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March 27, 2025

ADDENDUM NO. 4
City of Madison, Engineering Division

CONTRACT NO. 9610
IMAGINATION CENTER AT REINDAHL PARK

This addendum is issued to modify, explain or correct the original Drawings, Specifications, or Contract Documents marked as **Imagination Center at Reindahl Park, Contract #9610, as issued on February 13, 2025** and is hereby made a part of the contract documents.

Please acknowledge this addendum on page E-1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

Electronic version of these documents can be found on Bid Express at https://www.bidexpress.com/ and the City of Madison web site at http://www.cityofmadison.com/business/PW/contracts/openforBid.cfm

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at (608) 266-4751 to receive the material by another method.

For questions regarding this bid, contact:
Brent Pauba
PH: (608) 266-4092
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Sincerely,

James M. Wolfe, P.E.
City Engineer

This addendum modifies the following documents:
1. 9610 Exhibit-A_drawings.pdf
2. 9610 Exhibit-B_specifications.pdf

Please attach these Addendum documents to the Drawings and Project manual in your possession.

1. GENERAL

A. No General Updates

2. BIDDER QUESTIONS AND ANSWERS

A. With the bid due date changing from 3/27 to 4/3, is the desired construction start date moving to "Thursday, April 10, 2025." And the desired substantial completion date moving to "Not later than Thursday, September 10, 2026."

i. **Start Work Letter (SWL) and Construction Closeout dates have not been modified.**

ii. **See 9610 Contract.pdf, SECTION-D, ARTICLE 109.7 TIME OF COMPLETION for information on SWL, Interim Completion Date #1, and Construction Closeout dates.**

B. Please provide the size or rating for the fire extinguishers so a cabinet size can be determined.

i. **Specification Section 10 44 00 – Fire Protection Specialties already specifies a Multi-Purpose Dry Chemical Class ABC Fire Extinguisher. Specification has been updated to indicated a 5 LB extinguisher size.**

C. For the epoxy flooring areas, the documents require sealing horizontal joints. Please verify if caulk or fill is required.

i. **Dynamic joints such as expansion/construction or isolation; include a closed cell backer rod 1/8" wider than the joint. Use a flexible joint material, Metzger/McGuire, VersaFlex or equal. The manufacturer recommends honoring the joint by making a sawcut through the finished floor at a minimum depth of 3/4" and 1/4" wide.**

ii. **See updated specification Section 09 67 23 – Resinous Flooring.**

D. Please confirm whether AWI QCP is required for any portion of the project.

i. **No**

E. What kind of stone is required to be installed? 1 ½" wash stone or a different type?

i. **See Section 32 93 00, 2.04**

Stone Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:

- **Material: Washed, rounded clear stone.**
- **Size: 1.5"**
- **Color range: blend of buff, & light brown tones.**
- **Sample: Submit sample of mulch to Landscape Architect for approval before installation.**

F. What is required for the stabilized aggregate pathway? Pea gravel or permeable aggregate? "

i. **See Section 32 14 13.13, 2.01**

Stabilized Aggregate Material: Aggregate consisting of sound, angular, durable particles with patented powdered organic binder made from 100% naturally occurring integral binding/stabilizing material, factory blended, specifically for use as a stabilized pathway and surfacing material for exterior applications. Basis of Design: Pathway Aggregate with Organic-Lock Stabilizer by Kafka Granite, or approved equal.

- **Gradation: Material needs be provided in accordance with ASTM C136.**
- **Color: Blend of beige, light brown and cream accents; BOD Color "Golden Cream Marble" by Kafka Granite, or approved equal.**

G. Do we need to add a monitor for the E4 camera?

i. **Yes, per note 18 on sheet T101**

H. If we are providing an NVR for this site, how many days of retention time can we consider for recording?

i. **NVR is not required.**

I. Who will be responsible for the NVR and POE switches, camera licenses and cable? As per Div 28, it looks like it is in the customer's scope. Please verify."

i. **NVR is not required. The Owner purchases switches with the required POE. The Owner is providing camera licenses per Section 28 20 00, article 1.03C. Camera cabling is by Division 27 per detail C1 on sheet T101.**

J. Is stack signage by GC or by owner? This includes the "Nonfiction" and "Romance" signage shown in the bid documents.
- i. **Signage related to library collections (books, magazines, media) is outside the scope of this contract.**
- ii. **See updated Sheets AI412 and AI413.**

K. The specs only state - minimum 6" - as a dimension for the signage. Please specify the length x width dimensions for any sign that is greater than 6" in either direction.
- i. **Refer to the signage schedule on Sheet AI413 for dimensions, font sizes, etc.**

L. Provide dimensions for vertical identification/wayfinding signs/letters.
- i. **Refer to the signage schedule on Sheet AI413 for dimensions, font sizes, etc.**

M. Can the injection molded signage be 3D printed?
- i. **Yes**

N. For the "Targeted Business Enterprise Compliance Report Contact Report" which is required to be submitted with the bid for Imagination Center at Reindahl Park Contract No. 9610 in accordance with Addenda #1 "Bid Submittal Checklist For Contractor"; due to the increased number of TBEs contacted because of this project's TBE goal of 12% which includes subcontractors from SBE, MBE, WBE, and DBE directories of the City of Madison's Targeted Business Enterprise Programs we are requesting permission to submit the bid tracking sheet that has been used on similar City of Madison projects with DBE requirements. We had uploaded a similar form to the City previously.
- i. **Per DCR's response at the 3/20 SBE Meeting, a separate spreadsheet would be accepted in lieu of providing individual copies of the Target Business Enterprise Compliance Report – TBE Contact Report. If a separate spreadsheet is to be used, please indicate "see spreadsheet" on one copy of the TBE Contact Report. Ensure that the spreadsheet contains all the same required information as the TBE Contact Report. See example included with Addendum.**

O. Section 23 83 00, please verify if the tubing material is intended to be PEX/AL/PEX. Or, is standard crosslinked polyethylene with EVOH oxygen diffusion barrier, which is the majority, if not all, of what infloor radiant applications use, is acceptable and is actually the design intent?
- i. **Standard crosslinked polyethylene is acceptable.**
- ii. **See updated specification Section 23 83 00.**

P. Sheet E602, special purpose outlet EV1 – Electric Vehicle Juice Box. Aside from the connection shown on Sheet E010 this equipment is not listed anywhere else within the project documents. What are we providing for this connection? i.e., ground box for future, hard-wired connection, etc.
- i. **GC to provide EV charger and all associated electrical provisions.**
- ii. **See updated Sheets E602 and E611.**
- iii. **See new specification Section 26 27 29 – Electrical Vehicle Charging Station.**

Q. There are no specifications or part numbers listed for the EV Juice box; please provide. Who will be furnishing the EV Juice Box?
- i. **GC to provide EV charger and all associated electrical provisions.**
- ii. **See new specification Section 26 27 29 – Electrical Vehicle Charging Station for acceptable manufacturers.**

R. Per general note B & C on sheet E502, the Solar Tree will be purchased and installed (complete) by the General Contractor. Please confirm this is correct or clarify the exact scope of work required for both the GC & EC. Our understanding is that the EC is only responsible for the required electrical connections.
- i. **GC to procure and install solar tree as per described in the Bid Documents.**
- ii. **GC is to determine Scope of work for subcontractors.**

S. Sheet E620 states that the EC is to provide the utility transformer pad & empty raceway for the secondary service laterals. Per the MG&E handbook, these are to be furnished & installed by MG&E. Are we to follow the drawings or MG&E's handbook?

i. **Follow MG&E Handbook.**
ii. **See updated Sheet E620.**

T. MG&E requires the EC to stub conduit out of the CT cabinet. Typically, these conduits are SCH 40/80 PVC. Per specification section 26 05 33.13 – 4, Line F, all exterior conduit is to be either Galvanized Rigid Metal Conduit, Intermediate Metal Conduit, or PVC-coated galvanized steel rigid metal conduit. MG&E does not require these conduit types for their service entrance. Does the specification still apply here?
i. **On page 26 05 33.13-4 of the specification, section line F refers to Concealed within hollow stud walls conduit applications. Line C refers to Underground conduit applications. Follow C.3., C.4 and/or C.5 as required.**

U. The advertisement for bids & instructions to bidders references a pre-qualification application. Is this referencing the Best Value Contractor application or is there another application that needs to be submitted?
i. **See SECTION-A, PREQUALIFICATION APPLICATION of 9610 Contract.pdf. Relevant information copied for convenience below:**
ii. **PREQUALIFICATION APPLICATION: Forms are available on our website, www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-get-prequalified. If not currently prequalified in the categories listed in Section A, an amendment to your Prequalification will need to be submitted prior to the same due date. Postmark is not applicable**

V. Community Room 107
i. T701 - Why (3) 8 channel Shure WAPs for only 6 mics? (1) WAP would be sufficient unless more mics are to be added per the following question below.
   1. **More mics are anticipated after project completion.**
ii. Body packs mentioned in spec page 27 51 16 - 1, but no quantity or associated mic type listed in T701 equipment list. How many body packs and what mic type is desired?
   1. **See schedules on T701 and T702 for mics required.**
iii. T701 - What is the intended purpose of the Shure ANI USB on the AV flow?
   1. **To allow connection of patron's analog devices to the Dante network.**
iv. Switch model spec'd on T701 does not have enough ports for needed ethernet devices.
   1. **Switch was changed to 48 port in Addendum 1. If this is insufficient, inform City after bidding as the switch is owner-furnished.**
v. T701 AV flow material list shows a count of (2) NVX-E10 encoders. There are (4) sources that need encoders; UC-Engine, (2) HD-RX receivers for wall plate/floor box HDMI transmitters, Blu-ray player.
   1. **Blu-ray player was deleted in Addendum 1. One pair of encoders/decoders have now been added.**
vi. Where is the Crestron UC-PR going?
   1. **At the rack.**
vii. T701 - No control processor listed, please advise. (CP4N used as placeholder to serve both rooms 107 and 109.)
   1. **See updated Sheet T701.**
viii. Spec page 27 51 16 – 2, Item 2.04 A states speakers are to be 8", T701 specifies 6" QSC AD-C6T. Please advise.
   1. **Speaker description has been revised to match T701.**

W. Classroom 109
i. T702 - What is the intended purpose of the Shure ANI USB on the AV Flow?
   1. **To allow connection of patron's analog devices to the Dante network.**
ii. Does UC-PR stay in head-end rack, extended to wall plate via specified HDMI and USB wall plate transmitters?
   1. **Correct**.
iii. T702 - There are no NVX-D10s spec'd. (1) Will be needed.
   1. **One pair of encoders/decoders have been added.**
iv. Spec 27 51 16 – 2 item 1.44.C.2.a states handheld mics are required but T702 lists no HH mics or associated receivers. Please advise.
   1. **See Addendum 1**.

X. Pavilions 1 & 2
i. T704 - No control processor listed, please advise. (CP4N used as placeholder).
   1. **See Addendum 1.**

ii. T704 - DSP spec'd as "Biamp Server I/O" but no card types or counts are listed. Please advise quantity and type of cards desired and specify intended functions.
   1. **See functional description in Section 27 41 16 article 1.03 and provide appropriately.**

iii. T502 Rack drawing shows Shure Microflex wireless mics and charger, T704 AV flow equipment list shows Shure SLX wireless. Which is correct?
   1. **Revised to Microflex. See updated Sheet T704.**

iv. Cable TV is mentioned as a source on spec page 27 41 16 – 2 but is not shown on AV flow T703 or equipment list on T704.
   1. **Provide appropriate input facility.**

v. T704 – equipment list item HD-MD4X4-4KZ-E has been discontinued. Replace with HD-MD8X8-4KZ-E?
   1. **Revised to HD-MD8X8-4KZ-E. See updated Sheet T704.**

vi. Spec page 27 41 16 – 2 item E under System Functions mentions a 3.5mm audio jack. T703 AV flow and T704 equipment lists show no items with 3.5mm jacks. Note 69 on T101 says these should be ¼" jacks. Please confirm this jack plate type for block "I-O-1" and specify it's intended function.
   1. **Provide ¼" jacks. Note 69 describes the required function.**

vii. Spec page 27 51 16 – 2, Item 2.04A states speakers are to be 8"; T704 specifies 6" QSC AD-C6T. Please advise.
   1. **Speaker description has been revised to match T701.**

Y. Flat Screens

i. Spec page 27 51 23 – 1 item 1.01 lists NUC's and City-provided BrightSign players as sources. Please specify the type of NUC and whether or not it is client or contractor provided. Please also specify the desired licensing type and duration needed(BrightSIgn, Reach, etc.)
   1. **Note that Addendum 1 revised the BrightSign players to contractor-furnished. NUCs have now been deleted as BrightSign players have HDMI outputs. A one-year BrightSign Network Pass will be required for each BrightSign player.**

ii. Spec page 27 51 23 – 1 item 2.01A States 'Samsung 65" PM-H'. Samsung PM-H series displays are only available 43", 49" and 55". Please advise approved substitute.
   1. **Revised to Samsung QMR 65.**
   2. **See updated specification.**

Z. Small Meeting Rooms 120, 121, 122: Where are the specs/system descriptions for these rooms?

i. **See AV Connection Schedule on T601 for requirements for FS-55 and AV IN-A. These are all that is required in those rooms.**

AA. Specification Section 23 21 13 – Hydronic Piping: Please confirm that the project intended to specify type-K copper piping in lieu of type-L. "95%" of commercial projects specify type-L.

i. **It should be type L, not type K.**

ii. **See updated specification.**

BB. From Addendum #3 for Section 07 53 00 – Elastomeric Membrane Roofing: Is there a specific attachment you would like us to use to mechanically fasten the insulation? Or is the standard attachment sufficient?

i. **The A/E team reviewed the roof assembly as a whole and clarified the attachment methods for each layer. Standard mechanical attachment for the insulation is sufficient, as long as it meets the membrane manufacturer's recommendations.**

ii. **See updated specification.**

3. ACCEPTABLE EQUIVALENTS

A. Specification Section 26 09 23 – Lighting Control Devices – Lutron, Creston.

i. **Request is approved – see updated specification.**

B. Specification Section 28 46 00 – Fire Detection and Alarm, Edwards.

i. **Request is approved – see updated specification.**

C. Specification Section 23 83 00 – Radiant Heating and Cooling Units, Watts Radiant - Radiant heating hydronic piping and system

i. **Request is approved – see updated specification.**

4. 9610 Contract

A. No change

5. 9610 Exhibit-A_drawings

A. G001 - "INDEX SHEET"

i. Revised sheets are indicated with revision mark "A4".

B. AI412 - "SIGNAGE PLAN"

i. Removed stacked signage – not in scope.

C. AI413 – "SIGNAGE SCHEDULE"

i. Removed stacked signage – not in scope.

D. E602 - "ELECTRICAL SCHEDULES"

i. Revised EV1 requirements.

E. E611 – "PANEL SCHEDULES"

i. Revised circuit breaker size for circuit 17,19.

F. E620 – "ELECTRICAL ONE-LINE POWER DIAGRAM"

i. Revised transformer pad and service entrance conduit requirements.

G. T701 – "AV FLOW DIAGRAMS"

i. See sheet for revisions.

H. T702 – "AV FLOW DIAGRAMS"

i. See sheet for revisions.

I. T704 – "AV FLOW DIAGRAMS"

i. See sheet for revisions.

6. 9610 Exhibit-B_specifications

A. 00 01 10 TABLE OF CONTENTS

i. Sections revised, added or omitted are noted in the Table of Contents with (A4) after section title.

B. 07 53 00 ELASTOMERIC MEMBRANE ROOFING

i. Paragraph 2.03.C: Clarified requirements of vapor retarder.

ii. Paragraph 3.03.A: replaced "deck surface" with "bottom Cover Board-Layer"; added self-adhesive to description.

iii. Paragraph 3.03.C: Change method of attachment for insulation to mechanically fastened.

iv. Paragraph 3.03.D.1: Clarified two (2) Cover Board layers per Roof Assembly diagram on the drawings and respective attachment methods.

C. 08 80 00 GLAZING

i. Paragraph 2.04.C.3: removed requirement for Self-cleaning type on #1 surface of IG-1.

ii. Paragraph 2.04.D.3: removed requirement for Self-cleaning type on #1 surface of IG-1B.

iii. Paragraph 2.04.E.3: removed requirement for Self-cleaning type on #1 surface of IG-2.

iv. Paragraph 2.04.F.3: removed requirement for Self-cleaning type on #1 surface of IG-2B.

D. 09 30 00 TILING

i. Paragraph 1.05.B: added requirement to confirm lead times for tile as part of submittal.

ii. Paragraph 2.01.B.5: Specified tile for CWT-05 is discontinued. Provided replacement specification for CWT-05.

E. 09 67 23 RESINOUS FLOORING

i. Paragraph 3.02.A.6: added content for Horizontal joint preparation for Dynamic and Static joints.

F. 10 14 00 SIGNAGE

i. Paragraph 1.04.I.1: Corrected section reference for Maintenance Materials.

ii. Paragraph 2.01.A.5: Corrected section reference for substitutions.

iii. Paragraph 2.01.B.4: Corrected section reference for substitutions.

iv. Paragraph 2.02.B.10: Omitted Stack signage.

v. Paragraph 2.01.A.3: Added 3D printer as acceptable means of fabrication.

vi. Paragraph 2.05.A.1: Added 3D printed as acceptable material.

G. 10 22 39 FOLDING PANEL PARTITIONS

i. Paragraph 2.02.C.2: Omitted Clear Anodized as Exposed metal trim finish and replaced with "Selected by Architect from Manufacturer's standard finish options".

ii. Paragraph 2.02.F.1.a: Changed STC rating from "Equal to or greater than 55" to "52-57".

iii. Paragraph 2.02.G.5: Omitted Pocket Enclosures.

H. 10 44 00 FIRE PROTECTION SPECIALTIES
- **i.** Paragraph 2.01.A.8: Corrected section reference for substitutions.
- **ii.** Paragraph 2.01.B.8: Corrected section reference for substitutions.
- **iii.** Paragraph 2.01.C.2: Corrected section reference for substitutions.
- **iv.** Paragraph 2.02.B: Added Aluminum as acceptable tank material.
- **v.** Paragraph 2.02.B.2: Changed size of extinguisher to 5 pound.
- **vi.** Paragraph 2.02.B.3: Added finish of extinguisher to be Baked polyester powder coat, red color.

I. 23 21 13 HYDRONIC PIPING
- **i.** Paragraph 2.02.C: Changed copper tube from Type K to Type L.
- **ii.** Paragraph 2.03.C: Changed copper tube from Type K to Type L.
- **iii.** Paragraph 2.05.B: Changed copper tube from Type K to Type L.
- **iv.** Paragraph 2.06.A: Changed copper tube from Type K to Type L.

J. 23 83 00 RADIANT HEATING AND COOLING UNITS
- **i.** Paragraph 2.01.A: Updated material specifications for tube.
- **ii.** Paragraph 2.01.C: Added Watts as an approved manufacturer.

K. 26 09 23 LIGHTING CONTROL DEVICES - LUTRON
- **i.** Paragraph 2.01.B: Corrected section reference for substitutions.
- **ii.** Paragraph 2.01.C: Added Crestron Zum as an approved equal.

L. 26 27 29 ELECTRIC VEHICLE CHARGING STATION
- **i.** NEW section added.

M. 27 51 16 LIBRARY AUDIO VISUAL SYSTEMS
- **i.** Paragraph 2.04.A: Omitted specific requirements of Speakers and replaced with “See plans”.
- **ii.** Paragraph 2.04.B: Omitted specific requirements of Speakers Baffles and Enclosure and replaced with “See plans”.

N. 27 51 23 FLAT SCREENS
- **i.** Paragraph 1.01.B: Omitted NUCs.
- **ii.** Paragraph 1.01.D: Added language for BrightSign licensing.
- **iii.** Paragraph 1.01.E: Omitted "Install City furnished” and replaced with “At each display, provide a...”.
- **iv.** Paragraph 2.01.A.1: Changed Display size from 65” to 55”.
- **v.** Paragraph 2.01.B.1: Changed diagonal size from 65” to 55”.
- **vi.** Paragraph 2.01.C: Omitted “similar for 55” displays” and replaced with “Samsung QMR 65 for 65” displays”.

O. 28 46 00 FIRE DETECTION AND ALARM
- **i.** Paragraph 2.01.B: Added Edwards as acceptable Manufacturer.
- **ii.** Paragraph 2.01.C: Added Edwards as acceptable Manufacturer.
- **iii.** Paragraph 2.01.D: Corrected section reference for substitutions.

P. 32 17 23 PAVEMENT MARKINGS
- **i.** Reverted back to paint in lieu of thermosplastic paint.
- **ii.** Added reference to the specific WISDOT section for paint products.

