSE. BASIS OF DESIGN REELCRAFT 7850 OLP.
19. 3/4" ARGON AND ARGON/CO2 MIX SUPPLY DROPS DOWN TO WELDING BOOTH OUTLET STATIONS. REXARC MODEL 2-04-1604. MAKE FINAL CONNECTIONS AS REQUIRED.
20. WELDING GAS CONTROL STATION EQUAL TO ISIMET INDUSTRIAL SHOP CONTROLLER, SURFACE MOUNT OPTION. 120V INLET POWER AND OUTLET POWER TO SOLENOID VALVES. PANEL SHALL INCLUDE INDIVIDUAL SWITCHES FOR TWO GASES. EMERGENCY SHUT DOWN BUTTON WITH RESET. KEYED CONTROL PANEL ACTUATION. MOUNT CONTROL STATION AND SOLENOID VALVES AT 34" TO 48" HEIGHT RANGE. PROVIDE THE ENTIRE WIRING, CONDUIT PACKAGE INCLUDING SOLENOID VALVES AND REMOTE MOUNTED EMERGENCY SHUT DOWN SWITCHES.
21. WELDING GAS EMERGENCY SHUTOFF REMOTE STATION. WALL MOUNT, SURFACE MOUNTED OPTION MOMENTARY SWITCH WITH MANUAL RESET EQUAL TO ISIMET LAV2-HP.
22. WELDING GAS SOLENOID SHUTOFF VALVE EQUAL TO ISIMET S-803, 1" SIZE. PROVIDE 1 PER GAS INSTALL INSIDE SOLENOID VALVE BOX EQUAL TO ISIMET MODEL SE-1-1-1-2-CO2-ARG-3-S-G.
23. COMPRESSED AIR HOSE REEL. REFER TO MOUNTING DETAIL AND SUPPLY DIAGRAM. HOSE REEL WITH 100' OF 1/2" HOSE. BASIS OF DESIGN 82100 OLP.
24. EXTEND 1/2" COMPRESSED AIR CONNECTION TO WELDING FUME COLLECTOR WFC-01. FIELD COORDINATE EXACT EQUIPMENT CONNECTION LOCATION.

COPYRIGHT 2026 BY FANNING/HOWEY ASSOCIATES, INC.

TRENARY HALL WORKFORCE DEVELOPMENT ADDITION & RENOVATION

7600 State Route 703
Celina, OH 45822

WRIGHT STATE UNIVERSITY

ARCHITECT
FANNING HOWEY
419.586.7771 WWW.FHAI.COM
128 W Market St. Celina, Ohio 45822

A
B

KEY PLAN

CONSTRUCTION DOCUMENTS

STATE OF OHIO
MARK Z. HOPF
E-79009
REGISTERED PROFESSIONAL ENGINEER

DRAWN BY: CSS
PROJECT NUMBER: 224102.00
PROJECT ISSUE DATE: 09.04.2026

REV. NO.	DESCRIPTION	DATE
1	ADDENDUM 2	10/21/26

FIRST FLOOR PLUMBING PLAN

PL11

Autodesk Docs://WSU-LC - Workforce Development Project/2025_PLUM_224102.00.rvt
10/20/2026 3:25:49 PM