7. 9610 Exhibit-C_drawing_landsForWork

A. No change

8. 9610 Exhibit-D_ConstructionSequenceRequirements

A. No change

9. 9610 Reference-1_survey_topographic

A. No change

10. 9610 Reference-2_survey_ALTA

A. No change

11. 9610 Reference-3_report_AsbestosLead

A. No change

12. **9610 Reference-4_report_GeotechExploration**
    A. No change

13. **9610 reference-5_drawings_existingConditions**
    A. No change

14. **9610 reference-6_form_BidSubmittalChecklist**
    A. No change

15. **9610 Proposal Page**
    A. No change

ADDENDUM-4
TBE CONTRACT REPORT TRACKING - EXAMPLE

Company	Address	Telephone Number	Contact Person/Title	Question 1: Outline below all efforts to solicit a bid from the TBE. Include date, means of contact, who from your company made this contact and the result.	Question 2: Describe the information provided to the aforementioned TBE regarding the scope of work for which he/she was to provide a bid.	Question 3: Is this the same scope of work on which the subcontractor you intend to utilize based his/her bid? (Yes/No)	Did this TBE submit a bid? (Yes/No)	Is the General Contractor pre-qualified to self-perform this category of work? (Yes/No)

If you responded "Yes" to Question 3, please indicate which items (Items 1-5) apply and provide the requested detail. If you responded "No" to Question 3, please skip ahead to Question 6.	Item 1: The TBE listed is unavailable for work on this project for the following reasons. Provide specific detail for this conclusion. (Yes/No + Detail)	Item 2: The TBE listed is unqualified for work on this project. Provide specific details for this conclusion. (Yes/No + Detail)	Item 3: The TBE listed provided a price that was unreasonable (i.e. more than 5% above the lowest bidder). Provide specific detail for this conclusion including the TBE's price and the price of the subcontractor you intend to utilize. (Yes/No + Detail)	Item 3: A contract with the TBE listed may constitute a breach of the bidder's collective bargaining agreements. Provide specific detail for this conclusion including, but not limited to, correspondence from the TBE indicating it will not sign a project labor agreement and/or correspondence from the applicable trade union indicating a project labor agreement will not be allowed at the time of project bidding. (Yes/No + Detail)	Other; please specify reason(s) other than previously listed which made it impossible for you to utilize this TBE on this project. (Yes/No + Detail)	Question 6: Describe any other good faith efforts

ADDENDUM-4
DRAWINGS

ABBREVIATIONS

A
A/C air condition
A/E Architect/Engineer
ACT acoustical ceiling tile
ADDL additional
ADDM addendum
AFC above finished counter
AFF above finished floor
AFG above finished grade
AFS above finished slab
ALT alternate
ALUM aluminum
APPD approved
APT apartment
ASC above suspended ceiling

B
BB baseboard
BB bulletin board
BLDG building
BL blinds (window)
BLT borrowed light
BLW below
BPL base plate
BO bottom of
BOS bottom of steel

C
CB catch basin
CB construction bulletin
CF/CI contractor furnished, contractor installed
CF/OI contractor furnished, owner installed
CF/VI contractor furnished, vendor installed
CG corner guard
CH BD chalkboard
CIP cast-in-place
CJ control joint
CJ construction joint
CL centerline
CLG ceiling
CLR clear
CM construction management
CMU concrete masonry unit
CO cleanout
COL column
CONC concrete
CORR corridor
CONT continuous
CPT carpet
CSWK casework
CT ceramic tile
CTB ceramic tile base

D
DEMO demolition
DEPT department
DF drinking fountain
DFS Door and Frame Schedule
DH double hung
DIA diameter
DR door
DR FR door frame
DTL detail
DW dishwasher
DWG drawing

E
E east
EIFS exterior insulation & finish system
EL elevation
ELEC electric, electrical
ELEV elevator
EP epoxy
EPB epoxy base
EPS expanded polystyrene board
EQ equal
EXIST existing
EXP expand, expansion
EXT exterior

F
F female
F filler
FA fire alarm
FAB fabric
FAX facsimile
FC file cabinet
FD floor drain
FEC fire extinguisher cabinet
FHC fire hose cabinet
FG foot grille
FLR floor
FM factory mutual
FM floor mat
FP fire protection
FP fireproof
FPL fire place
FRP fiber reinforced panel
FT feet
FTG footing
FWP fabric wrapped panel

G
GA gage
GALV galvanized
GB grab bar
GC general contractor
GL glass
GLT glass tile

G (continued)
GLU LAM glued laminated wood
GR grade, grading
GRAN granite
GT grout
GWT glazed wall tile
GYP BD gypsum board

H
HB hose bibb
HC hollow core
HCP handicapped
HM hollow metal
HORIZ horizontal
HSKPG housekeeping
HT height
HVAC heating, ventilating & air conditioning
HW hot water
HWF hardwood floor
HWY highway

I
ID inside diameter
INSUL insulation
INT interior

J
JS janitor sink

K

L
LAM laminate
LAV lavatory
LL live load

M
MAX maximum
MC modular carpet tile
MECH mechanical
MFR manufacturer
MIN minimum
MIN minute
MISC miscellaneous
MO masonry opening
MS mop sink
MRB marble base
MRF marble floor
MTL metal

N
N north
N/A not applicable

N (continued)
NIC not in contract
NO number
NOM nominal
NS no scale
NTS not to scale

O
OC on center
OD outside diameter
OF/CI owner furnished, contractor installed
OF/OI owner furnished, owner installed
OF/VI owner furnished, vendor installed
OH DR overhead (coiling) door
OPH opposite hand
OPNG opening

P
PLAM plastic laminate
PLYWD plywood
PREFAB prefabricated
PREFIN prefinished
PSI pounds per square inch
PT paint, painted
PTN partition

Q
QT quarry tile
QTB quarry tile base

R
RB resilient base
RCP reflected ceiling plan
RD roof drain
REBAR reinforcing steel bars
RF resilient flooring
RFS room finish schedule
RO rough opening

S
S south
SAN sanitary
SC sealed concrete
SC solid core
SF square foot
SH shades
SIM similar
SS stainless steel
SSF solid surface
ST stain
ST stair
STN stone

S (continued)
STNB stone base
STRUCT structure
SV sheet vinyl

T
T&M time & materials
TEMP temperature
TER terrazzo
TERB terrazzo base
TFF top of finish floor
TK BD tackboard
TO top of ____
TOB top of beam
TOC top of concrete
TOJ top of joist
TOPO topography
TOS top of slab
TOS top of steel
TV television
TYP typical

U
UNO unless noted otherwise
UON unless otherwise noted

V
VCT vinyl composition tile
VF/CI vendor furnished, contractor installed
VF/OI vendor furnished, owner installed
VF/VI vendor furnished, vendor installed
VNR veneer
VIF verify in field
VWC vinyl wall covering

W
W west
W/ with
W/O without
WC water closet
WC wall covering
WD wood
WDB wood base
WDV wood veneer
WH water heater
WP wall protection
WP workpoint

X
XPS extruded polystyrene board (insul)

Y Z

SYMBOL LEGEND

VIEW NUMBER / TITLE / 1/2" = 1' - 0" — VIEW NAME / VIEW SCALE

DETAIL CALLOUT — 00 / A000 / SIM

SECTION CALLOUT — 00 / A000 / SIM

ELEVATION CALLOUT — 1 / 2 / 3 / 4 / A000

ELEVATION DATUM — Level / 0' - 0"

NORTH ARROW

EXISTING CONSTRUCTION

DEMOLITION

NEW CONSTRUCTION

WALL TAG — XX

DOOR TAG — 000

KEYNOTE TAG — 000.000

REVISION TAG — 0

FURNITURE TAG — 000

EQUIPMENT TAG — 000

WINDOW TAG — XX

CASEWORK TAG (PLAN OR ELEVATION) — 000 / W' x H' x D"

FINISH PLAN TAG — FLOOR / BASE / WALL / REMARKS

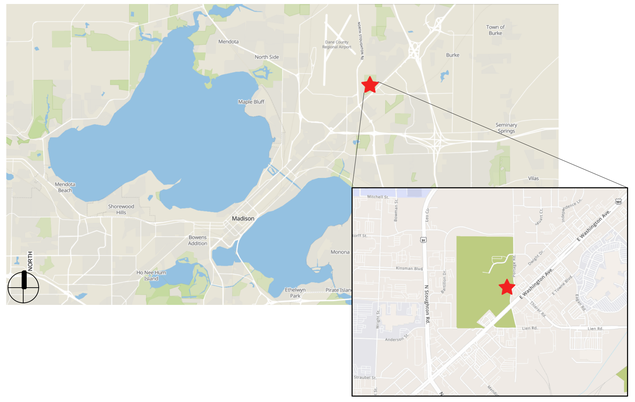
CEILING TAG — TYPE / HEIGHT

ROOM TAG — NAME / 0000

NEW GRID AND IDENTIFICATION — A A / 1 / 2

EXISTING GRID AND IDENTIFICATION — A A B / 1 / 2

VICINITY MAP



SHEET ORGANIZATION

EACH DRAWING SHEET IS BASED UPON A 30 SQUARE GRID SYSTEM, STARTING WITH '1' IN THE TOP LEFT HAND CORNER AND WORKING LEFT-TO-RIGHT AND TOP-TO-BOTTOM TO '30' IN THE BOTTOM RIGHT HAND CORNER, EXAMPLE BELOW:

1	2	3	4	5	6	TITLEBLOCK
7	8	9	10	11	12	
13	14	15	16	17	18	
19	20	21	22	23	24	
25	26	27	28	29	30	

3/27/2025 9:31:14 AM

PROJECT ADDRESS

IMAGINATION CENTER AT REINDAHL PARK

LIBRARY: 1814 PARKSIDE DR.
MADISON, WI 53704

PAVILION: 1818 PARKSIDE DR.
MADISON, WI 53704

CONTRACT No: 9610

MUNIS No: 17085

OWNER INFORMATION

CITY OF MADISON
210 MARTIN LUTHER KING, JR. BLVD.
MADISON, WI 53703-3342

CONTACT: Brent Pauba - Department of Public Works, Engineering Division
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MAIN: 608.266.4092

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G000–G300, ASP-200, A101–A811

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C100–C904

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LANDSCAPE SHEETS:
L101–L601

STRUCTURAL ENGINEERING

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STRUCTURAL SHEETS:
S001–S603

PLUMBING & FIRE PROTECTION

GRAEF, INC.
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MILWAUKEE, WI 53203
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EMAIL: jessica.culver@graef-usa.com
MAIN: 414.266.9008
FIRE PROTECTION SHEETS: F001–F101
PLUMBING SHEETS: P001–P911

MECHANICAL

GRAEF, INC.
1010 EAST WASHINGTON AVENUE, SUITE 202
MADISON, WI 53703
CONTACT: Matt Garcia, PE
EMAIL: matthew.garcia@graef-usa.com
MAIN: 414.266.9232
MECHANICAL SHEETS:
M001–M806

ELECTRICAL & TECHNOLOGY

GRAEF, INC.
275 WEST WISCONSIN AVENUE, SUITE 300
MILWAUKEE, WI 53203
CONTACT: Beth Ann Bruss, DES
EMAIL: beth.bruss@graef-usa.com
MAIN: 414.266.9252
ELECTRICAL SHEETS: ES001–E620
TECHNOLOGY SHEETS: T001–T704

INTERIOR DESIGN

INTERIOR LOGIC
1201 SOUTH STOUGHTON ROAD, SUITE 150
MADISON, WI 53716
CONTACT: Robin Stroebel, ASID, RID, LEED AP ID +C, WELL AP
EMAIL: rstroebel@intlogic.com
MAIN: 608.316.3870
INTERIORS SHEETS:
AI102–AI413

SET ISSUE

BID DOCUMENTS

JANUARY 6, 2025

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G101	CODE INFORMATION		
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CIVIL			
C100	EXISTING CONDITIONS		
C101	EXISTING CONDITIONS - SURVEY		
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C300	SITE LAYOUT PLAN		
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A515	BUILDING DETAILS		
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MADISON | MILWAUKEE | DENVER
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JLA PROJECT NUMBER: 20-0928

MADISON PUBLIC LIBRARY

play MADISON PARKS

IMAGINATION CENTER AT REINDAHL PARK

BID DOCUMENTS

DATE OF ISSUANCE JANUARY 6, 2025

REVISION SCHEDULE

Mark	Description	Date
A1	ADDENDUM #1	03/07/2025
A3	ADDENDUM #3	03/20/2025
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

INDEX SHEET

SHEET NUMBER

G001

BASIS OF DESIGN SIGNAGE:

COMFORT ROOM

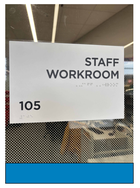
ADA/FAMILY RESTROOMS W/ CHANGING TABLE & MEN'S/WOMEN'S RESTROOM GRAPHIC

SIGNAGE NOTES:

- IMAGES PROVIDED FOR BASIS OF DESIGN ONLY. FINAL SIGNAGE DESIGN BY SUPPLIER. PROVIDE SHOP DRAWINGS FOR APPROVAL.
- EXTERIOR MONUMENT & BUILDING SIGNAGE - SEE ARCHITECTURAL DRAWINGS.
- DONOR SIGNAGE BY LIBRARY.
- A/V SIGNAGE - SEE TECHNOLOGY DRAWINGS.
- FOLLOW ADA SIGNAGE INSTALLATION GUIDELINES.
- COORDINATE MOUNTING HEIGHTS FOR EXTERIOR APPLIACTIONS.

VERTICAL IDENTIFICATION/ WAYFINDING

ROOM NAME & NUMBER



ROOM NAME & NUMBER W/ DONOR

ROOM NAME & NUMBER W/ DONOR

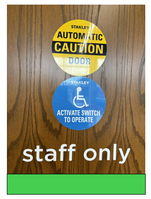
ROOM NAME & NUMBER W/ INSERT

NON-ADA RESTROOMS

ADA RESTROOMS

ADA/FAMILY RESTROOMS W/ CHANGING TABLE

ADHESIVE/DOOR EXAMPLES

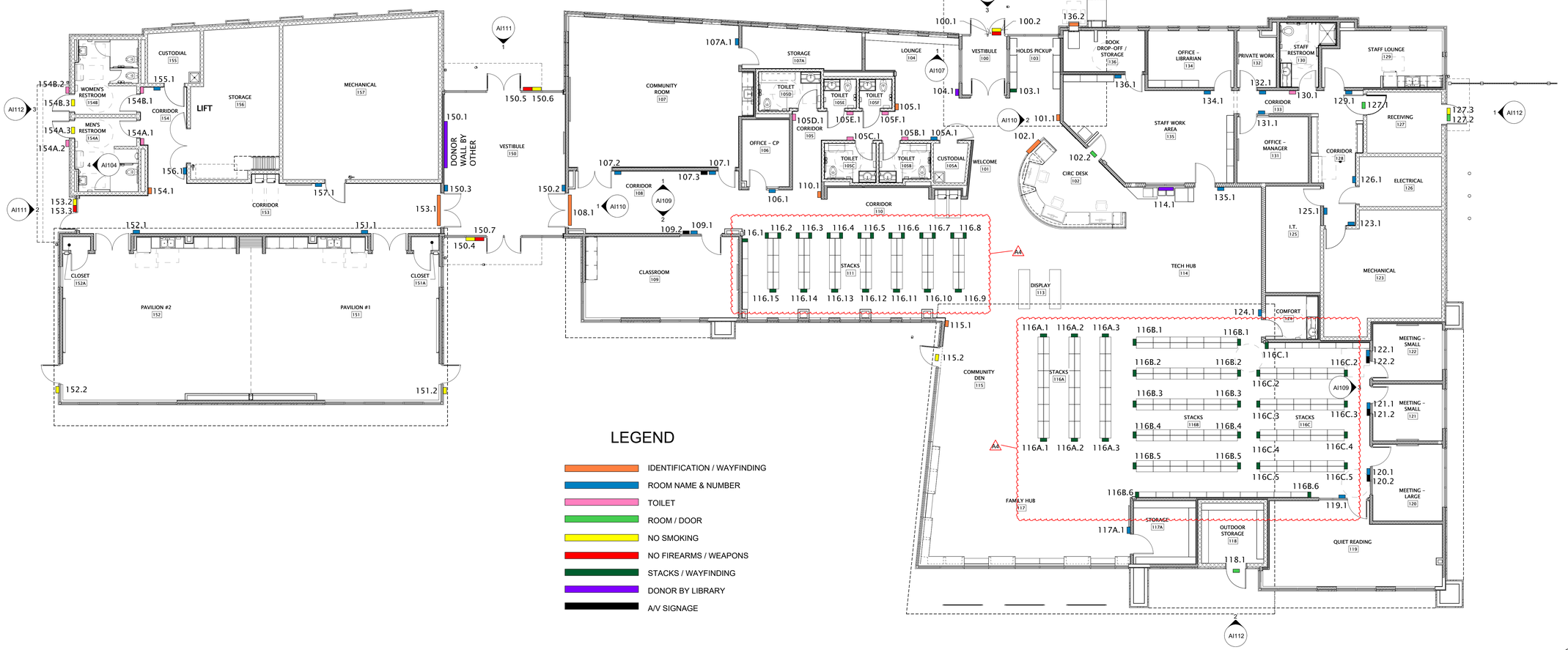


OMIT

STACK SIGNAGE OUTSIDE OF SCOPE

DONOR ONLY

A/V



LEGEND

- IDENTIFICATION / WAYFINDING
- ROOM NAME & NUMBER
- TOILET
- ROOM / DOOR
- NO SMOKING
- NO FIREARMS / WEAPONS
- STACKS / WAYFINDING
- DONOR BY LIBRARY
- A/V SIGNAGE

1 FIRST FLOOR SIGNAGE PLAN
1/8" = 1'-0"

NORTH

3/25/2025 3:54:09 PM

JLA ARCHITECTS
MADISON | MILWAUKEE | DENVER
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InteriorLOGIC workplace strategy
1201 S. STOUGHTON RD.
MADISON, WI 53716

JLA PROJECT NUMBER: 20-0928

CITY OF MADISON WISCONSIN

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IMAGINATION CENTER AT REINDAHL PARK

BID DOCUMENTS

PROGRESS DOCUMENTS

These documents reflect progress and intent and may be subject to change, including additional detail. These are not final construction documents and should not be used for final bidding or construction-related purposes.

DATE OF ISSUANCE JANUARY 6, 2025

REVISION SCHEDULE

Mark	Description	Date
A4	Stack signage outside of scope.	03/26/2025

SHEET TITLE

SIGNAGE PLAN

SHEET NUMBER

AI412

ROOM #	ROOM NAME	SIGN NUMBER	SIGN SIZE WIDTH	SIGN SIZE HEIGHT	SIGN SIZE THICK	FONT SIZE	MOUNTING	MATERIAL	TYPE	DONOR	BRAILLE	MESSAGE	NOTES
100	Vestibule	100.1				Font Size: 1"	Apply to door	Vinyl Applied Adhesive	City Ordinance	N	N	NO FIREAMRS/WEAPONS	See elevation 3 on sheet AI111
100	Vestibule	100.2				Font Size: 1"	Apply to door	Vinyl Applied Adhesive	City Ordinance	N	N	NO SMOKING	See elevation 3 on sheet AI111
101	Welcome	101.1				Font Size: 6" Font Thickness: 1/2"	Vertical	Plastic	Identification	N	N	CHECKOUT	See elevation 2 on sheet AI110
102	Circ Desk	102.1				Font Size: 3" Font Thickness: 1/2"	Horizontal	Plastic	Identification	N	N	BOOK DROP	Mount to reception desk See elevation 2 on sheet AI110
102	Circ Desk	102.2				Font Size: 2"	Apply to door	Vinyl Applied Adhesive	Door	N	N	STAFF ONLY	
103	Holds Pickup	103.1	9"	6"		Font Size: 5/8"		Plastic	Stacks/Surface Mount	N	N	HOLDS PICKUP	
104	Lounge	104.1						Plastic	Donor Sign	Y	N	TBD - by library	Donor sign by library
105	Corridor	105.1				Font Size: 6" Font Thickness: 1/2"	Vertical	Plastic	Identification	N	N	RESTROOMS	
105A	Custodial	105A.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	CUSTODIAL 105A	
105B	Toilet	105B.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	RESTROOM 105B Graphics: ADA, Water Closet, and Changing Table	
105C	Toilet	105C.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	RESTROOM 105C Graphics: ADA, Water Closet, and Changing Table	
105D	Toilet	105D.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	RESTROOM 105D Graphics: ADA, Water Closet, and Changing Table	
105E	Toilet	105E.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	RESTROOM 105E Graphic: Water Closet Graphic	
105F	Toilet	105F.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	RESTROOM 105F Graphic: Water Closet Graphic	
106	Office - CP	106.1	9"	6"		Font Size: 5/8"	Apply to sidelight	Plastic	Room	N	Y	OFFICE - CP 106	Include insert template; Include back panel for sidelight
107	Community Room	107.1	9"	6"		Font Size: 5/8"		Plastic	Room	Y	Y	COMMUNITY ROOM 107 Include Donor Name(s)	See elevation 1 on sheet AI109
107	Community Room	107.2	9"	6"		Font Size: 5/8"		Plastic	Room	Y	Y	COMMUNITY ROOM 107 Include Donor Name(s)	See elevation 1 on sheet AI109
107	Community Room	107.3						A/V	A/V	N	N		See elevation 1 on sheet AI109
107A	Storage	107A.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	STORAGE 107A	Include insert template;"staff only"
108	Corridor	108.1				Font Size: 6" Font Thickness: 1/2"	Horizontal	Plastic	Identification	N	N	PAVILIONS	See elevation 1 on sheet AI110

ROOM #	ROOM NAME	SIGN NUMBER	SIGN SIZE WIDTH	SIGN SIZE HEIGHT	SIGN SIZE THICK	FONT SIZE	MOUNTING	MATERIAL	TYPE	DONOR	BRAILLE	MESSAGE	NOTES
109	Classroom	109.1	9"	6"		Font Size: 5/8"	Mount on sidelight	Plastic	Room	Y	Y	CLASSROOM 109 Include Donor Name(s)	Include back panel for sidelight See elevation 2 on sheet AI109
109	Classroom	109.2					Mount to sidelight	A/V	A/V	N	N		See elevation 2 on sheet AI109
110	Corridor	110.1				Font Size: 6" Font Thickness: 1/2"	Vertical	Plastic	Identification	N	N	RESTROOMS	
114	Tech Hub	114.1						Plastic	Donor Sign	N	Y	TBD - by library	Donor sign by library
115	Community Den	115.1				Font Size: 6" Font Thickness: 1/2"	Vertical	Plastic	Identification	N	N	CHECKOUT	
115	Community Den	115.2				Font Size: 1"	Apply to door	Vinyl Applied Adhesive	City Ordinance	N	N	NO SMOKING	Apply to door - must be legible from the exterior side
116	Stacks	116.1											
116	Stacks	116.2											
116	Stacks	116.3											
116	Stacks	116.4											
116	Stacks	116.5											
116	Stacks	116.6											
116	Stacks	116.7											
116	Stacks	116.8											
116	Stacks	116.9											
116	Stacks	116.10.											
116	Stacks	116.11											
116	Stacks	116.12											
116	Stacks	116.13											
116	Stacks	116.14											
116	Stacks	116.15											
116A	Stacks	116A.1											
116A	Stacks	116A.2											
116A	Stacks	116A.3											
116B	Stacks	116B.1											
116B	Stacks	116B.2											
116B	Stacks	116B.3											

Stack signage outside of scope. By library.

A4

ROOM #	ROOM NAME	SIGN NUMBER	SIGN SIZE WIDTH	SIGN SIZE HEIGHT	SIGN SIZE THICK	FONT SIZE	MOUNTING	MATERIAL	TYPE	DONOR	BRAILLE	MESSAGE	NOTES
116B	Stacks	116B.4											
116B	Stacks	116B.5											
116B	Stacks	116B.6											
116C	Stacks	116C.1											
116C	Stacks	116C.2											
116C	Stacks	116C.3											
116C	Stacks	116C.4											
116C	Stacks	116C.5											
117A	Storage	117A.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	STORAGE 117A	Include insert template;"staff only"
118	Outdoor Storage	118.1				Font Size: 2"	Apply to door	Vinyl Applied Adhesive	Door/ Exterior	N	N	STAFF ONLY	Apply to door - must be legible from the exterior side See elevation 2 on sheet AI112
119	Quiet Reading	119.1	9"	6"		Font Size: 5/8"	Mount to sidelight	Plastic	Room	Y	Y	QUIET READING 119 Include Donor Name(s)	Include back panel for sidelight
120	Meeting - Large	120.1	9"	6"		Font Size: 5/8"	Mount to sidelight	Plastic	Room	Y	Y	MEETING 120 Include Donor Name(s)	Include back panel for sidelight
120	Meeting - Large	120.2					Mount to sidelight	A/V	A/V	N	N		
121	Meeting - Small	121.1	9"	6"		Font Size: 5/8"	Mount to sidelight	Plastic	Room	Y	Y	MEETING 121 Include Donor Name(s)	Include back panel for sidelight
121	Meeting - Small	121.2					Mount to sidelight	A/V	A/V	N	N		
122	Meeting - Small	122.1	9"	6"		Font Size: 2"	Mount to sidelight	Plastic	Room	Y	Y	MEETING 122 Include Donor Name(s)	Include back panel for sidelight
122	Meeting - Small	122.2					Mount to sidelight	A/V	A/V	N	N		
123	Mechanical	123.1	9"	6"		Font Size: 2"		Plastic	Room	N	Y	MECHANICAL 123	
124	Comfort	124.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	COMFORT ROOM 124 Graphic: see sheet AI412 comfort room basis of design signage	
125	I.T.	125.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	I.T. 125	
126	Electrical	126.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	ELECTRICAL 126	
127	Receiving	127.1				Font Size: 2"	Apply to door	Vinyl Applied Adhesive	Room/Door	N	N	RECEIVING	Apply to door
127	Receiving	127.2				Font Size: 2"	Apply to door	Vinyl Applied Adhesive	Room/Door/ Exterior	N	N	STAFF ENTRANCE	Apply to door - must be legible from exterior side See elevation 1 on sheet AI112

ROOM #	ROOM NAME	SIGN NUMBER	SIGN SIZE WIDTH	SIGN SIZE HEIGHT	SIGN SIZE THICK	FONT SIZE	MOUNTING	MATERIAL	TYPE	DONOR	BRAILLE	MESSAGE	NOTES
127	Receiving	127.3	9"	6"		Font Size: 1"	Apply to door	Plastic	Room/Door/ Exterior	N	N	NO SMOKING	Apply to door - must be legible from exterior side See elevation 1 on sheet AI112
129	Staff Lounge	129.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	STAFF LOUNGE 129	
130	Staff Restroom	130.1	9"	6"		Font Size: 5/8"		Plastic	Toilet	N	Y	RESTROOM 130 Graphics: Water Closet and ADA	
131	Office - Manager	131.1	9"	6"		Font Size: 5/8"	Mount to sidelight	Plastic	Room	N	Y	OFFICE - MANAGER 131	Include insert template; Include back panel for sidelight
132	Private Work	132.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	PRIVATE WORK 132	
134	Office - Librarian	134.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	LIBRARIAN 134	Include insert template
135	Staff Work Area	135.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	STAFF WORKROOM 135 (Insert by Library: "Staff Only")	Include insert template
136	Book Drop-Off/Storage	136.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	BOOK DROP-OFF / STORAGE 136	
136	Book Drop-Off/Storage	136.2	9"	6"		Font Size: 3" Font Thickness: 1/2"		Plastic	Identification	N	N	RETURNS	Coordinate exterior mounting See elevation 3 on sheet AI111
150	Vestibule	150.1							Donor Sign	Y	N		Donor sign by library
150	Vestibule	150.2	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	LIBRARY	
150	Vestibule	150.3	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	PAVILIONS	
150	Vestibule	150.4				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO SMOKING	
150	Vestibule	150.5				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO FIREARMS/WEAPONS	
150	Vestibule	150.6				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO SMOKING	
150	Vestibule	150.7				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO FIREARMS/WEAPONS	
151	Pavilion #1	151.1	9"	6"		Font Size: 5/8"		Plastic	Room	Y	Y	PAVILION 1 151 Include Donor Name(s)	
151	Pavilion #1	151.2				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO SMOKING	
152	Pavilion #2	152.1	9"	6"		Font Size: 5/8"		Plastic	Room	Y	Y	PAVILION 2 152 Include Donor Name(s)	
152	Pavilion #2	152.2				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO SMOKING	
153	Corridor	153.1				Font Size: 6" Font Thickness: 1/2"	Horizontal	Plastic	Identification	N	N	LIBRARY	
153	Corridor	153.2				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO SMOKING	
153	Corridor	153.3				Font Size: 1"	Mount to sidelight	Vinyl Applied Adhesive	Door/ Sidelight/ Exterior	N	N	NO FIREARMS/WEAPONS	
154	Corridor	154.1				Font Size: 6" Font Thickness: 1/2"	Vertical	Plastic	Identification	N	N	RESTROOMS	
154A	Men's Restroom	154A.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	MEN Graphics: Men's Restroom, ADA, Changing Table, and Water Closet	

ROOM #	ROOM NAME	SIGN NUMBER	SIGN SIZE WIDTH	SIGN SIZE HEIGHT	SIGN SIZE THICK	FONT SIZE	MOUNTING	MATERIAL	TYPE	DONOR	BRAILLE	MESSAGE	NOTES
154A	Men's Restroom	154A.2	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	MEN Graphics: Men's Restroom, ADA, Changing Table, and Water Closet	Exterior sign See elevation 3 on sheet AI112
154A	Men's Restroom	154A.3	9"	9"		Font Size: 1"	Apply to door	Vinyl Applied Adhesive	Door/Exterior	N	N	NO SMOKING	Apply to door - must be legible from the exterior side See elevation 3 on sheet AI112
154B	Women's Restroom	154B.1	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	WOMEN Graphics: Women's Restroom, ADA, Changing Table, and Water Closet	
154B	Women's Restroom	154B.2	9"	9"		Font Size: 5/8"		Plastic	Toilet	N	Y	WOMEN Graphics: Women's Restroom, ADA, Changing Table, and Water Closet	Exterior sign See elevation 3 on sheet AI112
154B	Women's Restroom	154B.3	9"	9"		Font Size: 1"	Apply to door	Vinyl Applied Adhesive	Door/Exterior	N	N	NO SMOKING	Apply to door - must be legible from the exterior side See elevation 3 on sheet AI112
155	Custodial	155.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	CUSTODIAL 155	
156	Storage	156.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	STORAGE 156	
157	Mechanical	157.1	9"	6"		Font Size: 5/8"		Plastic	Room	N	Y	MECHANICAL 157	

SIGNAGE NOTES:

- IMAGES PROVIDED FOR BASIS OF DESIGN ONLY. FINAL SIGNAGE DESIGN BY SUPPLIER. PROVIDE SHOP DRAWINGS FOR APPROVAL.
- EXTERIOR MONUMENT & BUILDING SIGNAGE – SEE ARCHITECTURAL DRAWINGS.
- DONOR SIGNAGE BY LIBRARY.
- A/V SIGNAGE – SEE TECHNOLOGY DRAWINGS.
- FOLLOW ADA SIGNAGE INSTALLATION GUIDELINES.
- COORDINATE MOUNTING HEIGHTS FOR EXTERIOR APPLIACTIONS.

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InteriorLOGIC workplace strategy
1201 S. STOUGHTON RD.
MADISON, WI 53716

JLA PROJECT NUMBER: 20-0928

MADISON PUBLIC LIBRARY

play MADISON PARKS

IMAGINATION CENTER AT REINDAHL PARK

BID DOCUMENTS

PROGRESS DOCUMENTS

These documents reflect progress and intent and may be subject to change, including additional detail. These are not final construction documents and should not be used for final bidding or construction-related purposes.

DATE OF ISSUANCE JANUARY 6, 2025

REVISION SCHEDULE

Mark	Description	Date
A4	Stack signage outside of scope.	03/26/2025

SHEET TITLE

SIGNAGE SCHEDULE

SHEET NUMBER

AI413

SPECIAL PURPOSE OUTLET SCHEDULE

GENERAL NOTE:

A. LOADS SHOWN ON THE SPECIAL PURPOSE OUTLET SCHEDULE MAY REQUIRE EITHER A RECEPTACLE (A PLUG-IN CONTACT DEVICE AS DEFINED BY THE NEC) OR MAY REQUIRE A DIRECT CONNECTION (HARDWIRED) TO THE LOADS BRANCH CIRCUIT. FOR EACH LOAD THE ELECTRICAL CONTRACTOR SHALL CONFIRM THE TYPE OF TERMINATION REQUIRED AS INDICATED ON THE EQUIPMENT MANUFACTURERS SHOP DRAWINGS. ALL RECEPTACLES, DISCONNECT SWITCHES, OR OTHER DEVICES REQUIRED FOR TERMINATION OF THESE CIRCUITS SHALL BE INCLUDED IN THE CONTRACTOR'S BASE BID. LOADS ON THIS SCHEDULE MAY ALSO REQUIRE NON-STANDARD ELECTRICAL ROUGH-IN HEIGHTS. ELECTRICAL CONTRACTOR SHALL ALSO VERIFY RACEWAY ROUGH-IN HEIGHTS FOR THESE LOADS WITH EQUIPMENT SHOP DRAWINGS PRIOR TO RACEWAY ROUGH-IN.

B. ALL MOUNTING HEIGHTS ARE MEASURED FROM ABOVE FINISHED FLOOR OR GRADE TO THE CENTER OF BOX, UNLESS OTHERWISE INDICATED.

C. IF THE NEMA TYPE IS LEFT BLANK IT IS A DIRECT CONNECTION.

NOTE:

1. PROVIDE BOX, CONDUIT AND PULL STRING FOR FUTURE HEAT PUMP WATER HEATER. PROVIDE SPARE BREAKER WITHIN PANEL A. CIRCUITING SHOWN FOR PANEL AND SERVICE SIZING ONLY.
2. PROVIDE BLANK FACE PLATE AND PROVISIONS FOR FUTURE OVER FLOOR RACEWAY TO FUTURE RFID GATE. PROVIDE WITH PULL STRING.
3. PROVIDE CONDUIT STUB THROUGH CONCRETE FLOOR. PROVIDE BLANK CAP OVER STUB. COORDINATE EXACT LOCATION FOR CONDUIT STUB WITH ARCHITECT PRIOR TO INSTALLATION. PROVIDE WITH PULL STRING.
4. ALL RFID GATES SHALL BE FED FROM THE SAME CIRCUIT IN PANEL B. PROVIDE A SWITCH TO CONTROL POWER TO ALL GATES NEXT TO PANEL B. PROVIDE SPACE FOR THREE 24V TRANSFORMERS NEAR PANEL B.
5. MOUTE RECEPTACLE TO THE TOP OF THE TELECOM RACK. SEE DETAIL B1/T501 FOR ADDITIONAL INFORMATION.
6. OWNER SUPPLIED UPS. VERIFY ELECTRICAL REQUIREMENTS WITH OWNER PRIOR TO INSTALLATION.
7. ELECTRICAL CONTRACTOR TO PROVIDE GUTTER DEICING SYSTEM. BASIS OF DESIGN IS NVENT RAYCHEM GUTTER DEICING SYSTEM. PROVIDE WITH 920 SERIES ELECTRONIC TEMPERATURE CONTROLS. LOCATE CONTROLLER NEAR PANEL A. VERIFY REQUIREMENTS WITH EQUIPMENT PROVIDED.
8. ELECTRICAL CONTRACTOR TO PROVIDE GUTTER DEICING SYSTEM. BASIS OF DESIGN IS NVENT RAYCHEM GUTTER DEICING SYSTEM. PROVIDE WITH 920 SERIES ELECTRONIC TEMPERATURE CONTROLS. LOCATE CONTROLLER NEAR PANEL D. VERIFY REQUIREMENTS WITH EQUIPMENT PROVIDED.
9. COORDINATE INSTALLATION WITH WOOD CEILING INSTALLER.

TAG	DRIVING	LOCATION	POWER				FEED FROM		BREAKER		WIRING				RECEPTACLE INFORMATION		MOUNTING HEIGHT	SEE NOTE
			SPECIFIED SIZE	VOLTAGE	PHASE	ELECTRICAL LOAD	PANEL	CIRCUIT	SIZE	POLES	PHASE & NEUTRAL QTY	PHASE & NEUTRAL SIZE	GROUND SIZE	COND.	GFCI	NEMA TYPE		
TR-1	TELECOM RACK	125		120 V	1	1920 VA	C	12	20	1	2	12	12	1/2"		5-20R QUAD	RACK	5
TR-2	TELECOM RACK	125		120 V	1	1920 VA	C	13	20	1	2	12	12	1/2"		5-20R QUAD	RACK	5
TR-3	TELECOM RACK	125		120 V	1	1920 VA	C	14	20	1	2	12	12	1/2"		5-20R QUAD	RACK	5
TR-4	TELECOM RACK	125		120 V	1	1920 VA	B	41	20	1	2	12	12	1/2"		5-20R QUAD	WALL ABOVE RACK	
TR-5	TELECOM RACK	125		120 V	1	1920 VA	A	80	20	1	2	12	12	1/2"		5-20R QUAD	WALL ABOVE RACK	
UPS-1	RACK MOUNTED UPS	125		120 V	1	1500 VA	C	15	20	1	2	12	12	1/2"		TBD	RACK	6
UPS-2	RACK MOUNTED UPS	125		120 V	1	1500 VA	C	16	20	1	2	12	12	1/2"		TBD	RACK	6
WS-1	WATER SOFTENER	157	1 FLA	120 V	1	120 VA	A	77	20	1	2	12	12	1/2"			44"	

SPECIAL PURPOSE OUTLET SCHEDULE

GENERAL NOTE:

A. LOADS SHOWN ON THE SPECIAL PURPOSE OUTLET SCHEDULE MAY REQUIRE EITHER A RECEPTACLE (A PLUG-IN CONTACT DEVICE AS DEFINED BY THE NEC) OR MAY REQUIRE A DIRECT CONNECTION (HARDWIRED) TO THE LOADS BRANCH CIRCUIT. FOR EACH LOAD THE ELECTRICAL CONTRACTOR SHALL CONFIRM THE TYPE OF TERMINATION REQUIRED AS INDICATED ON THE EQUIPMENT MANUFACTURERS SHOP DRAWINGS. ALL RECEPTACLES, DISCONNECT SWITCHES, OR OTHER DEVICES REQUIRED FOR TERMINATION OF THESE CIRCUITS SHALL BE INCLUDED IN THE CONTRACTOR'S BASE BID. LOADS ON THIS SCHEDULE MAY ALSO REQUIRE NON-STANDARD ELECTRICAL ROUGH-IN HEIGHTS. ELECTRICAL CONTRACTOR SHALL ALSO VERIFY RACEWAY ROUGH-IN HEIGHTS FOR THESE LOADS WITH EQUIPMENT SHOP DRAWINGS PRIOR TO RACEWAY ROUGH-IN.

B. ALL MOUNTING HEIGHTS ARE MEASURED FROM ABOVE FINISHED FLOOR OR GRADE TO THE CENTER OF BOX, UNLESS OTHERWISE INDICATED.

C. IF THE NEMA TYPE IS LEFT BLANK IT IS A DIRECT CONNECTION.

NOTE:

1. PROVIDE BOX, CONDUIT AND PULL STRING FOR FUTURE HEAT PUMP WATER HEATER. PROVIDE SPARE BREAKER WITHIN PANEL A. CIRCUITING SHOWN FOR PANEL AND SERVICE SIZING ONLY.
2. PROVIDE BLANK FACE PLATE AND PROVISIONS FOR FUTURE OVER FLOOR RACEWAY TO FUTURE RFID GATE. PROVIDE WITH PULL STRING.
3. PROVIDE CONDUIT STUB THROUGH CONCRETE FLOOR. PROVIDE BLANK CAP OVER STUB. COORDINATE EXACT LOCATION FOR CONDUIT STUB WITH ARCHITECT PRIOR TO INSTALLATION. PROVIDE WITH PULL STRING.
4. ALL RFID GATES SHALL BE FED FROM THE SAME CIRCUIT IN PANEL B. PROVIDE A SWITCH TO CONTROL POWER TO ALL GATES NEXT TO PANEL B. PROVIDE SPACE FOR THREE 24V TRANSFORMERS NEAR PANEL B.
5. MOUTE RECEPTACLE TO THE TOP OF THE TELECOM RACK. SEE DETAIL B1/T501 FOR ADDITIONAL INFORMATION.
6. OWNER SUPPLIED UPS. VERIFY ELECTRICAL REQUIREMENTS WITH OWNER PRIOR TO INSTALLATION.
7. ELECTRICAL CONTRACTOR TO PROVIDE GUTTER DEICING SYSTEM. BASIS OF DESIGN IS NVENT RAYCHEM GUTTER DEICING SYSTEM. PROVIDE WITH 920 SERIES ELECTRONIC TEMPERATURE CONTROLS. LOCATE CONTROLLER NEAR PANEL A. VERIFY REQUIREMENTS WITH EQUIPMENT PROVIDED.
8. ELECTRICAL CONTRACTOR TO PROVIDE GUTTER DEICING SYSTEM. BASIS OF DESIGN IS NVENT RAYCHEM GUTTER DEICING SYSTEM. PROVIDE WITH 920 SERIES ELECTRONIC TEMPERATURE CONTROLS. LOCATE CONTROLLER NEAR PANEL D. VERIFY REQUIREMENTS WITH EQUIPMENT PROVIDED.
9. COORDINATE INSTALLATION WITH WOOD CEILING INSTALLER.

TAG	DRIVING	LOCATION	POWER				FEED FROM		BREAKER		WIRING				RECEPTACLE INFORMATION		MOUNTING HEIGHT	SEE NOTE
			SPECIFIED SIZE	VOLTAGE	PHASE	ELECTRICAL LOAD	PANEL	CIRCUIT	SIZE	POLES	PHASE & NEUTRAL QTY	PHASE & NEUTRAL SIZE	GROUND SIZE	COND.	GFCI	NEMA TYPE		
AHU-01-02	AIR HANDLING UNIT - CIRCUIT 2 - LIGHTING	157	5 A	120 V	1	600 VA	A	36	20	1	2	12	12	1/2"			TBD	
AHU-01-03	AIR HANDLING UNIT - CIRCUIT 3 - BIPOLAR IONIZATION	157	0.3 MCA	120 V	1	4 VA	A	38	15	1	2	12	12	1/2"			TBD	
AHU-02-02	AIR HANDLING UNIT - CIRCUIT 2 - LIGHTING	123	5 A	120 V	1	600 VA	D	47	20	1	2	12	12	1/2"			TBD	
AHU-02-03	AIR HANDLING UNIT - CIRCUIT 3 - BIPOLAR IONIZATION	123	0.2 MCA	120 V	1	2 VA	D	45	15	1	2	12	12	1/2"			TBD	
AO	AUTO OPERATOR	SEE PLANS		120 V	1	500 VA	<varies>	<varies>	20	1	2	12	12	1/2"				
BAS-L	BAS - LIBRARY	125		120 V	1	600 VA	D	48	20	1	2	12	12	1/2"			TBD	
BAS-P	BAS - PAVILION	157		120 V	1	600 VA	A	40	20	1	2	12	12	1/2"			TBD	
CH	CHARGER	105A		120 V	1	1200 VA	B	16	20	1	2	12	12	1/2"		5-20R	44"	
CHT	FUTURE ADULT CHANGING TABLE	105D		120 V	1	500 VA	B	20	20	1	2	12	12	1/2"		TBD	TBD	
CO	COPIER	114		120 V	1	1200 VA	B	5	20	1	2	12	12	1/2"		5-20R	18"	
COA	COPIER ACCESSORIES	114		120 V	1	1200 VA	B	4	20	1	2	12	12	1/2"		5-20R	18"	
DWH-1	HEAT PUMP WATER HEATER	157	30 FLA	208 V	1	6240 VA	A	71,73	40	2	2	8	10	3/4"			44"	
EC-ERV01	ENERGY RECOVERY VENTILATOR ELECTRIC PREHEAT COIL	157	24.33 MCA	208 V	3	8765 VA	A	53,55,57	35	3	3	10	10	3/4"				
EC-ERV02	ENERGY RECOVERY VENTILATOR ELECTRIC PREHEAT COIL	123	27.8 MCA	208 V	3	10015 VA	D	56,58,60	35	3	3	10	10	3/4"				
EV1	ELECTRIC VEHICLE - SINGLE	SITE	40 A CKT	208 V	1	6656 VA	D	17,19	40	2	2	8	10	3/4"			44"	
EWC	ELECTRIC WATER COOLER (A4)	SEE PLANS		120 V	1	500 VA	<varies>	<varies>	20	1	2	12	12	1/2"	■	5-20R	VERIFY	
FACU	FIRE ALARM CONTROL UNIT	126		120 V	1	500 VA	D	7	20	1	2	12	12	1/2"			TBD	
FDWH-1	FUTURE HEAT PUMP WATER HEATER	157		208 V	1	6240 VA	A	74,76	40	2	2			3/4"			44"	1
FGD	FUTURE GARBAGE DISPOSAL	129		120 V	1	1200 VA	B	25	20	1	2	12	12	1/2"		5-20R	18"	
FRG-1	FUTURE RFID GATE - WALL MOUNTED	115		120 V	1	32 VA			20	1	2	-	-	1/2"			18"	2, 4
FRG-2	FUTURE RFID GATE - CONDUIT STUB	SEE PLANS		120 V	1	32 VA			20	1	2	-	-	3/4"			-	3, 4
GDI-1	GUTTER DE-ICING SYSTEM	ROOF	12W PER FOOT	208 V	1	1836 VA	A	82,84	15	2	2	12	12	1/2"			TBD	7
GDI-2	GUTTER DE-ICING SYSTEM	ROOF	12W PER FOOT	208 V	1	2316 VA	D	68,70	20	2	2	12	12	1/2"			TBD	8
HL1C	HL1 CAMERA	SEE PLANS		120 V	1	180 VA	<varies>	<varies>	20	1	2	12	12	1/2"		5-20R	<varies>	
LC	LIFT CHARGER	156		120 V	1	500 VA	A	13	20	1	2	12	12	1/2"		5-20R	44"	
MCB	MIKE CHARGING BASE	SEE PLANS		120 V	1	180 VA	<varies>	<varies>	20	1	2	12	12	1/2"		5-20R	44"	
MS	MONUMENT SIGN	SITE		120 V	1	500 VA	A	32	20	1	2	12	12	1/2"			TBD	
MW	MICROWAVE	129		120 V	1	1200 VA	B	26	20	1	2	12	12	1/2"		5-20R	24"	
P-RH-01	RADIANT HEAT MANIFOLD PUMP	154	0.03 FLA	120 V	1	4 VA	A	15	15	1	2	12	12	1/2"				
P-RH-02	RADIANT HEAT MANIFOLD PUMP	152A	0.03 FLA	120 V	1	4 VA	A	15	15	1	2	12	12	1/2"				
P-RH-03	RADIANT HEAT MANIFOLD PUMP	151A	0.03 FLA	120 V	1	4 VA	A	15	15	1	2	12	12	1/2"				
P-RH-04	RADIANT HEAT MANIFOLD PUMP	107A	0.03 FLA	120 V	1	4 VA	B	53	15	1	2	12	12	1/2"				
P-RH-05	RADIANT HEAT MANIFOLD PUMP	127	0.03 FLA	120 V	1	4 VA	D	54	15	1	2	12	12	1/2"				
P-RH-06	RADIANT HEAT MANIFOLD PUMP	123	0.03 FLA	120 V	1	4 VA	D	54	15	1	2	12	12	1/2"				
P-RH-07	RADIANT HEAT MANIFOLD PUMP	117A	0.03 FLA	120 V	1	4 VA	D	54	15	1	2	12	12	1/2"				
PROJ	PROJECTOR	SEE PLANS	20 A CKT	120 V	1	600 VA	A	<varies>	20	1	2	12	12	1/2"		5-20R	CEILING	9
PROJ-F	PROJECTOR - FUTURE	SEE PLANS	20 A CKT	120 V	1	600 VA	A	<varies>	20	1	2	12	12	1/2"		5-20R	CEILING	9
REF	REFIGERATOR	SEE PLANS		120 V	1	1200 VA	<varies>	<varies>	20	1	2	12	12	1/2"		5-20R	<varies>	
S1C	S1 CAMERA			120 V	1	180 VA	D	69	20	1	2	12	12	1/2"		5-20R	80"	
SC	SCRUBBER	155		120 V	1	500 VA	A	14	20	1	2	12	12	1/2"		5-20R	44"	
SF	SENSOR FAUCET	SEE PLANS	1 A	120 V	1	120 VA	<varies>	<varies>	20	1	2	12	12	1/2"		SIMPLEX 5-20R	18"	
SGN	WALL-MOUNTED SIGN	EXTERIOR		120 V	1	500 VA	B	29	20	1	2	12	12	1/2"				
ST	SENSOR TOILET	SEE PLANS	1 A	120 V	1	120 VA	<varies>	<varies>	20	1	2	12	12	1/2"		SIMPLEX 5-20R	18"	
SU	SENSOR URINAL	154A	1 A	120 V	1	120 VA	A	16	20	1	2	12	12	1/2"		SIMPLEX 5-20R	18"	
TP	TEMPORARY POWER	SITE		208 V	1	8320 VA	B	45,47	50	2	2	8	10	3/4"		50 AMP TWIST LOCK	24" 24"	

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GRÄEF

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Suite 202
Madison, WI 53703
608 / 242 1550

JLA PROJECT NUMBER: 20-0928

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IMAGINATION CENTER AT REINDAHL PARK

BID DOCUMENTS

DATE OF ISSUANCE JANUARY 6, 2025

REVISION SCHEDULE

Mark	Description	Date
A1	ADDENDUM #1	03/07/2025
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

ELECTRICAL SCHEDULES

SHEET NUMBER

E602

3/24/2025 2:35:44 PM

PANEL: C — New Construction

VOLTAGE: 208Y/120V	BUS RATING: 100 A	FEED-THRU LUGS: NO
PHASE / WIRE: 3P / 4W	MAIN TYPE: MLO	MOUNTING: RECESSED
SVC. ENTRANCE LABEL: NO	MAIN RATING: 0 A	ENCLOSURE: TYPE 1
MINIMUM AIC:	UPSTREAM BREAKER RATING: 60 A	200% NEUTRAL: NO
IS SERIES RATED ALLOWED: NO	SPD: NO	PANELBOARD TYPE: PANELBOARD

CKT	DESCRIPTION	TRIP	POLE	CB TYPE	LOAD TYPE	LOAD	A	B	C	LOAD	LOAD TYPE	CB TYPE	POLE	TRIP	DESCRIPTION	CKT
1	125	20 A	1		R	180 VA	180 VA	180 VA		180 VA	R		1	20 A	125	2
3	125	20 A	1		R	180 VA		180 VA	180 VA	180 VA	R		1	20 A	125	4
5	125	20 A	1		R	180 VA			180 VA	180 VA	R		1	20 A	125	6
7	125	20 A	1		R	180 VA	180 VA	180 VA		180 VA	R		1	20 A	125	8
9	125	20 A	1		R	180 VA		180 VA	180 VA	180 VA	R		1	20 A	125	10
11	125	20 A	1		R	180 VA			180 VA	1920 VA	EQ		1	20 A	SPO - TR-1	12
13	SPO - TR-2	20 A	1		EQ	1920 VA	1920 VA	1920 VA		1920 VA	EQ		1	20 A	SPO - TR-3	14
15	SPO - UPS-1	20 A	1		EQ	1500 VA		1500 VA	1500 VA	1500 VA	EQ		1	20 A	SPO - UPS-2	16
17																18
19																20
21																22
23																24
25	SPARE	20 A	1		--	--	0 VA	0 VA		--	--		1	20 A	SPARE	26
27	SPARE	20 A	1		--	--		0 VA	0 VA	--	--		1	20 A	SPARE	28
29	SPARE	20 A	1		--	--			0 VA	--	--		1	20 A	SPARE	30
							4560 VA	3720 VA	2460 VA							

PANEL TOTALS	
TOTAL CONN. LOAD:	10740 VA
TOTAL ADJUSTED LOAD:	10740 VA
TOTAL CONN. AMPS:	30 A
TOTAL ADJUSTED AMPS:	30 A

NOTES:

LOAD TYPE	CONNECTED LOAD	ADJUSTMENT FACTOR	ADJUSTED LOAD
EQ	8760 VA	100.00%	8760 VA
R	1980 VA	100.00%	1980 VA

CIRCUIT BREAKER TYPE ABBREVIATIONS:	LOAD TYPE ABBREVIATIONS:		
GFCI = GROUND FAULT CIRCUIT INTERRUPTER	C = COOLING SEASON ONLY	F = FARM	R = RECEPTACLE
HACR = HEATING AND AIR CONDITIONING RATED	ECD = ELECTRIC CLOTHES DRYER	GL1 = GENERAL LIGHTING - 2 W / SQ FT	SA = SMALL APPLIANCE
HB = HAND-BLOCKING DEVICE	EL = ELEVATOR	GL2 = GENERAL LIGHTING - 3 W / SQ FT	T = TRANSFORMER
L = LOCKABLE	EQ = EQUIPMENT	H = HEATING SEASON ONLY	V = VENTILATING
ST = SHUNT TRIP	ER1 = ELECTRIC RANGE LESS THAN 3.5 KW	K = KITCHEN EQUIPMENT - NON-DWELLING UNIT	W = WELDING
	ER2 = ELECTRIC RANGE 3.5 - 8.75 KW	L = LIGHTING	X = XRAY
	EX = EXISTING	P = PANEL	YR = YEAR ROUND

INVERTER: INV — New Construction

INPUT VOLTAGE: 208	CAPACITY IN WATTS: 8000	MANUFACTURER: IOTA
OUTPUT VOLTAGE: 120	QTY OF OUTPUT BREAKERS: 6	CATALOG NUMBER: IIS-8000-208IN-120OUT-ST-FSREQ(#)-TREQ(#)-6-1P120-20AMP-ON-6

CKT	Load Name	TRIP	POLE	CB TYPE	LOAD TYPE	A		B		LOAD TYPE	CB TYPE	POLE	TRIP	Load Name	CKT
1	EXTERIOR LIGHTING	20 A	1		L	509 VA	1513 VA			L		1	20 A	LIGHTING	2
3	LIGHTING	20 A	1		L			1465 VA	544 VA	L		1	20 A	LIGHTING	4
5	SPARE	20 A	1		--	0 VA	0 VA			--		1	20 A	SPARE	6
						2023 VA		2009 VA							

PANEL TOTALS	
TOTAL CONN. LOAD:	4032 VA
TOTAL ADJUSTED LOAD:	5039 VA
TOTAL CONN. AMPS:	19 A
TOTAL ADJUSTED AMPS:	24 A

NOTES:
1.

LOAD TYPE	CONNECTED LOAD	ADJUSTMENT FACTOR	ADJUSTED LOAD
L	4032 VA	125.00%	5039 VA

GENERAL NOTES:
1. PROVIDE WITH 90 MINUTES OF BACKUP, UL924 LISTING.
2. OR PRIOR APPROVED EQUAL.

CIRCUIT BREAKER TYPE ABBREVIATIONS:	LOAD TYPE ABBREVIATIONS:		
GFCI = GROUND FAULT CIRCUIT INTERRUPTER	C = COOLING SEASON ONLY	F = FARM	R = RECEPTACLE
HACR = HEATING AND AIR CONDITIONING RATED	ECD = ELECTRIC CLOTHES DRYER	GL1 = GENERAL LIGHTING - 2 W / SQ FT	SA = SMALL APPLIANCE
HB = HAND-BLOCKING DEVICE	EL = ELEVATOR	GL2 = GENERAL LIGHTING - 3 W / SQ FT	T = TRANSFORMER
L = LOCKABLE	EQ = EQUIPMENT	H = HEATING SEASON ONLY	V = VENTILATING
ST = SHUNT TRIP	ER1 = ELECTRIC RANGE LESS THAN 3.5 KW	K = KITCHEN EQUIPMENT - NON-DWELLING UNIT	W = WELDING
	ER2 = ELECTRIC RANGE 3.5 - 8.75 KW	L = LIGHTING	X = XRAY
	EX = EXISTING	P = PANEL	YR = YEAR ROUND

PANEL: D — New Construction

VOLTAGE: 208Y/120V	BUS RATING: 400 A	FEED-THRU LUGS: NO
PHASE / WIRE: 3P / 4W	MAIN TYPE: MLO	MOUNTING: SURFACE
SVC. ENTRANCE LABEL: NO	MAIN RATING: 0 A	ENCLOSURE: TYPE 1
MINIMUM AIC:	UPSTREAM BREAKER RATING: 250 A	200% NEUTRAL: NO
IS SERIES RATED ALLOWED: NO	SPD: NO	PANELBOARD TYPE: PANELBOARD

CKT	DESCRIPTION	TRIP	POLE	CB TYPE	LOAD TYPE	LOAD	A		B		C		LOAD	LOAD TYPE	CB TYPE	POLE	TRIP	DESCRIPTION	CKT
1	SITE LIGHTING	20 A	1		L	1304 VA	1304 VA	180 VA					180 VA	R		1	20 A	ROOF	2
3	126	20 A	1		R	360 VA			360 VA	180 VA			180 VA	R		1	20 A	126	4
5	126	20 A	1		R	360 VA					360 VA	180 VA	180 VA	R		1	20 A	EXTERIOR	6
7	SPO - FACU	20 A	1		EQ	500 VA	500 VA	540 VA					540 VA	R		1	20 A	123	8
9	124, 114	20 A	1		EQ, R	1020 VA			1020 VA	1080 VA			1080 VA	R		1	20 A	122	10
11	121	20 A	1		R	1080 VA					1080 VA	540 VA	540 VA	R		1	20 A	120	12
13	116C, 119	20 A	1		R	540 VA	540 VA	360 VA					360 VA	R		1	20 A	117A, 118	14
15	116B, 117	20 A	1		R	1260 VA			1260 VA	900 VA			900 VA	R		1	20 A	EXTERIOR	16
17	SPO - EV1	40 A	2		EQ	6656 VA					3328 VA	1260 VA	1260 VA	R		1	20 A	EXTERIOR	18
19	--	--	--	--	--	--	3328 VA	720 VA					720 VA	R		1	20 A	R STORAGE 117A	20
21	117	20 A	1		R	720 VA			720 VA	720 VA			720 VA	R	GFCI	1	20 A	115	22
23	115	20 A	1	GFCI	R	720 VA					720 VA	900 VA	900 VA	R		1	20 A	116C, 115, 116B, 113	24
25	111	20 A	1		R	1080 VA	1080 VA	720 VA					720 VA	R		1	20 A	109	26
27	109	20 A	1		R	360 VA			360 VA	180 VA			180 VA	R		1	20 A	120	28
29	120	20 A	1		R	180 VA					180 VA	180 VA	180 VA	R		1	20 A	120	30
31	120	20 A	1		R	180 VA	180 VA	180 VA					180 VA	R		1	20 A	119	32
33	119	20 A	1		R	180 VA			180 VA	180 VA			180 VA	R		1	20 A	119	34
35	119	20 A	1		R	180 VA					180 VA	180 VA	180 VA	R		1	20 A	109	36
37	109	20 A	1		R	180 VA	180 VA	360 VA					360 VA	R		1	20 A	109	38
39	109	20 A	1		R	180 VA			180 VA	180 VA			180 VA	R		1	20 A	109	40
41	LIGHTING	20 A	1		L	1520 VA					1520 VA	1025 VA	1025 VA	L		1	20 A	LIGHTING	42
43	LIGHTING	20 A	1		L	956 VA	956 VA	2023 VA					4032 VA	Spare; L		2	50 A	INV	44
45	SPO - AHU-02-03	15 A	1		EQ	2 VA			2 VA	2009 VA			--	--	--	--	--	--	46
47	SPO - AHU-02-02	20 A	1		L	600 VA					600 VA	600 VA	600 VA	EQ		1	20 A	SPO - BAS-L	48
49	MOTOR - IU-02 & OU-02	25 A	2		YR	2766 VA	1383 VA	1383 VA					2766 VA	YR		2	25 A	MOTOR - IU-01 & OU-01	50
51	--	--	--	--	--	--			1383 VA	1383 VA			--	--	--	--	--	--	52
53	MOTORS - CUH-01, CHU-02,...	15 A	1		YR	475 VA					475 VA	11 VA	11 VA	H		1	15 A	SPOS - R-PH-05 - 07	54
55	SPO - AO	20 A	1		EQ	500 VA	500 VA	3338 VA					10015 VA	H		3	35 A	SPO - EC-ERV02	56
57	MOTOR - ERV-02	35 A	3		V	6971 VA			2324 VA	3338 VA			--	--	--	--	--	--	58
59	--	--	--	--	--	--					2324 VA	3338 VA	--	--	--	--	--	--	60
61	--	--	--	--	--	--	2324 VA	901 VA					2702 VA	V		3	15 A	MOTOR - RF-02	62
63	EXTERIOR	20 A	1		R	540 VA			540 VA	901 VA			--	--	--	--	--	--	64
65	R FAMILY HUB 117	20 A	1		R	540 VA					540 VA	901 VA	--	--	--	--	--	--	66
67	123	20 A	1		R	720 VA	720 VA	1158 VA					2316 VA	H		2	20 A	SPO - GDI-2	68
69	SPO - HL1C & S1C	20 A	1		EQ	360 VA			360 VA	1158 VA			--	--	--	--	--	--	70
71																			72
73																			74
75																			76
77																			78
79	SPARE	20 A	1		--	--	0 VA	0 VA					--	--		1	20 A	SPARE	80
81	SPARE	20 A	1		--	--			0 VA	0 VA			--	--		1	20 A	SPARE	82
83	SPARE	20 A	1		--	--					0 VA	0 VA	--	--		1	20 A	SPARE	84
							24858 VA		20899 VA		20421 VA								

PANEL TOTALS	
TOTAL CONN. LOAD:	66178 VA
TOTAL ADJUSTED LOAD:	65290 VA
TOTAL CONN. AMPS:	184 A
TOTAL ADJUSTED AMPS:	181 A

NOTES:

LOAD TYPE	CONNECTED LOAD	ADJUSTMENT FACTOR	ADJUSTED LOAD
EQ	8738 VA	100.00%	8738 VA
H	12342 VA	100.00%	12342 VA
L	9436 VA	125.00%	11795 VA
Motor	6971 VA	125.00%	8714 VA
R	19980 VA	75.03%	14990 VA
V	2702 VA	100.00%	2702 VA
YR	6008 VA	100.00%	6008 VA

CIRCUIT BREAKER TYPE ABBREVIATIONS:	LOAD TYPE ABBREVIATIONS:		
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	ER2 = ELECTRIC RANGE 3.5 - 8.75 KW	L = LIGHTING	X = XRAY
	EX = EXISTING	P = PANEL	YR = YEAR ROUND

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Mark	Description	Date
A1	ADDENDUM #1	03/07/2025
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

PANEL SCHEDULES

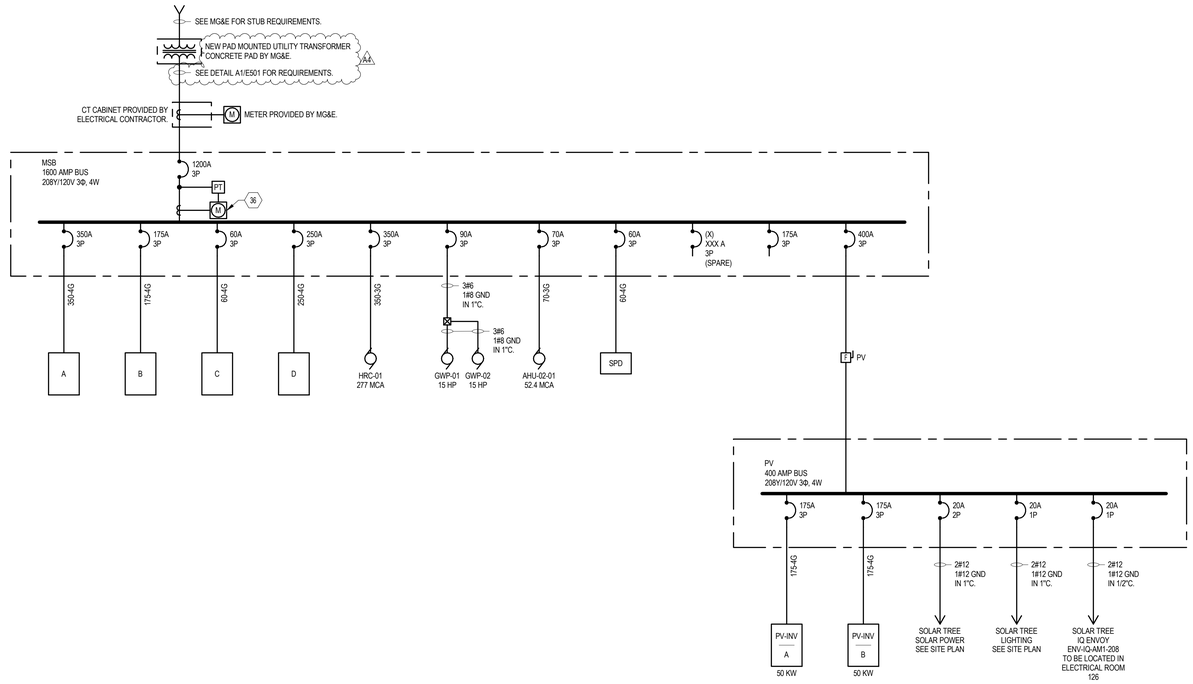
SHEET NUMBER

E611

3/24/2025 2:35:47 PM

SHEET KEYNOTES

36 PROVIDE WITH SCHNEIDER ELECTRIC POWERLOGIC POWER METER PM5500. COORDINATE CAT-6 CONNECTION WITH TELECOMMUNICATIONS AND CONTROLS CONTRACTOR. ELECTRICAL CONTRACTOR TO PROVIDE SAFE ACCESS TO LOCATIONS IN THE SWITCHGEAR AS REQUIRED TO FACILITATE THE CONNECTION FROM THE PM5500 METER TO THE BUILDING AUTOMATION SYSTEM.



COPPER FEEDER SCHEDULE

FEEDER AMPACITY	CONDUCTOR SIZE (kcmil)		CONDUIT SIZE	
	PH AND N	GRD	(3) AND (3G)	(4) AND (4G)
50	#8	#10	3/4"	1"
60	#6	#10	3/4"	1"
70	#4	#8	1-1/4"	1-1/4"
80	#4	#8	1-1/4"	1-1/4"
100	#3	#8	1-1/4"	1-1/4"
110	#2	#6	1-1/4"	1-1/2"
125	#1	#6	1-1/2"	2"
150	#1/0	#6	1-1/2"	2"
175	#2/0	#6	2"	2"
200	#3/0	#6	2"	2-1/2"
225	#4/0	#4	2"	2-1/2"
250	#250	#4	2-1/2"	3"
300	#350	#4	3"	3"
350	#500	#3	3"	3-1/2"
400	(2) #3/0	(2) #3	(2) 2"	(2) 2-1/2"
450	(2) #4/0	(2) #2	(2) 2"	(2) 2-1/2"
500	(2) #250	(2) #2	(2) 2-1/2"	(2) 3"
600	(2) #350	(2) #1	(2) 3"	(2) 3"
700	(2) #500	(2) #1/0	(2) 3"	(2) 3-1/2"
800	(2) #600	(2) #1/0	(2) 3-1/2"	(2) 4"
1000	(3) #400	(3) #2/0	(3) 3"	(3) 3-1/2"
1200	(3) #600	(3) #3/0	(3) 3-1/2"	(3) 4"
1600	(4) #600	(4) #4/0	(4) 3-1/2"	(4) 4"
2000	(5) #600	(5) #250	(5) 3-1/2"	(5) 4"

GENERAL NOTES:

1. THE ABOVE FEEDER SCHEDULE IS A SCHEDULE OF TYPICAL FEEDERS AND SOME SIZES MAY NOT BE UTILIZED.
2. ALL CONDUCTOR AMPACITIES ARE BASED ON TABLE 310.15(B)(16) OF THE NEC FOR COPPER CONDUCTOR TYPE THWTHWN.
3. FEEDER SIZES SHOWN ON THE RISER DIAGRAM INDICATE CIRCUIT BREAKER AMPACITIES AND DO NOT ACCOUNT FOR VOLTAGE DROP.

200 - 4G
- FEEDER DESIGNATION
- SYSTEM DESCRIPTION (3): 3PH, 3W (3G): 3PH, 3W + GRD (4): 3PH, 4W (4G): 3PH, 4W + GRD
- CONDUCTOR AMPACITY (SEE FEEDER SCHEDULE)

LINE TYPE LEGEND

- ITEMS SHOWN AS DASHED BLACK LINES ARE EXISTING TO REMAIN
- ITEMS SHOWN AS DASHDOTDOT BLACK LINES ARE EXISTING TO BE DEMOLISHED
- ITEMS SHOWN AS SOLID BLACK LINES ARE NEW
- ITEMS SHOWN AS LONG DASH SHORT DASH BLACK LINES ARE EQUIPMENT ENCLOSURES.

STANDARD PANEL DESIGNATIONS

XX-#
- INDICATES FLOOR NUMBER

XX
- DISTINGUISHES THIS PANEL FROM OTHER SIMILAR PANELS FOR A GIVEN FLOOR. 1ST PANEL OF THIS TYPE = "A" 2ND PANEL OF THIS TYPE = "B", ETC.

INDICATES BRANCH
BLANK - NORMAL LOADS
EM - EMERGENCY LOADS (NEC ARTICLE 700)
LR - LEGALLY REQUIRED LOADS (NEC ARTICLE 701)
OP - OPTIONAL LOADS (NEC ARTICLE 702)
CR - CRITICAL CARE LOADS (NEC ARTICLE 517)
EQ - EQUIPMENT LOADS (NEC ARTICLE 517)
LS - LIFE SAFETY LOADS (NEC ARTICLE 517)

INDICATES VOLTAGE
BLANK - 208V ONLY
L - 208V
H - 480V

STANDARD SWITCHBOARD & I-LINE PANEL (GEAR) DESIGNATIONS

XXX
- INDICATES GEAR TYPE
  MSB - MAIN SWITCHBOARD
  MDP - MAIN DISTRIBUTION PANEL
  MP - MECHANICAL PANEL

XX
- DISTINGUISHES THIS GEAR FROM OTHER SIMILAR GEAR. 1ST GEAR OF THIS TYPE = "A" 2ND GEAR OF THIS TYPE = "B", ETC.

INDICATES VOLTAGE
BLANK - 208V ONLY
L - 208V
H - 480V

A1 ONE-LINE POWER DIAGRAM

NOT TO SCALE

3/24/2025 2:35:47 PM

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Mark	Description	Date
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

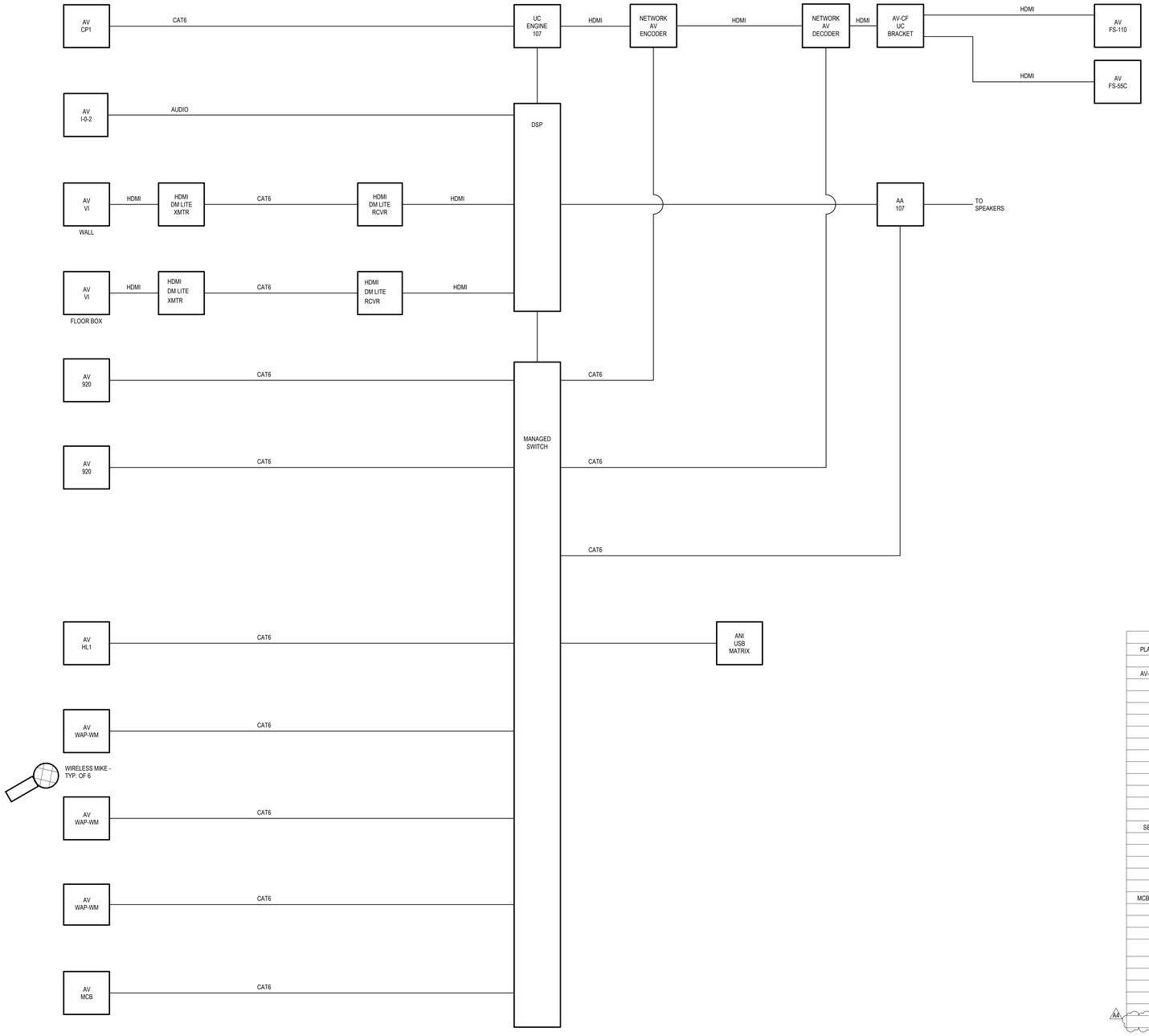
ELECTRICAL ONE-LINE POWER DIAGRAM

SHEET NUMBER

E620

GENERAL SHEET NOTES

A. AV FLOW DIAGRAM IS FOR ILLUSTRATION PURPOSES ONLY. TO INDICATE DESIGN INTENT AND SHALL BE REDONE BY THE AUDIO-VISUAL INTEGRATOR AS PART OF THE SUBMITTAL PROCESS. ANY ADDITIONAL COMPONENTS OR CONNECTIONS NECESSARY FOR FUNCTION SHALL BE PROVIDED BY THE AUDIO-VISUAL INTEGRATOR.
B. ALL EQUIPMENT SHOWN BELOW, UNLESS INDICATED "BY OWNER", SHALL BE PROVIDED BY THE AUDIO-VISUAL SYSTEM INTEGRATOR. A SUBCONTRACTOR TO THE DIVISION 26 CONTRACTOR WITH SPECIAL EXPERTISE IN AUDIOVISUAL WORK PERFORMING WORK UNDER SECTIONS 27 41 00, 27 41 16, 27 51 16, AND 27 51 23.
C. PROVIDE CONNECTION TO FIRE ALARM CONTROL MODULE AT AV RACK TO SILENCE PROGRAMMING IF A FIRE ALARM IS IN PROGRESS.



A1 AV FLOW DIAGRAM - COMMUNITY ROOM 107
NTS

COMMUNITY ROOM 107

PLAN DESIGNATION	QTY	MASTER NO.	MANUFACTURER	DESCRIPTION
FS-110	1	C110S	ABSEN	110" DIAGONAL 1.27MM ALL-IN-ONE W/SPARES, MOUNT 1080P
AV-CF (UC FOR 107)	1	UC-CX100-Z-WM	CRESTRON	CRESTRON FLEX ADVANCED VIDEO CONFERENCE SYSTEM INTEGRATOR KIT WITH A WALL MOUNTED CONTROL INTERFACE
NOT USED				
PA RACK 107	1	UCA-RMK-1U	CRESTRON	RACK MOUNT KIT FOR UC ENGINE BRACKET ASSEMBLY
PA RACK 107	1	TESIRA SERVER-IO AVB	BIAMP	CONFIGURABLE I/O DSP WITH UP TO 48 CHANNELS OF I/O, 1 DSP-2 CARD (2 ADDITIONAL DSP-2 CARDS CAN BE AD
PA RACK 107	1	TESIRA DAN-1	BIAMP	TESIRA 64X64 DANTE MODULE FOR USE IN SERVER OR SERVER-IO CHASSIS
PA RACK 107	8	TESIRA SEC-4	BIAMP	TESIRA 4 CHANNEL MIC/LINE INPUT CARD WITH ACOUSTIC ECHO CANCELLATION PER CHANNEL
PA RACK 107	3	TESIRA SOC-4	BIAMP	TESIRA 4 CHANNEL MIC/LINE OUTPUT CARD
PA RACK 107	1	TESIRA EX-UBT	BIAMP	POE AVB/USB EXPANDER WITH BLUETOOTH WIRELESS TECHNOLOGY
AV-VI	1	HD-TX-4KZ-101-1G-W	CRESTRON	DM LITE 4K60 4:4:4 TRANSMITTER FOR HDMI SIGNAL EXTENSION OVER CATX CABLE, WALL PLATE, WHITE
PA RACK 107	1	HD-RX-4KZ-101	CRESTRON	DM LITE 4K60 4:4:4 RECEIVER FOR HDMI SIGNAL EXTENSION OVER CATX CABLE
NOT SHOWN (A4)	3	DM-NVX-E10	CRESTRON	DM NVX 1080P60 4:4:4 NETWORK AV ENCODER
NOT SHOWN	3	DM-NVX-D10	CRESTRON	DM NVX 1080P60 4:4:4 NETWORK AV DECODER
AV HL1	1	7090043790672	HUDDLY	HUDDLY L1 W/ NETWORK ADAPTER, WALL & SHELF MOUNT, 2M ETHERNET CABLE
SEE FLOOR PLAN	12	AD-C6T-WH	QSC	6.5" TWO-WAY CEILING SPEAKER, 70/100V TRANSFORMER WITH 16 BYPASS, 135 CONICAL DMT COVERAGE, INCLUDES
AA 107	1	SPA4-60	QSC	1/2 RU 4 CHANNEL ENERGY STAR AMPLIFIER / MULTICHANNEL OPERATION 60 WATTS INTO 8 & 4, BRIDGED PAIR OP
DSAL	1	LS-71-072	LISTEN	LISTEN IDSP ADVANCED LEVEL IV STATIONARY RF SYSTEM (72 MHZ)
AV 920	2	MXA920W-S	SHURE	920 CEILING ARRAY, WHITE, SQUARE, 24 IN
AV WAP-WM	3	MXWAPT8=-Z10	SHURE	8-CH ACCESS POINT TRANSCEIVER
NOT SHOWN	6	MXW2/SM58=-Z10	SHURE	HH TRANSMITTER WITH SM58
MCB FOR 107 AND 109	1	MXWNCS8	SHURE	8-CH NETWORKED CHARGING STATION
AV I-0-2	1	D-J3	RDL - RADIO DESIGN LABS	MIC/LINE INPUT ASSEMBLY-XLR RCA TERMINAL BLOCK
PA RACK 107	1	C9300X-48HX-A	CISCO	SWITCH FURNISHED BY CITY
PA RACK 107	1	PD-815SC-NS	MIDDLE ATLANTIC	SLIM PWR STRIP,8 OUTLET,1
PA RACK 107	1	ERK-SERIES	MIDDLE ATLANTIC	RACK LESS R DR SIZE AS REQUIRED - INCLUDE SPACE FOR CLASSROOM GEAR. PROVIDE SPECIAL RACK WITH LOCKABLE DOOR CONTROLLED BY KEYSCAN CARD READER.
PA RACK 107	1	ERK-SERIES	MIDDLE ATLANTIC	ERK REAR RAIL OPTION
PA RACK 107	1	CBS-ERK-SERIES	MIDDLE ATLANTIC	SKIRTED CASTER BASE FOR ERK
PA RACK 107	2	QFAN	MIDDLE ATLANTIC	4-1/2 QUIET FAN WITH GUAR
PA RACK 107	1	UPS-S2200R	MIDDLE ATLANTIC	UPS STD 2200VA
~~FS-55C~~ (A4)	~~1~~	~~S90D~~	~~SAMSUNG~~	~~55" MONITOR, PROVIDE MOUNT~~
AV-CC	1	CP4	CRESTRON	RACK MOUNTED AV CONTROL SYSTEM

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Mark	Description	Date
A1	ADDENDUM #1	03/07/2025
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

AV FLOW DIAGRAMS

SHEET NUMBER

T701

3/24/2025 2:36:11 PM

GENERAL SHEET NOTES

A. AV FLOW DIAGRAM IS FOR ILLUSTRATION PURPOSES ONLY. TO INDICATE DESIGN INTENT AND SHALL BE REDONE BY THE AUDIO-VISUAL INTEGRATOR AS PART OF THE SUBMITTAL PROCESS. ANY ADDITIONAL COMPONENTS OR CONNECTIONS NECESSARY FOR FUNCTION SHALL BE PROVIDED BY THE AUDIO-VISUAL INTEGRATOR.
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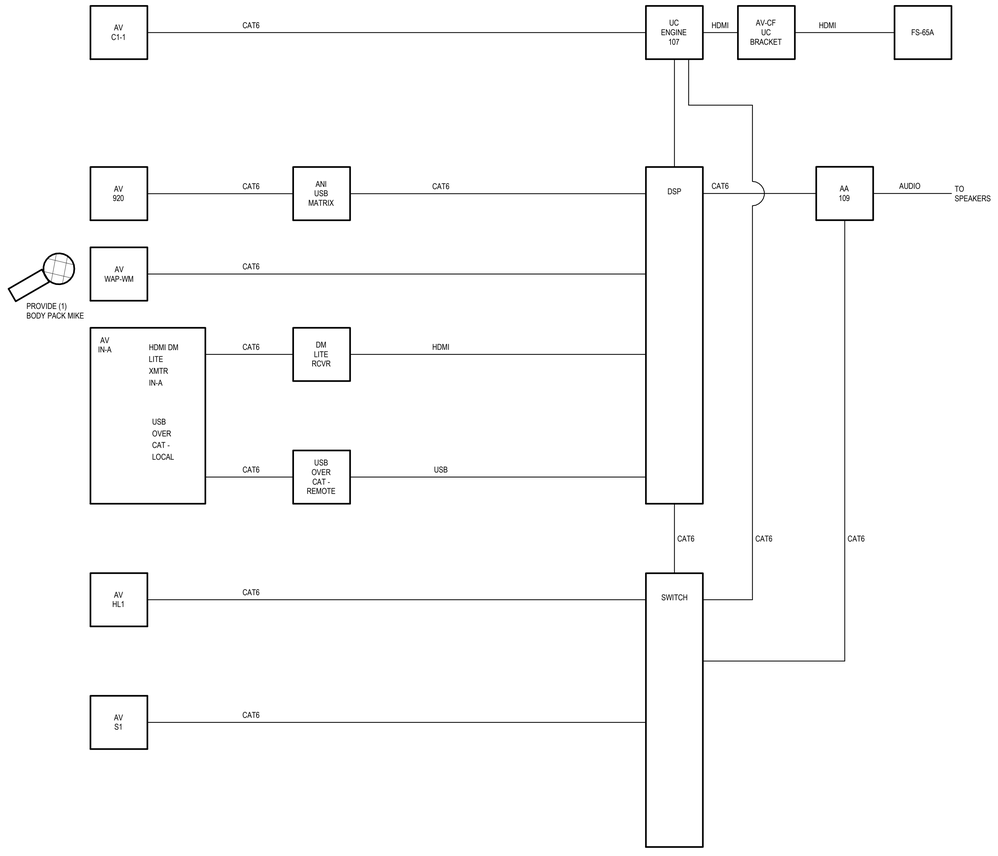
C. PROVIDE CONNECTION TO FIRE ALARM CONTROL MODULE AT AV RACK TO SILENCE PROGRAMMING IF A FIRE ALARM IS IN PROGRESS.



A2 AV FLOW DIAGRAM - CLASSROOM
NTS

CLASSROOM 109

PLAN DESIGNATION	QTY	MASTER NO.	MANUFACTURER	DESCRIPTION
FS-65A	1	FW85BZ30L	SONY	85IN BRAVIA 4K HDR PROFESSIONAL DISPLAY
FS-65A	1	AS3LDP7	CHIEF	LOW DENSITY WALL MOUNT WITH PDU
AV-CF (UC 109)	1	UC-CX100-Z-WM	CRESTRON	CRESTRON FLEX ADVANCED VIDEO CONFERENCE SYSTEM INTEGRATOR KIT WITH A WALL MOUNTED CONTROL INTERFACE
PA RACK 107	1	UCA-RMK-1U	CRESTRON	RACK MOUNT KIT FOR UC ENGINE BRACKET ASSEMBLY
PA RACK 107	1	TESIRAFORTE DAN VT	BIAMP	FIXED I/O DSP WITH 12 ANALOG INPUTS, 8 ANALOG OUTPUTS, 8 CHANNELS CONFIGURABLE USB AUDIO, 32 X 32 CH
PA RACK 107	1	ANIUSB-MATRIX	SHURE	DANTE (4 INPUTS) TO ANALOG (1 INPUT/1 OUTPUT) ROUTER/USB INTERFACE (1 INPUT/1 OUTPUT ONBLOCK CONNECT
AV IN-A	1	HD-TX-4KZ-101-1G-W	CRESTRON	DM LITE 4K60 4:4:4 TRANSMITTER FOR HDMI SIGNAL EXTENSION OVER CATX CABLE, WALL PLATE, WHITE
PA RACK 107	1	HD-RX-4KZ-101	CRESTRON	DM LITE 4K60 4:4:4 RECEIVER FOR HDMI SIGNAL EXTENSION OVER CATX CABLE
AV IN-A	1	USB-EXT-2-LOCAL-1G-W	CRESTRON	USB OVER CATEGORY CABLE EXTENDER WALL PLATE, LOCAL, WHITE
PA RACK 107	1	USB-EXT-2-REMOTE	CRESTRON	USB OVER CATEGORY CABLE EXTENDER, REMOTE
PA RACK 107	2	DM-NVX-E10	CRESTRON	DM NVX 1080P60 4:4:4 NETWORK AV ENCODER
NOT USED				
AV HL1	2	7090043790672	HUDDLY	HUDDLY L1 W/ NETWORK ADAPTER, WALL & SHELF MOUNT, 2M ETHERNET CABLE
SEE FLOOR PLAN	4	AD-C6T-WH	QSC	6.5" TWO-WAY CEILING SPEAKER, 70/100V TRANSFORMER WITH 16 BYPASS, 135 CONICAL DMT COVERAGE, INCLUDES
AA 109	1	SPA4-60	QSC	1/2 RU 4 CHANNEL ENERGY STAR AMPLIFIER / MULTICHANNEL OPERATION 60 WATTS INTO 8 & 4, BRIDGED PAIR OP
AV 920	1	MXA920W-S	SHURE	920 CEILING ARRAY, WHITE, SQUARE, 24 IN
PA RACK 107	1	C9300X-48HX-A	CISCO	SWITCH FURNISHED BY CITY
				MOUNT RACK MOUNTED GEAR IN SHARED RACK IN 107
PA RACK 107	1	UPS-S2200R	MIDDLE ATLANTIC	UPS STD 2200VA
AV S1	1	7090043790993	HUDDLY	HUDDLY S1 W/NETWORK ADAPTER, WALL AND SHELF MOUNT, 2M ETHERNET CABLE
NOT SHOWN	1	MXW1X/O-Z10	SHURE	WIRELESS BODY PACK MIKE
~~AV-WP-WM~~	~~1~~	~~MXWAPT2-Z10~~	~~SHURE~~	~~2-CH ACCESS POINT TRANSCEIVER~~
NOT SHOWN	1	DM-NVX-E10	CRESTRON	DM NVX 1080P60 4:4:4 NETWORK AV ENCODER
NOT SHOWN	1	DM-NVX-D10	CRESTRON	DM NVX 1080P60 4:4:4 NETWORK AV DECODER

A4

JLA ARCHITECTS
MADISON | MILWAUKEE | DENVER
JLA-AP.COM

GRAEF
1010 East Washington Avenue,
Suite 202
Madison, WI 53703
608 / 242 1550

JLA PROJECT NUMBER: 20-0928

CITY OF MADISON WISCONSIN

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IMAGINATION CENTER AT REINDAHL PARK

BID DOCUMENTS

DATE OF ISSUANCE JANUARY 6, 2025

REVISION SCHEDULE

Mark	Description	Date
A1	ADDENDUM #1	03/07/2025
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

AV FLOW DIAGRAMS

SHEET NUMBER

T702

3/24/2025 2:36:12 PM

GENERAL SHEET NOTES

A. ALL EQUIPMENT SHOWN BELOW, UNLESS INDICATED "BY OWNER", SHALL BE PROVIDED BY THE AUDIO-VISUAL SYSTEM INTEGRATOR: A SUBCONTRACTOR TO THE DIVISION 26 CONTRACTOR WITH SPECIAL EXPERTISE IN AUDIOVISUAL WORK PERFORMING WORK UNDER SECTIONS 27 41 00, 27 41 16, 27 51 16, AND 27 51 23.

PAVILION #1 151 & PAVILION #2 152				
PLAN DESIGNATION	QTY	MASTER NO.	MANUFACTURER	DESCRIPTION
AV RPS-2	2	ELECTROL	DA-LITE	120" MOTORIZED PROJECTION SCREEN - SEE SPECIFICATION SECTION 11 52 13.
AV P	2	L775U	EPSON	7000 LUMEN LASER 3LCD PROJECTOR
	2	V12808001	EPSON	UNIVERSAL PROJECTOR MOUNT
AV IN	2	HD-TX-101-C-1G-E-B-T	CRESTRON	HDMI INPUT PLATE
	2	HD-MD8X8-4KZ-E	CRESTRON	HDMI RECEIVER
AV C	2	TSW-570P-B-S	CRESTRON	WALL TOUCH PANEL
CPS XMTR/RCVR	1	GLS-PART-CN	CRESTRON	PARTION SENSOR
	1	PW240-RU	CRESTRON	POWER SUPPLY
	1	PC-200	CRESTRON	POWER STRIP
	LOT	CRESNET-P-TL-SP100	CRESTRON	CRESTRON SIGNAL CABLE
	1	TESIRA SERVER I-O	BIAMP	DIGITAL SIGNAL PROCESSOR
	2	MXW2/SM58	SHURE	DUAL CHANNEL WIRELESS MIKES
SEE FLOOR PLAN	16	AD-CST-WH	QSC	CEILING SPEAKERS, 70/100V TRANSFORMERS
AA	1	GXD 8 1200W	QSC	1200 WATT 2-CHANNEL AUDIO AMPLIFIER
AV I-0-1	2	DB-J2	RDL	AUX AUDIO INPUT PLATE
	1	DWR-16-22PD SPECIAL	MIDDLE ATLANTIC	WALL RACK WITH LOCKABLE DOOR CONTROLLED BY KEYSCAN CARD READER
	1	C9300X-48HX-A	CISCO	SWITCH FURNISHED BY CITY
	LOT	CAT6		CABLE
	LOT	14 AWG IN CONDUIT		SPEAKER WIRE
	2	CX-50	BARCO	CLICK-SHARE WIRELESS CONNECTION SYSTEM
AV-CC	1	CP4	CRESTRON	RACK MOUNTED AV CONTROL SYSTEM

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BID DOCUMENTS

DATE OF ISSUANCE JANUARY 6, 2025

REVISION SCHEDULE

Mark	Description	Date
A1	ADDENDUM #1	03/07/2025
A3	ADDENDUM #3	03/20/2025
A4	ADDENDUM #4	03/27/2025

SHEET TITLE

AV FLOW DIAGRAMS

SHEET NUMBER

T704

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ADDENDUM-4
SPECIFICATIONS

TABLE OF CONTENTS

[CoM] Denotes City of Madison section

(A1) = Revised as part of Bid Specification Addendum 1, dated 3-6-25.

(A3) = Revised as part of Bid Specification Addendum 3, dated 3-20-25.

(A4) = Revised as part of Bid Specification Addendum 4, dated 3-27-25.

END OF SECTION

SECTION 07 53 00
ELASTOMERIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Elastomeric roofing membrane application.

B. Insulation, flat and tapered.

C. Vapor retarder.

D. Deck sheathing.

E. Cover boards.

F. Roofing walkway pads.

1.02 RELATED REQUIREMENTS

A. Section 05 31 00 - Steel Decking: Placement of acoustical insulation for deck flutes.

B. Section 07 62 00 - Sheet Metal Flashing and Trim.

C. Section 07 71 00 - Roof Specialties: Prefabricated roofing expansion joint flashing.

D. Section 07 71 23 - Manufactured Gutters and Downspouts.

E. Section 07 72 00 Roof Accessories.

1.03 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023a.

C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension; 2016 (Reapproved 2021).

D. ASTM D570 - Standard Test Method for Water Absorption of Plastics; 2022.

E. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2020).

F. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

G. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

H. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a, with Editorial Revision (2023).

I. FM (AG) - FM Approval Guide; Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of associated counterflashings installed under other sections.

B. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers; review preparation and installation procedures and coordination and scheduling necessary for related work.

1.05 SUBMITTALS

A. See Section 01 33 23-Submittals for City of Madison required submittal procedures.

B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, surfacing, and fasteners.

1. Vapor Retarder: per manufacturer requirements.

C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and mechanical fastener layout.

D. Samples for Verification: Submit two samples of standard size.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Installer's qualification statement.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.

B. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact.

C. Store materials in weather protected environment, clear of ground and moisture.

D. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.

E. Protect foam insulation from direct exposure to sunlight.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather.

B. Do not apply roofing membrane when ambient temperature is below 40 degrees F (5 degrees C) or above 100 degrees F (38 degrees C).

C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

E. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.09 WARRANTY

A. See Section 01 77 00-Closeout Procedures for additional warranty requirements.

B. Correct defective work within a two year period after Date of Substantial Completion.

C. Provide 30 year manufacturer's material and labor warranty to cover failure to prevent penetration of water.
   1. Cover wind speeds up to 72 mph

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. EPDM Membrane Materials:
   1. Basis of Design: Elevate/Firestone Rubbergard Max EPDM: www.holcimelevate.com
   2. Carlisle SynTec Systems; Sure-Tough EPDM: www.carlisle-syntec.com/#sle.
   3. Johns Manville; JM EPDM: www.jm.com/#sle.
   4. Versico Roofing Systems; VersiGard EPDM: www.versico.com/#sle.

5. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

B. Insulation:
1. Dow: www.dow.com/#sle.
2. GAF: www.gaf.com/#sle.
3. Hunter Panels: www.hunterpanels.com/#sle.
4. Owens Corning Corporation: www.owenscorning.com/#sle.
5. ROCKWOOL: www.rockwool.com/#sle.
6. Versico Roofing Systems; SecurShield Insulation: www.versico.com/#sle.
7. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ROOFING - UNBALLASTED APPLICATIONS

A. Elastomeric Membrane Roofing: One ply membrane, fully adhered, over vapor retarder and insulation.

B. Roofing Assembly Requirements:
1. Insulation Thermal Resistance (R-Value): 5 per inch, minimum; provide insulation of thickness required.

C. Acceptable Insulation Types - Constant Thickness Application: Any type that meets requirements and is approved by membrane manufacturer for application.

D. Acceptable Insulation Types - Tapered Application: Any type that meets requirements and is approved by membrane manufacturer for application.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Membrane: Ethylene-propylene-diene-monomer (EPDM); non-reinforced; complying with minimum properties of ASTM D4637/D4637M.
1. Thickness: 90 mil, 0.090 inch (2.3 mm), minimum.
2. Sheet Width: 120 inches (3,048 mm), maximum.
a. Adhered Application: Limit width to 120 inches (3,048 mm), maximum, when ambient temperatures are less than 40 degrees F (4.4 degress C) for extended period of time during installation.
3. Color: Black.
4. Tensile Strength: 9 psi (1305 MPa), minimum, measured in accordance with ASTM D412.
5. Ultimate Elongation: 200 percent, minimum, measured in accordance with ASTM D412.
6. Durometer Hardness, Type A: 30, minimum, in accordance with ASTM D2240
7. Tear Strength: 150 lbf per inch (26.3 kN/m), measured in accordance with ASTM D624.
8. Water Absorption: 8 percent increase in weight, maximum, measured in accordance with ASTM D570, 24 hour immersion.
9. Water Vapor Permeability: 1 perm inch, measured in accordance with ASTM E96/E96M.

B. Seaming Materials: As recommended by membrane manufacturer.

C. Vapor Retarder: ~~(only if required by manufacturer requirements)~~ ~~Non-bituminous, foil and fibrous-mesh laminate~~Self-adhesive tri-laminate woven, high-density polyethylene top surface with factory laminated SBS modified bitumen adhesive, complying with requirements of fire rating classification; compatible with roofing and insulation materials.
1. Fire-retardant adhesive.
2. Vapor Permeability: ~~1 perm inch, measured in accordance with ASTM E96/E96M.~~ Meet requirements of ASTM D1970 or ASTM E2178.
3. Sealability around Nail: Conforms to ASTM D1970.
4. Product: Elevate V-Force Vapor Barrier Membrane; www.holcimelevate.com

D. Flexible Flashing Material: Same material as membrane.
1. Thickness: 30 mil (0.76 mm).
2. Maximum Perm Rate: 0.04.

3. Tensile Strength: 1,200 psi (8.3 MPa).
4. Elasticity: 50 percent with full recovery without set.
5. Color: Black.

2.04 DECK SHEATHING

A. Deck Sheathing: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch (6.4 mm) thick.
1. Thickness: 1/2-inch (12.7 mm), Type X, fire-resistant.
2. Products:
a. Georgia-Pacific; DensDeck: www.densdeck.com/#sle.
b. Georgia-Pacific; DensDeck Prime with EONIC Technology: www.densdeck.com/#sle.
c. USG Corporation; Securock Ultralight Glass-Mat Roof Board: www.usg.com/#sle.
d. USG Corporation; Securock Ultralight Coated Glass-Mat Roof Board: www.usg.com/#sle.
e. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

2.05 COVER BOARDS

A. Cover Boards: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
1. Thickness: 1/2-inch (12.7 mm), Type X, fire-resistant.
2. FM classified for Very Severe Hail (VSH) in approved single ply membrane assemblies.
3. Products:
a. Georgia-Pacific; DensDeck: www.densdeck.com/#sle.
b. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

2.06 INSULATION

A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
1. Classifications:
a. Type VII: Faced with glass mat faced gypsum board on one major surface of the core foam and faced on the other major surface with any facer described in this specification.
1) Compressive Strength: 16 psi (110 kPa), minimum.
2) Thermal Resistance, R-value (RSI-value): At 1-1/2 inches (38 mm) thick; R-8.5 (1.23) at 75 degrees F (24 degrees C); at total system minimum R-40 must be achieved.
2. Board Size: 48 by 96 inches (1220 by 2440 mm).
3. Board Thickness: 1.5 inch (37.5 mm).
4. Tapered Board: Slope as indicated; minimum thickness as indicated on the drawings; fabricate of fewest layers possible.
5. Board Edges: Square.
6. Products:
a. Dow Chemical Company: www.dow.com/#sle.
b. GAF; EnergyGuard Polyiso Insulation: www.gaf.com/#sle.
c. Mule-Hide Products Co, Inc; Poly ISO Flat: www.mulehide.com/#sle.
d. Versico Roofing Systems; SecurShield Insulation: www.versico.com/#sle.
e. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

2.07 ACCESSORIES

A. Prefabricated Roofing Expansion Joint Flashing: See Section 07 71 00.

B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; elastomeric material compatible with membrane.

C. Sheathing Joint Tape: Paper type, 6 inches (152 mm) wide, self adhering.

D. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches (152 mm) wide; self adhering.

E. Insulation Fasteners: Appropriate for purpose intended.

F. Membrane Adhesive: As recommended by membrane manufacturer.

G. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

H. Insulation Adhesive: As recommended by insulation manufacturer.

I. Roofing Nails: Galvanized, hot-dipped type, size and configuration as required to suit application.

J. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.

K. Insulation Perimeter Restraint: Stainless steel edge device configured to restrain insulation boards in position and provide top flashing.

L. Sealants: As recommended by membrane manufacturer.

M. Walkway Pads: Suitable for maintenance traffic, contrasting color or otherwise visually distinctive from roof membrane.
   1. Composition: 100% Recycled Rubber, non-slip surface.
      a. With EPDM compatable adhesive strip
   2. Size: 30 inches wide, minimum.
   3. Thickness: 1/2-inch to 2-inches.
   4. Surface Color: Black, Grey or White.
   5. Manufacture:
      a. Same as roofing supplier, if they offer a suitable product.
      b. RubberForm Recycled Products, LLC.; Rooftop Walkway Rubber Mats;
      c. Substitutions: See Section 01 25 13 – Product Substitution Procedures

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify deck is supported and secure.

C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

D. Verify deck surfaces are dry and free of snow or ice.

E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION - METAL DECK

A. Install deck sheathing on metal deck.
   1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
   2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
   3. Tape joints.

B. Mechanically fasten sheathing to roof deck, in accordance with roofing manufacturer's instructions.
   1. Over entire roof area, fasten sheathing using six fasteners with washers per sheathing board.
   2. At roof perimeter to a distance of 4 feet (1.2 m) in from edges, fasten sheathing using 6 fasteners with washers per board.

3.03 INSTALLATION - VAPOR RETARDER AND INSULATION, UNDER MEMBRANE

A. Install self-adhesive vapor retarder to ~~deck surface~~Cover Board-Layer 1~~with adhesive~~ in accordance with manufacturer's instructions.
   1. Extend vapor retarder under cant strips and blocking to deck edge.
   2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

~~Attachment of Insulation: Embed insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.~~

C. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.

~~Cover Boards: Mechanically fasten cover boards in accordance with roofing manufacturer's instructions andFM (AG)Factory Mutual requirements.~~

D. Cover Boards: Mechanically fasten cover boards in accordance with roofing manufacturer's instructions ~~andFM (AG)Factory Mutual requirements~~.
   1. Layer 1 (bottom): Mechanically fasten cover boards to roof deck in accordnace with roofing manufacturer's instructions.
   2. Layer 2 (top): Adhere cover boards with low-rise foam to top layer of poly-iso insulation.

E. Lay subsequent layers of insulation with joints staggered minimum 6 inches (152 mm) from joints of preceding layer.

F. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

G. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.

H. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

I. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

J. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches (457 mm).

K. Do not apply more insulation than can be covered with membrane in same day.

3.04 INSTALLATION - MEMBRANE

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Fully Adhered Application: Apply adhesive to substrate at rate ~~of ___ gal per 100 sq ft (___ L/9.3 sq m).~~recommended by roofing manufacturer. Fully embed membrane in adhesive except in areas directly over or within 3 inches (76 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

D. Overlap edges and ends and seal seams by contact adhesive, minimum 3 inches (76 mm). Seal permanently waterproof. Apply uniform bead of sealant to joint edge.

E. At intersections with vertical surfaces:
   1. Extend membrane over cant strips and up a minimum of 4 inches (102 mm) onto vertical surfaces.
   2. Fully adhere flexible flashing over membrane and up to nailing strips.

F. Around roof penetrations, seal flanges and flashings with flexible flashing.

G. Install roofing expansion joints where indicated. Make joints watertight.
   1. Install prefabricated joint components in accordance with manufacturer's instructions.

H. Coordinate installation of roof drains and sumps and related flashings.

3.05 FIELD QUALITY CONTROL

A. See Section 01 45 16-Field Quality Control Procedures for City of Madison requirements. for additional requirements.

B. Owner will provide testing services, and Contractor to provide temporary construction and materials for testing in accordance with requirements.

C. Provide daily on-site attendance of roofing and insulation manufacturer's representative during installation of this work.

3.06 CLEANING

A. See Section 01 77 00-Closeout Procedures for additional requirements.

B. Remove bituminous markings from finished surfaces.

C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.

D. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

A. Protect installed roofing and flashings from construction operations.

B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Laminated glass interlayers.

D. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers.

B. Section 07 26 00 - Vapor Retarders.

C. Section 07 27 00 - Air Barriers.

D. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

E. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

F. Section 08 41 26 - All-Glass Entrances and Storefronts: Glazing provided as part of entrance assembly.

G. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2019).

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

E. ASTM C1036 - Standard Specification for Flat Glass; 2021.

F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).

I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

L. GANA (SM) - GANA Sealant Manual; 2008.

M. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.

O. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.

P. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

A. See Section 01 33 23-Submittals for City of Madison required submittal procedures.

B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

C. Installer's qualification statement.
   1. Architectural Glass and Metal Technician (AGMT) certificates or equivalent ANSI accredited certificates for architectural glass and metal installers for no less than 50% of the crew installing architectural glass and metal products.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
   1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

B. Installer Qualifications: A qualified glazing contractor for this Project who employs glazing technicians certified under the Architectural Glass and Metal Technician (AGMT) certification program. No less than 50% of the crew performing architectural glass and metal work shall be Architectural Glass and Metal Technicians (AGMT).

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.07 MOCK-UPS

A. See Section 01 43 39 - Mockups for additional requirements.

1.08 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

A. See Section 01 77 00-Closeout Procedures for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Float Glass Manufacturers:
   1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
   2. Guardian Glass, LLC: www.guardianglass.com/#sle.
   3. Oldcastle Building Envelope: www.obe.com
   4. Vitro Architectural Glass (formerly PPG Glass); Solarban 65: www.vitroglazings.com/#sle.
   5. Or Approved Equal.
   6. Substitutions: See Section 01 25 13 - Product Substitution Procedures.

B. Laminated Glass Manufacturers:
   1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
   2. Or Approved Equal.
   3. Substitutions: See Section 01 25 13 - Product Substitution Procedures.

C. Bird-Friendly Glass Manufacturers:

1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
2. Guardian Glass, LLC: www.guardianglass.com/#sle.
3. Oldcastle Building Envelope: www.obe.com
4. Vitro Architectural Glass (formerly PPG Glass); Solarban 65: www.vitroglazings.com/#sle.
5. Or Approved Equal.
6. Substitutions: See Section 01 25 13 - Product Substitution Procedures.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   3. Glass thicknesses listed are minimum.

B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
   1. In conjunction with weather barrier related materials described in other sections, as follows:
      a. Water-Resistive Barriers: See Section 07 25 00.
      b. Vapor Retarders: See Section 07 26 00.
      c. Air Barriers: See Section 07 27 00.
   2. To utilize inner pane of multiple pane insulating glass units for continuity of vapor retarder and/or air barrier seal.
   3. To maintain a continuous vapor retarder and/or air barrier throughout glazed assembly from glass pane to heel bead of glazing sealant.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
   2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
   3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
   1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
   1. Glass: Any of the manufacturers specified for float glass.
   2. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
   3. Guardian Glass, LLC: www.guardianglass.com/#sle.
   4. Oldcastle Building Envelope: www.obe.com
   5. Vitro Architectural Glass (formerly PPG Glass); Solarban 65: www.vitroglazings.com/#sle.
   6. Substitutions: See Section 01 25 13 - Product Substitution Procedures.

B. Insulating Glass Units: Types as indicated.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO.
3. Spacer Color: Black.
4. Edge Seal:
   a. Color: Black.
5. Purge interpane space with dry air, hermetically sealed.

C. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with argon.
   a. Basis of Design: Cardinal Endure IG spacer.
   b. Basis of Design Air Gap: 1/2 inch or 13 mm.
3. Outboard Lite: Heat-strengthened float glass, 1/4 inch or 5.77 mm thick, minimum.
   a. Tint: Clear.
   ~~Coating: Self-cleaning type, on #1 surface.~~
   b. Coating: Low-E (passive type), LoE-270 on #2 surface.
4. Inboard Lite: Heat-strengthened float glass, 1/4 inch or 5.77 mm thick, minimum.
   a. Tint: Clear.
5. Total Thickness: 1 inch or 24.4 mm .
6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.30, nominal.
7. Visible Light Transmittance (VLT): 68 percent, nominal.
8. Solar Heat Gain Coefficient (SHGC): 0.41, nominal.

D. Type IG-1B - Insulating Glass Units: Bird-friendly Acid Etched vision glass, double glazed.
1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with argon.
   a. Basis of Design: Cardinal Endure IG spacer.
   b. Basis of Design Air Gap: 1/2 inch or 13 mm.
3. Outboard Lite: Heat-strengthened float glass, 1/4 inch or 5.77 mm thick, minimum.
   a. Tint: Clear.
   b. Bird-Friendly Pattern: 5 mm dots, spaced at 2 by 2 inches.
      1) Acid-etched on exterior, Surface 1, of IGU.
      ~~Coating: Self-cleaning type, on #1 surface.~~
   c. Coating: Low-E (passive type), LoE-270 on #2 surface.
4. Inboard Lite: Heat-strengthened float glass, 1/4 inch or 5.77 mm thick, minimum.
   a. Tint: Clear.
5. Total Thickness: 1 inch or 24.4 mm .
6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.30, nominal.

E. Type IG-2 - Insulating Glass Units: Vision glass, double glazed.
1. Applications: Tempered exterior glazing as indicated on drawings.
2. Space between lites filled with argon.
   a. Basis of Design: Cardinal Endure IG spacer.
   b. Basis of Design Air Gap: 1/2 inch or 13 mm.
3. Outboard Lite: Fully tempered float glass, 1/4 inch or 5.77 mm thick, minimum.
   a. Tint: Clear.
   ~~Coating: Self-cleaning type, on #1 surface.~~
   b. Coating: Low-E (passive type), LoE-270 on #2 surface.
4. Inboard Lite: Fully tempered float glass, 1/4 inch or 5.77 mm thick, minimum.
   a. Tint: Clear.
5. Total Thickness: 1 inch or 25.7 mm.

6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.30, nominal.

F. Type IG-2B - Insulating Glass Units: Bird-friendly Acid Etched vision glass, double glazed.
1. Applications: Tempered exterior glazing as indicated on drawings.
2. Space between lites filled with argon.
a. Basis of Design: Cardinal Endure IG spacer.
b. Basis of Design Air Gap: 1/2 inch or 13 mm.
3. Outboard Lite: Fully tempered float glass, 1/4 inch or 5.77 mm thick, minimum.
a. Tint: Clear.
b. Bird-Friendly Pattern: 5 mm dots, spaced at 2 by 2 inches.
1) Acid-etched on exterior, Surface 1, of IGU.
~~Coating: Self-cleaning type, on #1 surface.~~
c. Coating: Low-E (passive type), LoE-270 on #2 surface.
4. Inboard Lite: Fully tempered float glass, 1/4 inch or 5.77 mm thick, minimum.
a. Tint: Clear.
5. Total Thickness: 1 inch or 24.4 mm .
6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.30, nominal.

G. Type IG-3B - Insulating Glass Units: Bird-friendly Acid Etched laminated exterior glazing.
1. Space between lites filled with argon.
a. Basis of Design: Cardinal Endure IG spacer.
b. Basis of Design Air Gap: 1/2 inch or 13 mm.
2. Outboard Lites: Heat-strengthened float glass, 1/4 inch or 5.77 mm thick, minimum.
a. Tint: Clear.
b. Bird-Friendly Pattern: 5 mm dots, spaced at 2 by 2 inches.
1) Acid-etched on exterior, Surface 1, of IGU.
c. Coating: Low-E (passive type), LoE-270 on #2 surface.
d. PVB Interlayer between outboard lites (LGI-1).
3. Inboard Lite: Heat-strengthened float glass, 1/4 inch or 5.77 mm thick, minimum.
a. Tint: Clear.
4. Total Thickness: 1 inch or 24.4 mm .
5. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.30, nominal.

2.05 BASIS OF DESIGN - INSULATING GLASS UNITS

A. Basis of Design - Insulating Glass Units: Vision glazing, with low-e coating.
1. Applications: Exterior insulating glass glazing unless otherwise indicated.
2. Space between lites filled with argon.
3. Total Thickness: 1 inch or 24.4 mm.
4. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.30, nominal.
5. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO.
6. Spacer Color: Black.
7. Edge Seal:
a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
8. Color: Black.
9. Purge interpane space with dry air, hermetically sealed.

2.06 GLAZING UNITS

A. Type G-1 - Monolithic Interior Vision Glazing:
1. Applications: Interior glazing unless otherwise indicated.

2. Glass Type: Annealed float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), nominal.

B. Type G-2 - Monolithic Interior Vision Glazing:
1. Applications: Tempered interior glazing as indicated on drawings.
2. Glass Type: Fully tempered float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch (6.4 mm), nominal.

2.07 LAMINATED GLASS INTERLAYERS

A. Type LGI-1 - Polyvinyl Butyral (PVB) Interlayer for Laminated Glazing:
1. Functionality: Post-breakage safety and security.
2. Applications:
a. Single pane, laminated glass unit.
b. Interior laminated pane of insulating glass unit, Type IG-3B.
3. Color: Clear.
4. Thickness: As required for indicated performance of laminated glass application.
5. Manufacturers:
a. Eastman Chemical Company; Saflex Clear PVB Interlayer: www.saflex.com/#sle.
b. Sekisui S-LEC America, LLC; S-LEC Clear Film: www.s-lec.us/#sle.
c. Substitutions: See Section 01 60 00 - Product Requirements.

2.08 GLASS COATINGS

A. Decorative Coating: Two component, water-based silicone polyurethane opaque color hybrid coating for roll coat and spray applications.
1. Application: Interior locations as indicated on drawings.
a. Glass and Coating Orientation: On surface facing substrate
2. Decorative Coating Glass Unit Fabrication: Strictly according to coating manufacturer's written instructions.
3. Dry Film Thickness: Between 0.0012 inch (0.030 mm) and 0.0015 inch (0.040 mm), minimum.
4. Color: Selected from manufacturer's standard range and indicated on drawings.

2.09 GLAZING COMPOUNDS

A. Type GC-1 - Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; gray color.

B. Type GC-2 - Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

C. Type GC-3 - Polysulfide Sealant: Two component; chemical curing, nonsagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

D. Type GC-4 - Polyurethane Sealant: Single component, chemical curing, nonstaining, nonbleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; color as selected.

E. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

F. Manufacturers:
1. Bostik Inc: www.bostik-us.com/#sle.
2. Dow Corning Corporation: www.dowcorning.com/construction/#sle.Dow Corning Corporation: www.dowcorning.com/construction/#sle.
3. Momentive Performance Materials, Inc: www.momentive.com/#sle.

4. Pecora Corporation: www.pecora.com/#sle.
5. Tremco Commercial Sealants & Waterproofing; Proglaze: www.tremcosealants.com/#sle.

2.10 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.

B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
   1. Width: As required for application.
   2. Thickness: As required for application.
   3. Spacer Rod Diameter: As required for application.
   4. Manufacturers:
      a. Pecora Corporation: www.pecora.com/#sle.
      b. Tremco Global Sealants: www.tremcosealants.com/#sle.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

C. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

D. Glazing Clips: Manufacturer's standard type.

E. Smoke Removal Window/Glazing Unit Markings: Adhesive backed markings affixed to manually operable or fixed windows of high-rise buildings to identify units intended for post-fire smoke removal in compliance with ICC (IBC) and local building officials.

2.11 SOURCE QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Provide shop inspection and testing for all types of glass.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

D. Verify that sealing between joints of glass framing members has been completed effectively.

E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, and paint.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.

B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.

F. Carefully trim protruding tape with knife.

3.06 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.

E. Place glazing tape on free perimeter of glazing in same manner described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Carefully trim protruding tape with knife.

3.07 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch (5 mm) below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch (6.4 mm) below sight lines.
   1. Place glazing tape on glazing pane of unit with tape flush with sight line.

G. Fill gap between glazing and stop with manufacturer's recommended sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch (9 mm) below sight line.

H. Apply cap bead of manufacturer's recommended sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.08 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch (610 mm) intervals, 1/4 inch (6 mm) below sight line.

F. Fill gaps between pane and applied stop with manufacturer's recommended type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.09 FIELD QUALITY CONTROL

A. See Section 01 45 16-Field Quality Control Procedures for City of Madison requirements.

B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

C. Monitor and report installation procedures and unacceptable conditions.

3.10 CLEANING

A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

C. Remove nonpermanent labels immediately after glazing installation is complete.

D. Clean glass and adjacent surfaces after sealants are fully cured.

E. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.11 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

3.12 SCHEDULES

A. See applicable schedules as indicated on the drawings.

END OF SECTION

SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Ceramic accessories.

D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.

B. Section 07 95 13 - Expansion Joint Cover Assemblies: Expansion joint components.

C. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing; remediation procedures.

D. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.

E. Section 22 40 00 - Plumbing Fixtures: Shower receptor.

1.03 REFERENCE STANDARDS

A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2017 (Reaffirmed 2022).

B. ANSI A108.1b - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

D. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.

E. ANSI A108.5 - Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue Plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar; 2023.

F. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.

G. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.

H. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).

I. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.

J. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.

K. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

L. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2019.

M. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.

N. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.

O. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2019.

P. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 2019.

Q. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2014 (Reaffirmed 2019).

R. ANSI A118.11 - American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2017.

S. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).

T. ANSI A118.13 - American National Standard Specification for Bonded Sound Reduction Membranes for Thin-Set Ceramic Tile Installation; 2014 (Reaffirmed 2024).

U. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2019.

V. ANSI A136.1 - American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile; 2020.

W. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

X. ANSI A137.2 - American National Standard Specifications for Glass Tile; 2022.

Y. ANSI A137.3 - American National Standard Specifications for Gauged Porcelain Tile and Gauged Porcelain Tile Panels/Slabs; 2021.

Z. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.

AA. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

BB. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).

CC. ASTM E492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine; 2022.

DD. ASTM E2179 - Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors; 2021.

EE. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.

FF. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

GG. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

HH. ICC-ES AC380 - Acceptance Criteria for Termite Physical Barrier Systems; 2021, with Editorial Revision (2022).

II. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2023.

JJ. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship 2019.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting: Convene a pre-installation meeting one week before starting work of this section; require attendance by affected installers

1.05 SUBMITTALS

A. See Section 01 33 23-Submittals for City of Madison required submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
   1. Confirm lead times for tile products at time of submittals to provide adequate delivery time to meet the construction schedule. Significant lead times of greater than 12 weeks could require re-assessment of specified product and potential substitution.

C. Shop Drawings: Indicate tile layout; patterns; color arrangement; perimeter conditions; junctions with dissimilar materials; control and expansion joints; thresholds; ceramic accessories; setting details.

D. Samples: Provide two of each type indicated.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Master Grade Certificate: Submit for each type of tile, signed by the tile manufacturer and tile installer.

G. Installer's Qualification Statement:
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.
   2. Submit documentation of completion of apprenticeship and certification programs.
   3. Submit documentation of Natural Stone Institute Accreditation.

H. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 60 00 - Product Requirements, for additional provisions.
   2. Extra Tile: 5 percent of each type, size, color, and surface finish combination

1.06 QUALITY ASSURANCE

A. Maintain one copy of ANSI A108/A118/A136 and TCNA (HB) on site.

B. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.
   2. Installer Certification:
      a. Ceramic Tile Education Foundation (CTEF): Certified Tile Installer (CTI).
      b. Apprenticeship Program: Installer has achieved Journey-worker status through an apprenticeship from the International Union of Bricklayers and Allied Craft-workers (IUBAC) or a U.S. Department of Labor (DOL)-recognized program.
      c. International Masonry Training and Education Foundation (IMTEF): Supervisor Certification Program (SCP).

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature above 50 degrees F (10 degrees C) during installation and curing of setting materials.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products of each type by the same manufacturer.
   1. Substitutions: Not permitted.

B. Glazed Wall Tile.
   1. Size: As indicated on the drawings.
   2. Surface finish as indicated on drawings.
   3. Color(s): As indicated on drawings.
   4. Pattern: As indicated on drawings.
   5. Products
      a. Virginia Tile; Wow USA Duo [CWT-03].
      b. Ceramic Tileworks; ~~Craft [CWT-05]~~, Village [CWT-06], Up [CWT-08], Small [CWT-09].
      c. Ceramic Tileworks: Country Ash Blue [CWT-05], 3x8
      d. Substitutions: Not permitted.

C. Porcelain Floor Tile.
   1. Size: As indicated on the drawings.
   2. Thickness: 3/8 inch.
   3. Edges: Square (Rectified).
   4. Surface Finish: UPS.
   5. Color: As indicated on drawings.
   6. Pattern: 1/3 lap.
   7. Products:
      a. Ceramic Tileworks; Oh!Take [POR-01].
      b. Ceramic Tileworks; Platform [POR-02].
      c. Substitutions: Not permitted.

D. Porcelain Wall Tile.
   1. Size: As indicated on the drawings.
   2. Thickness: 3/8 inch.
   3. Edges: Square (Rectified).
   4. Surface Finish: UPS.
   5. Color: As indicated on drawings.
   6. Pattern: As indicated on drawings.
   7. Products:
      a. Ceramic Tileworks; Symmetry [CWT-01 / CWT-07].
      b. Crossville; Native Metal [CWT-02].
      c. Substitutions: Not permitted.

E. Mosaic Wall Tile.
   1. Type: Curve Chevron.
   2. Size: As indicated on drawings.
   3. Finish: Gloss.
   4. Color(s): Jade.
   5. Pattern: As indicated on drawings.
   6. Products:
      a. Virginia Tile: Walker Zanger 6th Ave. [CWT-04]
      b. Substitutions: Not permitted.

2.02 TRIM AND ACCESSORIES

A. Non-Ceramic: Satin natural anodized extruded aluminum.
   1. Application: End Cap and Outside Corners

a. Product: Schluter Systems Jolly.
b. Size: As necessary for the tile/application.
2. Application: Tile to carpet flooring transitions.
a. Product: Schluter Systems Schiene.
b. Size: As necessary for the tile/application.
3. Application: Floor to wall transitions.
a. Product: Schluter Systems DILEX-EHK & AHKA.
b. Size: As necessary for the tile/application.
4. Installation: Set with tile mortar or adhesive.
5. Substitutions: .See Section 01 25 13 – Product Substitution Procedures.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
1. Basis of Design: LATICRETE International.
2. Substitutions: .See Section 01 25 13 – Product Substitution Procedures.

C. Improved Latex-Portland Cement Mortar Bond Coat: ANSI A118.15.
1. Applications: Use this type of bond coat where indicated, and where no other type of bond coat is indicated.
2. Products:
a. Basis of Design: LATICRETE International, Inc; MULTIMAX LITE.
b. Substitutions: . See Section 01 25 13 – Product Substitution Procedures.

2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:
1. Basis of Design: LATICRETE International, Inc.
a. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

C. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
1. Applications: Use this type of grout where indicated.
2. Color(s): As selected by Architect from manufacturer's full line.
3. Products:
a. SPECTRALOCK Pro.

2.05 ACCESSORY MATERIALS

A. Manufacturers:
1. Basis of Design: LATICRETE International.
2. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

B. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; intended as waterproofing.
1. Crack Resistance: No failure at 1/8 inch (3.2 mm).
2. Fluid or Trowel Applied Type:
a. Material: Synthetic rubber; Acrylic.
b. Thickness: 20 mils (0.5 mm).
c. Product: HydroBAN.

C. Tile Underlayment: Specifically designed for bonding to thin-set setting mortar; not primarily waterproofing material and having the following characteristics:
1. Sound Reduction: Comply with ANSI A118.13; ASTM E492; ASTM E2179
2. Crack Resistance: No failure at 1/8-inch (3.2 mm) inch gap, minimum; comply with ANSI A118.12
3. Water Resistance: Comply with ANSI A118.10, bonded waterproofing.

4. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.
5. Suitable for installation over green concrete.
6. Type: Fluid or trowel applied.
    a. Products:
        1) LATICRETE International, Inc; Level Plus.
        2) Substitutions: See Section 01 25 13 – Product Substitution Procedures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
    1. Test in accordance with Section 09 05 61.
    2. Test as Follows:
        a. Alkalinity (pH): ASTM F710.
        b. Internal Relative Humidity: ASTM F2170.
        c. Moisture Vapor Emission: ASTM F1869.
    3. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.
    4. Follow moisture and alkalinity remediation procedures in Section 09 05 61.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases; Align floor, base, and wall joints.; Align floor and wall joints

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square; and external angles square

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Install thresholds where indicated.

I. Sound tile after setting. Replace hollow sounding units.

J. Keep control and expansion joints free of mortar, grout, and adhesive.

K. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

L. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

M. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior; concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat; F116, organic adhesive; with standard grout unless otherwise indicated.
   1. Use uncoupling membrane under all tile unless other underlayment is indicated.
   2. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.
   3. Where epoxy bond coat and grout are indicated, install in accordance with TCNA (HB) Method F131.
   4. Where furan bond coat and grout are indicated, install in accordance with TCNA (HB) Method F133.
   5. Where epoxy or furan grout is indicated, but not epoxy or furan bond coat, install in accordance with TCNA (HB) Method F115.

3.05 INSTALLATION - WALL TILE

A. Over gypsum wallboard on wood or metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat; W223, thin-set with organic adhesive.
   1. Where mortar bed is indicated, install in accordance with TCNA (HB) Method W222, one coat method.
   2. Where waterproofing membrane is indicated other than at showers and bathtub walls, install in accordance with TCNA (HB) Method W222, one coat method.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat, W211, bonded mortar bed without membrane.

3.06 CLEANING AND MAINTENANCE

A. Clean tile and grout surfaces.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface 4 days after installation.

3.08 SCHEDULE

A. As indicated on the drawings.

END OF SECTION

SECTION 09 67 23
RESINOUS FLOORING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Resinous flooring system as shown on the drawings and in schedules.

1.03 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete

1.04 SYSTEM DESCRIPTION

A. The work shall consist of preparation of the substrate, the furnishing and application of an epoxy based multi roller applied flooring system. The system shall have the color and texture as specified by the Owner. It shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.

B. Cove base (if required) to be applied where noted on plans and per manufacturers standard details unless otherwise noted.

1.05 SUBMITTALS

A. Product Data: Latest edition of Manufacturer's literature including performance data and installation procedures.

B. Manufacturer’s Safety Data Sheet (SDS) for each product being used.

C. Samples: A 3 x 3 inch square sample of the proposed system. Color, texture, and thickness shall be representative of overall appearance of finished system subject to normal tolerances.

1.06 QUALITY ASSURANCE

A. The Manufacturer shall have a minimum of 10 years experience in the production, sales, and technical support of epoxy and urethane industrial flooring and related materials.

B. The Applicator shall have experience in installation of the flooring system as confirmed by the manufacturer in all phases of surface preparation and application of the product specified.

C. No requests for substitutions shall be considered that would change the generic type of the specified system.

D. System shall be in compliance with requirements of United States Department of Agriculture (USDA),

E. Food, Drug Administration (FDA), and local Health Department.

F. A pre-installation conference shall be held between Applicator, General Contractor and the Owner to review and clarification of this specification, application procedure, quality control, inspection and acceptance criteria and production schedule.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Packing and Shipping
   1. All components of the system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the product type and batch number.

B. Storage and Protection
   1. The Applicator shall be provided with a storage area for all components. The area shall be between 60 F and 90 F, dry, out of direct sunlight and in accordance with the Manufacturer's recommendations and relevant health and safety regulations.
   2. Copies of Safety Data Sheets (SDS) for all components shall be kept on site for review by the Engineer or other personnel.

C. Waste Disposal
   1. The Applicator shall be provided with adequate disposal facilities for non-hazardous waste generated during installation of the system.

1.08 PROJECT CONDITIONS

A. Site Requirements
   1. Application may proceed while air, material and substrate temperatures are between 60 F and 90 F providing the substrate temperature is above the dew point. Outside of this range, the Manufacturer shall be consulted.
   2. The relative humidity in the specific location of the application shall be less than 85 % and the surface temperature shall be at least 5 F above the dew point.
   3. The Applicator shall ensure that adequate ventilation is available for the work area.
   4. The Applicator shall be supplied with adequate lighting equal to the final lighting level during the preparation and installation of the system.

B. Conditions of new concrete to be coated with epoxy material.
   1. Concrete shall be moisture cured for a minimum of 7 days and have fully cured a minimum of twenty eight days in accordance with ACI-308 prior to the application of the coating system pending moisture tests.
   2. Concrete shall have a flat rubbed finish, float or light steel trowel finish (a hard steel trowel finish is neither necessary nor desirable).
   3. Sealers and curing agents should not to be used.
   4. Concrete surfaces on grade shall have been constructed with a vapor barrier to protect against the effects of vapor transmission and possible delamination of the system.

C. Safety Requirements
   1. All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application.
   2. "No Smoking" signs shall be posted at the entrances to the work area.
   3. The Owner shall be responsible for the removal of foodstuffs from the work area.
   4. Non-related personnel in the work area shall be kept to a minimum.

1.09 WARRANTY

A. Dur-A-Flex, Inc. warrants that material shipped to buyers at the time of shipment substantially free from material defects and will perform substantially to Dur-A-Flex, Inc. published literature if used in accordance with the latest prescribed procedures and prior to the expiration date.

B. Dur-A-Flex, Inc. liability with respect to this warranty is strictly limited to the value of the material purchase.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Basis of Design: Dur-A-Flex, Inc.,
   95 Goodwin Street, East Hartford, CT 06108
   Phone: (860) 528-9838, Fax: (860) 528-2802
   www.dur-a-flex.com

B. Manufacturer of Approved System shall be single source and made in the USA.

2.02 FLOORING – PAVILION RESTROOMS

A. Dur-A-Flex, Inc; Dur-A-Chip Broadcast with Urethane Topcoat (to be referenced as **Micro**)
   1. System Materials:
      a. Primer: Dur-A-Glaze #4 WB resin and hardener.
      b. First Broadcast Coat: Dur-A-Gard OPF resin and hardener.
         1) Chips: Micro Decorative Colored Chips.
      c. Second Broadcast and Grout Coat: Dur-A-Glaze #4 resin and Water Clear hardener.

1) Chips: Micro Decorative Colored Chips.
d. Grout coat: Dur-A-Glaze #4 resin and Water Clear hardener.
e. Topcoat: Armor Top resin, hardener and grit.
f. Nominal Thickness: 60mils
2. Patch Materials
a. Shallow Fill and Patching: Use Dur-A-Glaze #4 Cove Rez.
b. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Crete.

2.03 FLOORING - CUSTODIAL 105A, 155 AND STORAGE 118

A. Dur-A-Flex, Inc, Shop Floor Epoxy Broadcast seamless flooring system (to be referenced as **Shop Floor**)
1. System Materials:
a. Primer: Dur-A-Glaze #4 WB resin and hardener.
b. First Broadcast Coat: Dur-A-Gard OPF resin and hardener.
1) Chips: Micro Decorative Colored Chips.
c. Second Broadcast and Grout Coat: Dur-A-Glaze #4 resin and Water Clear hardener.
1) Chips: Micro Decorative Colored Chips.
d. Dur-A-Glaze #4 resin and Water Clear hardener.
e. Topcoat: Armor Top resin, hardener and grit.
f. Nominal Thickness: 1/8 inch
2. Patch Materials
a. Shallow Fill and Patching: Use Dur-A-Glaze #4 Cove Rez.
b. Deep Fill and Sloping Material (over ¼ inch): Use Dur-A-Crete.

2.04 PRODUCT REQUIREMENTS – DUR-A-CHIP (MICRO)

A. Primer: Dur-A-Glaze #4 WB
1. Percent Solids: 56 %
2. VOC: 2 g/L
3. Bond Strength to Concrete ASTM D 4541: 550 psi, substrates fails
4. Hardness, ASTM D 3363: 3H
5. Elongation, ASTM D 2370: 9 %
6. Flexibility (1/4: Cylindrical mandrel), ASTM D 1737: Pass
7. Impact Resistance, MIL D-2794: >160
8. Abrasion Resistance ASTM D 4060
a. CS 17 wheel; 1,000g Load: 30 mg loss

B. Broadcast Coat: Dur-A-Gard OPF
1. Percent Solids: 100 %
2. VOC: 59 g/L
3. Compressive Strength, ASTM D 695: 16,000 psi
4. Tensile Strength, ASTM D 638: 3,800 psi
5. Flexural Strength, ASTM D 790: 4,000 psi
6. Abrasion Resistance, ASTM D 4060
a. C-10 Wheel, 1,000 gm load; 1,000 cycles: 35 mg loss
7. Flame Spread/NFPA-101, ASTM E 84: Class A
8. Impact Resistance MIL D-3134: 0.025 inch Max
9. Water Absorption MIL D-3134: Pass
10. Potlife @ 70 F: 20-25 minutes

C. Broadcast Coat and Grout Coat: Dur-A-Glaze #4 Water Clear
1. Percent Solids: 100 %
2. VOC: 3.8 g/L
3. Compressive Strength, ASTM D 695: 11,200 psi

4. Tensile Strength, ASTM D 638: 2,100 psi
5. Flexural Strength, ASTM D 790: 5,100 psi
6. Abrasion Resistance, ASTM D 4060
   a. C-10 Wheel, 1,000 gm load; 1,000 cycles: 29 mg loss
7. Flame Spread/NFPA-101, ASTM E 84: Class A
8. Impact Resistance MIL D-24613: 0.0007 inches, no cracking or delamination
9. Water Absorption. MIL D-24613: Nil
10. Potlife @ 70 F: 20 minutes

D. Topcoat: Armor Top
1. Percent Solids: 95 %
2. VOC: 0 g/L
3. Tensile Strength, ASTM D 2370: 7,000 psi
4. Adhesion, ASTM 4541: Substrate Failure
5. Hardness, ASTM D 3363: 4H
6. 60^0 Gloss ASTM D 523: 70
7. Abrasion Resistance, ASTM D4060 Gloss; Satin
   a. CS 17 wheel (1,000 g load) 1,000 cycles:
      1) Gloss: 4 mg loss with grit; 10 mg loss without grit
      2) Satin: 8 mg loss with grit; 12 mg loss without grit
8. Pot Life, 70 F, 50% RH: 2 Hours
9. Full Chemical Resistance: 7 days

2.05 PRODUCT REQUIREMENTS – EPOXY BROADCAST (SHOP FLOOR)

A. Primer: Dur-A-Glaze #4 WB
1. Percent Solids: 56 %
2. VOC: 2 g/L
3. Bond Strength to Concrete ASTM D 4541: 550 psi, substrates fails
4. Hardness, ASTM D 3363: 3H
5. Elongation, ASTM D 2370: 9 %
6. Flexibility (1/4: Cylindrical mandrel), ASTM D 1737: Pass
7. Impact Resistance, MIL D-2794: >160
8. Abrasion Resistance ASTM D 4060,
   a. CS 17 wheel; 1,000 g Load: 30 mg loss

B. Broadcast and Grout Coat: Dur-A-Guard OPF
1. Percent Solids: 95.2%
2. VOC: 8 g/L
3. Compressive Strength, ASTM D 695: 17,500 psi
4. Tensile Strength, ASTM D 638: 4,000 psi
5. Flexural Strength, ASTM D 790: 6,250 psi
6. Flexural Modulus of Elasticity, ASTM D 790: 6.2×10^5
7. Abrasion Resistance, ASTM D 4060
   a. CS 17 Wheel, 1,000 gm load; 1,000 cycles: 24 mg loss
8. Flame Spread/NFPA-101, ASTM E 84: Class B
9. Flammability, ASTM D 635: Self Extinguishing
10. Indentation, MIL D-3134: 0.025 Max
11. Impact Resistance MIL D-3134: Pass
12. Water Absorption. ASTM D-750: 0.04%

C. Topcoat: Armor Top
1. Percent Solids: 95.2 %
2. VOC: 0 g/L
3. Tensile Strength, ASTM D 2370: 7,000 psi

4. Adhesion, ASTM 4541: Substrate Failure
5. Hardness, ASTM D 3363: >4H
6. 60^0 Gloss ASTM D 523; Gloss: 75 +/- 10; Satin: 50+/- 10.
7. Abrasion Resistance, ASTM D4060
   a. CS 17 wheel (1,000 g load) 1,000 cycles
      1) Gloss: 4 mg loss with grit; 10 mg loss without grit
      2) Satin: 8 mg loss with grit; 12 mg loss without grit
8. Pot Life, 70 F, 50% RH: 45 mins
9. Full Chemical Resistance: 7 days

PART 3 – EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas and conditions, with Applicator present, for compliance with requirements for maximum moisture content, installation tolerances and other conditions affecting flooring performance.

B. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements specified.

3.02 PREPARATION

A. General
   1. New and existing concrete surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, and bituminous products.
   2. Moisture Testing: Perform tests recommended by manufacturer and as follows.
      a. Perform relative humidity test using is situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
      b. If the relative humidity exceeds 75% then Dur-A-Glaze MVP Primer moisture mitigation system by Dur-A-Flex, Inc must be installed prior to resinous flooring installation. Slab-on grade substrates without a vapor barrier may also require this moisture mitigation system.
   3. There shall be no visible moisture present on the surface at the time of application of the system Compressed oil-free air and/or a light passing of a propane torch may be used to dry the substrate.
   4. Mechanical surface preparation
      a. Shot blast all surfaces to receive flooring system with a mobile steel shot, dust recycling machine (Blastrac or equal). All surface and embedded accumulations of paint, toppings hardened concrete layers, laitance, power trowel finishes and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a minimum profile of CSP 3-4 as described by the International Concrete Repair Institute.
      b. Floor areas inaccessible to the mobile blast machines shall be mechanically abraded to the same degree of cleanliness, soundness and profile using diamond grinders, needle guns, bush hammers, or other suitable equipment.
      c. Where the perimeter of the substrate to be coated is not adjacent to a wall or curb, a minimum 1/4 inch key cut shall be made to properly seat the system, providing a smooth transition between areas. The detail cut shall also apply to drain perimeters and expansion joint edges.
      d. Cracks and joints (non-moving) greater than 1/8 inch wide are to be chiseled or chipped-out and repaired according to the manufacturer's recommendations.
   5. At spalled or worn areas, mechanically remove loose or delaminated concrete to a sound concrete and patch per manufactures recommendations.
   6. Horizontal joint preparation
      a. Dynamic Joints (Expansion/Construction/Isolation) Saw cut through the finished floor at a minimum depth of 3/4"D x 1/4"W with a diamond blade saw. Include a closed cell backer rod, 1/8" wider than the joint. Infill with flexible joint material, Metzger/McQuire, Versaflex or equal.

b. Static Joints (Control/Contraction) Remove all laitance, debris and sealers to a depth of 3/4"D x 1/4"W with a diamond blade saw. Include a closed cell backer rod, 1/8" wider than the joint. Infill with Dur-A-Glaze #4 with Cab, Poly-Crete SL or MD, MMA SL, Metzger/McQuire MM-80 or equal.

3.03 APPLICATION

A. General
1. The system shall be applied in six distinct steps as listed below:
   a. Substrate preparation
   b. Priming
   c. First broadcast coat application with first chip broadcast
   d. Second broadcast coat with second chip broadcast
   e. Grout coat application
   f. Topcoat application
2. Immediately prior to the application of any component of the system, the surface shall be dry and any remaining dust or loose particles shall be removed using a vacuum or clean, dry, oil-free compressed air.
3. The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results in accordance with the manufacturer's recommendations.
4. The system shall follow the contour of the substrate unless pitching or other leveling work has been specified by the Architect.
5. A neat finish with well-defined boundaries and straight edges shall be provided by the Applicator.

B. Primer
1. **Micro:** the primer shall be Dur-A-Glaze #4 WB Primer that is mixed at the ratio of 1 part resin to 4 parts hardener per the manufacturer's instructions.
   a. The primer shall be applied by 1/8 inch notched squeegee and back rolled at the rate of 200 sf/gal to yield a dry film thickness of 4 mils.
2. **Shop Floor**: the primer shall consist of a liquid resin and hardener that is mixed at the ratio of 1 part resin to 4 parts hardener per the manufacturer's instructions.
   a. The primer shall be applied by 1/8 inch notched squeegee and back rolled at the rate of 200 sf/gal to yield a dry film thickness of 6 mils.

C. Broadcast Coats
1. The broadcast coat shall be applied as a double broadcast system as specified by the Architect.
2. The broadcast coat shall be comprised of two components: a resin, and hardener as supplied by the Manufacturer and mixed in the ratio of 2 parts resin to 1 part hardener.
3. The resin shall be added to the hardener and thoroughly mixed by suitably approved mechanical means.
4. First Broadcast Coat
   a. **Micro**: The first broadcast coat shall be applied over horizontal surfaces using the dip and roll, and back roll method at the rate of 300 sf/gal using the Dur-A-Gard OPF material.
      1) Chips shall be broadcast to excess into the wet material at the rate of 0.15 lbs/sf.
      2) Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
      3) Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.
   b. **Shop Floor**: The first broadcast coat shall be applied over horizontal surfaces using "v" notched squeegee and back rolled at the rate of 90-100 sf/gal.
      1) Quartz aggregate shall be broadcast to excess into the wet material at the rate of 0.5 lbs/sf.
      2) Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose aggregate.
5. Second Broadcast Coat

a. **Micro**: Apply a second broadcast coat of resin shall be applied by flat squeegee then back rolled with a coverage rate of 150 sf/gal with the Dur-A-Glaze #4 Water Clear epoxy.
   1) Chips shall be broadcast to excess at the rate of 0.15 lbs/sf.
   2) Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose chips.
   3) Scrape the floor with a trowel or floor scraper. Sweep and vacuum the floor again.
b. **Shop Floor**: Apply a second coat of resin with a coverage rate of 90-100 sf/gal
   1) Broadcast flintshot aggregate to rejection at the rate of 0.5 lbs/sf.
   2) Allow material to fully cure. Vacuum, sweep and/or blow to remove all loose chips.

D. Grout Coat
1. **Micro**: The grout coat shall be comprised of a Dur-A-Glaze # 4 Water Clear epoxy that is mixed in the ratio of 1 part hardener to 2 parts resin and installed per the manufacturer's recommendations.
   a. The grout coat shall be squeegee applied and back rolled with a coverage rate of 100 sf/gal.
2. **Shop Floor**: The grout coat shall be comprised of liquid components, combined at a ratio of 2 parts resin to 1 part hardener by volume and shall be thoroughly blended by mechanical means such as a high speed paddle mixer.
   a. The grout coat shall be squeegee applied with a coverage rate of 90-100 sf/gal
   b. The grout coat will be back rolled and cross rolled to provide a uniform texture and finish

E. Topcoat (Urethane)
1. **Micro:** The topcoat of Armor Top shall be roller applied at the rate of 500 sf/gal to yield a dry film thickness of 3 mils.
   a. The finish floor will have a nominal thickness of 60 mils.
2. **Shop Floor:** The topcoat of Armor Top shall be roller applied at the rate of 500 sf/gal to yield a dry film thickness of 3 mils.
   a. The topcoat shall be comprised of a liquid resin, hardener and pigment mixed per the manufacturer's instructions.
   b. The finished floor will have a nominal thickness of 1/8 inch.

3.04 FIELD QUALITY CONTROL

A. Tests, Inspection
1. The following tests shall be conducted by the Applicator:
   a. Temperature
      1) Air, substrate temperatures and, if applicable, dew point.
   b. Coverage Rates
      1) Rates for all layers shall be monitored by checking quantity of material used against the area covered.

3.05 CLEANING AND PROTECTION

A. Cure flooring material in compliance with manufacturer's directions, taking care to prevent their contamination during stages of application and prior to completion of the curing process.

B. Remove masking. Perform detail cleaning at floor termination, to leave cleanable surface for subsequent work of other sections.

END OF SECTION

SECTION 10 14 00
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs.

B. Recognition/Donor panels.

C. Building identification signs.

1.02 RELATED REQUIREMENTS

A. Section 26 51 00 - Interior Lighting: Exit signs required by code.

B. Section 10 14 63 - Electrionic Message Signage.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

C. ASTM E2072 - Standard Specification for Photo-luminescent (Phosphorescent) Safety Markings 2014.

D. ICC A117.1 - Accessible and Usable Buildings and Facilities 2009.

E. NFPA 170 - Standard for Fire Safety and Emergency Symbols 2021.

F. UL 1994 - Luminous Egress Path Marking Systems Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 23 - Submittals for City of Madison required submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication, submit preliminary schedule.
3. Submit for approval by Owner through Architect prior to fabrication.

D. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

F. Verification Samples: Submit samples showing colors specified.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

H. Manufacturer's Qualification Statement.

I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. ~~See Section 01 60 00 - Product Requirements~~ See Section 01 78 43 – Spare Parts and Extra Materials, for additional provisions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

C. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.

B. Maintain this minimum temperature during and after installation of signs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Flat Signs:
   1. Best Sign Systems, Inc.
   2. FASTSIGNS
   3. Inpro
   4. Takeform
   5. Substitutions: ~~See Section 01 60 00 - Product Requirements~~ See Section 01 25 13 – Product Substitution Procedures.

B. Dimensional Letter Signs:
   1. FASTSIGNS.
   2. Inpro
   3. Takeform
   4. Substitutions: ~~See Section 01 60 00 - Product Requirements~~See Section 01 25 13 – Product Substitution Procedures

2.02 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with injection molded panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch (0.8 mm) and Grade II braille.
   3. Character Height: 1 inch (25 mm)
   4. Sign Height: 6” minimum, unless otherwise indicated.
   5. Office Doors: Identify with the room names and numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name and braille.
   6. Conference, Meeting Rooms, Community Room, Class Room & Pavilion: Identify with the room names and numbers indicated on drawings and braille.
      a. Include Room Schedulers per Sign Schedule on drawings.
   7. Service Rooms: Identify with the room names and numbers indicated on drawings and braille.
   8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN" restrooms 154A and 154B only Restroom on all others, room numbers indicated on the drawings and braille.
   9. Staff Only; refer to drawings and schedule for vinyl door graphic
      ~~Stacks; Dewey Decimal guide signs on end of stacks. Numbers to be determined.~~

C. Recognition/Donor Panels: Engraved panel media; individual name signs attached with magnetic tape to fixed panel.
   1. Dimensions and Number of Name Signs: To be determined.
   2. Provide all name signs whether engraved or not, for uniform overall appearance.
   3. Color: To be determined

D. Building Information Signs:
   1. Type:
      a. No Smoking with City of Madison Ordinance.
      b. No Weapons with City of Madison Ordinance.
   2. Mount on outside wall and/or glazing in location indicated on drawings.

E. Other Dimensional Letter Signs: Wall-mounted.
   1. Interior: As indicated on drawings and schedule. Letters, 8 inches (150 mm) high, plastic.

2.03 SIGN TYPES

A. Flat Signs: Refer to drawings for basis of design.
   1. Edges: Square.
   2. Corners: Square.
   3. Wall Mounting of One-Sided Signs: Tape adhesive; Concealed screws.
   4. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.

2.04 TACTILE SIGNAGE MEDIA

A. Injection Molded Panels: One-piece acrylic plastic, with raised letters and braille.
   1. Product: Refer to drawings for basis of design
   2. Total Thickness: 1/8 inch (3 mm)
   3. Signs created with a 3D printer are acceptable as long as they meet all other requirements.

2.05 DIMENSIONAL LETTERS

A. Plastic Letters:
   1. Material: Injection molded plastic or Formed plastic or 3D printed.
   2. Color: To be determined
   3. Mounting: Concealed screws

2.06 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

B. Tape Adhesive: Double sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION

SECTION 10 22 39
FOLDING PANEL PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Top-supported folding panel partitions, horizontal opening.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking and track support shimming.

B. Section 08 71 00 - Door Hardware: Lock cylinders for panels

C. Section 26 05 33.13 - Conduit for Electrical Systems: Empty conduit from partition motor controller to disconnect and from motor controller to control buttons.

D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections; control buttons .

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard; 2022.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

D. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

E. ASTM E413 - Classification for Rating Sound Insulation; 2022.

F. ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation Between Spaces Separated by Operable Partitions; 2012 (Reapproved 2020).

G. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2020.

H. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene at project site seven calendar days prior to scheduled beginning of construction activities of this section to review section requirements.
   1. Require attendance by representatives of installer.

1.05 SUBMITTALS

A. See Section 01 33 23-Submittals for City of Madison required submittal procedures.

B. Product Data: Provide data on partition materials, operation, hardware and accessories, electric operating components, track switching components, and colors and finishes available.

C. Design Data: Design calculations, bearing seal and signature of structural engineer licensed to practice in the State in which the Project is located, showing loads at points of attachment to the building structure.

D. Shop Drawings: Indicate opening sizes, track layout, details of track and required supports, static and dynamic loads, location and details of pass door and frame, adjacent construction and finish trim, and stacking depth.

E. Samples for Review: Submit two samples of surface finish, 12 by 12 inches (300 by 300 mm) size, illustrating quality, colors selected, texture, and weight.

F. Certificates: Certify that partition system meets or exceeds specified acoustic requirements.

G. Manufacturer's Instructions: Indicate special procedures.

H. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods. Describe cleaning materials detrimental to finish surfaces and hardware finish.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until installation.

1.08 WARRANTY

A. See Section 01 77 00-Closeout Procedures, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Folding Panel Partitions - Horizontal Opening:
1. BASIS OF DESIGN: Modernfold, a DORMA Group Company: www.modernfold.com/#sle.
2. Kwik-Wall Company; Model 3050: www.kwik-wall.com/#sle.
3. Substitutions: See Section 01 25 13 – Product Substitution Procedures.

2.02 FOLDING PANEL PARTITIONS - HORIZONTAL OPENING

A. Folding Panel Partitions: Center opening; paired panels; side stacking; motor operated.
1. Basis of Design: Acousti-seal Encore Paired Panel, STC 56 by Modernfold.

B. Panel Construction:
1. Panel Properties:
a. Thickness With Finish: 4 inches (100 mm).
b. Width: Equal widths.
c. Weight: 12 lb/sq ft (59 kg/sq m).

C. Panel Finishes:
1. Facing: Vinyl coated fabric .
a. Selection: Reed (Arani) 101189-513.
2. Exposed Metal Trim: ~~Clear anodized~~Selected by Architect from Manufacturer's standard finish options..

D. Panel Seals:
1. Modernfold Sure Set Automatic System: Top and Bottom
2. Panel to Panel Seals: Grooved and gasketed astragals, with continuous flexible ribbed vinyl seal fitted to panel edge construction; color to match panel finish.
3. Acoustic Seals: Flexible acoustic seals at jambs, meeting mullions, ceilings, floor and ceiling seals, and above track to structure acoustic seal.

E. Suspension System:
1. Modernfold Smart Track suspension system

F. Performance:
1. Acoustic Performance:
a. Sound Transmission Class (STC): ~~[Equal to or greater than 55]~~52 to 57 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90, on panel size of 100 sq ft (9.3 sq m).
2. Installed partition system track capable of supporting imposed loads, with maximum deflection of 1/360 of span.

G. Operation:

1. Electric Operator: 12 inches (300 mm) per second traveling speed; adjustable friction clutch brake actuated by solenoid controlled motor starter; enclosed limit switch; enclosed magnetic reversing starter.
2. Control Station: One standard keyed, three button OPEN-STOP-CLOSE type; 24 volt circuit; surface mounted.
   a. Location to be determined
   b. Key switch prepared for mortise lock cylinder.
   c. Key switches alike.
3. Safety Features:
   a. Limit Switches: Automatic type, at both extremes of travel, to prevent over-travel.
   b. Emergency Release: Mechanism to disengage motor drive system and permit manual operation.
   c. Pocket Door Interlock: Mechanism to prevent operation of panels unless storage pocket doors are fully open.
4. Electrical Requirements:
   a. See Manufacturer recommendations for motor size required for specified panel system.
   b. Disconnect Switch: Factory mount disconnect switch in control panel.

~~Accessories:~~

~~Pocket Enclosures: Door, frame, and trim to match adjacent panels.~~

2.03 MATERIALS

A. Aluminum Extrusions: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Vinyl Coated Fabric: ASTM F793 Category VI, polyvinyl fluoride (PVC) finish for washability and improved flame retardance; color as selected by Architect from manufacturer's standard range.

C. Hardwood Plywood: Face species Beech, plain sliced, book matched, veneer core; HPVA HP-1, Front Face Grade AA, Back Face Grade 1; glue type as recommended for application.

D. Particleboard: ANSI A208.1; composed of wood chips, sawdust, or flakes of medium density, made with waterproof resin binders; of grade to suit application; sanded faces.

E. Acoustic Insulation:
   1. Type: As required for acoustic performance indicated.
   2. Thickness: As required for acoustic performance indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that required utilities are available, of the correct characteristics, in proper location, and ready for use.

C. Verify track supports are laterally braced and will permit track to be level within 1/4 inch (6.4 mm) of required position and parallel to the floor surface.

D. Verify floor flatness of 1/8 inch in 10 feet (3 mm in 3 m), non-cumulative.

E. Verify wall plumbness of 1/8 inch in 10 feet (3 mm in 3 m), non-cumulative.

3.02 INSTALLATION

A. Install partition in accordance with manufacturer's instructions and ASTM E557.

B. Fit and align partition assembly level and plumb.

C. Lubricate moving components.

D. Install acoustic sealant to achieve required acoustic performance.

3.03 ADJUSTING

A. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals.

B. Visually inspect partition in full extended position for light leaks to identify a potential acoustical leak.

C. Adjust partition assembly to achieve lightproof seal.

3.04 CLEANING

A. Clean finish surfaces and partition accessories.

3.05 CLOSEOUT ACTIVITIES

A. Demonstrate operation of partition and identify potential operational problems.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Self-service reloadable fire extinguishers.

C. Fire blankets.

D. Fire extinguisher cabinets.

E. Accessories.

1.02 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.

B. FM (AG) - FM Approval Guide; Current Edition.

C. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 SUBMITTALS

A. See Section 01 33 23-Submittals for City of Madison required submittal procedures.

B. Product Data: Provide extinguisher operational features.

C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.04 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:

1. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: www.activarcpg.com/#sle.
2. Ansul, a Tyco Business: www.ansul.com/#sle.
3. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
4. Nystrom, Inc: www.nystrom.com/#sle.
5. Oval Brand Fire Products; Oval Dry Chemical Fire Extinguisher - Multipurpose ABC: www.ovalfireproducts.com/#sle.
6. Potter-Roemer: www.potterroemer.com/#sle.
7. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
8. Substitutions: ~~See Section 01 60 00 - Product Requirements.~~See Section 01 25 13 – Product Substitution Procedures

B. Fire Extinguisher Cabinets and Accessories:

1. Activar Construction Products Group, Inc. - JL Industries; Ambassador Series: www.activarcpg.com/#sle.
2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
3. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.

4. Nystrom, Inc: www.nystrom.com/#sle.
5. Oval Brand Fire Products; Cabinets for Low Profile Extinguishers: www.ovalfireproducts.com/#sle.
6. Potter-Roemer: www.potterroemer.com/#sle.
7. The Williams Brothers Corporation of America; Classic Economy Series: www.wbdoors.com/#sle.
8. Substitutions: ~~See Section 01 60 00 - Product Requirements.~~See Section 01 25 13 – Product Substitution Procedures

C. Fire Hose and Hydrant Cabinets and Accessories:
1. The Williams Brothers Corporation of America; Hose & Hydrant Storage Series: www.wbdoors.com/#sle.
2. Substitutions: ~~See Section 01 60 00 - Product Requirements.~~See Section 01 25 13 – Product Substitution Procedures

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: ~~Carbon steel~~Carbon steel or Aluminum tank, with pressure gauge.
1. Class: A:B:C type.
2. Size: ~~2.5 pound (1.13 kg)~~5 pound (2.27 kg).
~~Size and classification as scheduled.~~
3. Finish: ~~Baked polyester powder coat,[____]color~~Baked polyester powder coat, red color.
4. Temperature range: Minus 40 degrees F (Minus 40 degrees C) to 120 degrees F (49 degrees C).

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated.
1. Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.

C. Fire Rated Cabinet Construction: One-hour fire rated.
1. Steel; double wall or outer and inner boxes with 5/8 inch (15.9 mm) thick fire barrier material.

D. Cabinet Configuration: Semi-recessed type.
1. Size to accommodate accessories.
2. Trimless type.
3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

E. Door: 0.036 inch (0.9 mm) metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.

F. Door Glazing: Acrylic plastic, clear, 1/8 inch (3 mm) thick, flat shape and set in resilient channel glazing gasket.

G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

H. Fabrication: Weld, fill, and grind components smooth.

I. Finish of Cabinet Exterior Trim and Door: No.4 - Brushed stainless steel.

J. Finish of Cabinet Interior: White colored enamel.

2.04 ACCESSORIES

A. Fire Blanket: Fire retardant treated wool; red, 62 by 84 inch (1575 by 2135 mm) size.

B. Extinguisher Brackets: Formed steel, chrome-plated.

C. Extinguisher Theft Alarm: Battery operated alarm, 10 second delay for disarming, activated by opening cabinet door.

D. Lettering: “FIRE EXTINGUISHER” decal, or vinyl self-adhering, prespaced black lettering in accordance with authorities having jurisdiction (AHJ).

E. Floor Signs:

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure rigidly in place.

C. Place extinguishers in cabinets.

3.03 MAINTENANCE

A. See Section 01 77 00-Closeout Procedures for additional requirements relating to maintenance service.

3.04 MAINTENANCE - SELF-SERVICE FIRE EXTINGUISHERS

A. Monthly Inspections: Inspect self-service fire extinguishers on monthly basis in accordance with manufacturer’s instructions, and requirements of the authorities having jurisdiction (AHJ).

B. Annual Inspections: Inspect self-service fire extinguishers on annual basis in accordance with manufacturer’s instructions, and requirements of the authorities having jurisdiction (AHJ).

C. Inspection Certification Tag: Provide new tag indicating acceptable condition of fire extinguisher, date of inspection, and name of self-service inspector for each inspection.

END OF SECTION

SECTION 23 21 13
HYDRONIC PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Hydronic system requirements.
B. Heating water piping, above grade.
C. Chilled water piping, above grade.
D. Condenser water piping, buried.
E. Condenser water piping, above grade.
F. Equipment drains and overflows.
G. Pipe hangers and supports.
H. Unions, flanges, mechanical couplings, and dielectric connections.

1.02 RELATED REQUIREMENTS

A. Section 23 05 16 - Expansion Fittings and Loops for HVAC Piping.
B. Section 23 05 23 - General-Duty Valves for HVAC Piping.
C. Section 23 05 48 - Vibration and Seismic Controls for HVAC.
D. Section 23 05 53 - Identification for HVAC Piping and Equipment.
E. Section 23 07 19 - HVAC Piping Insulation.
F. Section 23 21 14 - Hydronic Specialties.
G. Section 23 25 00 - HVAC Water Treatment: Pipe cleaning.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
D. ASME B31.9 - Building Services Piping 2020.
E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
F. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service 2019a.
G. ASTM A183 - Standard Specification for Carbon Steel Track Bolts and Nuts 2014 (Reapproved 2020).
H. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.
I. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).
J. ASTM B32 - Standard Specification for Solder Metal 2020.
K. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
M. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications 2018.
N. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992 (Reapproved 2022).
O. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing 2023.

P. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems 2023.

Q. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications 2007 (Reapproved 2019).

R. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.

S. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2023).

T. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2018.

U. AWWA C606 - Grooved and Shouldered Joints 2022.

V. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

1.04 SUBMITTALS

A. See Section 01 33 23 - Submittals for City of Madison required submittal procedures.

B. Product Data:
   1. Include data on pipe materials, pipe fittings, valves, and accessories.
   2. Provide manufacturers catalog information.

C. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 - PRODUCTS

2.01 HYDRONIC SYSTEM REQUIREMENTS

A. Comply with ASME B31.9 and applicable federal, state, and local regulations.

B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
   1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
   2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
   3. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.

C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges or unions to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.

2.02 HEATING WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
   2. Threaded Joints: ASME B16.3, malleable iron fittings.

B. Steel Pipe Sizes 12 Inches and Greater: ASTM A53/A53M, 3/8 inch wall, black, using one of the following joint types:
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
   2. Threaded Joints: ASTM A536 ductile iron fittings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type ~~K~~L (A), drawn, using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
      b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.03 CHILLED WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black; using one of the following joint types:
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
   2. Threaded Joints: ASME B16.3, malleable iron fittings.

B. Steel Pipe Sizes 12 Inches and Greater: ASTM A53/A53M, 3/8 inch wall, black; using one of the following joint types:
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
   2. Threaded Joints: ASTM A536 ductile iron fittings.

C. Copper Tube: ASTM B88 (ASTM B88M), Type ~~K~~L (A), hard drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22, solder wrought copper fittings.
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
      b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.04 CONDENSER WATER PIPING, BURIED

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black with AWWA C105/A21.5 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Fittings: ASTM A234/A234M, wrought steel welding type with double layer, half-lapped polyethylene tape.
   2. Joints: Threaded for pipe 2 inches and under; AWS D1.1/D1.1M, welded for pipe over 2 inches.

2.05 CONDENSER WATER PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M, Schedule 40, black.
   1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings with finish matching piping; AWS D1.1/D1.1M welded.
   2. Threaded Joints: ASME B16.3, malleable iron fittings with finish matching piping.

B. Copper Tube: ASTM B88 (ASTM B88M), Type ~~K~~L (A), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
      a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
   2. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.

2.06 EQUIPMENT DRAINS AND OVERFLOWS

A. Copper Tube: ASTM B88 (ASTM B88M), Type ~~K~~L (A), drawn; using one of the following joint types:
   1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.

2.07 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
   3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
   4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.

5. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
7. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Greater: Steel channels with welded spacers and hanger rods, cast iron roll.
8. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
9. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
10. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
11. Vertical Support: Steel riser clamp.
12. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
14. Floor Support for Hot Pipe Sizes 6 Inches and Greater: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
15. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
16. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
17. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.08 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

A. Unions for Pipe 2 Inches and Less:
   1. Ferrous Piping: 150 psig malleable iron, threaded.
   2. Copper Pipe: Bronze, soldered joints.

B. Flanges for Pipe 2 Inches and Greater:
   1. Ferrous Piping: 150 psig forged steel, slip-on.
   2. Copper Piping: Bronze.
   3. Gaskets: 1/16 inch thick, preformed neoprene.

C. Dielectric Connections:
   1. Waterways:
      a. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      b. Dry insulation barrier able to withstand 600-volt breakdown test.
      c. Construct of galvanized steel with threaded end connections to match connecting piping.
      d. Suitable for the required operating pressures and temperatures.
   2. Flanges:
      a. Dielectric flanges with same pressure ratings as standard flanges.
      b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
      c. Dry insulation barrier able to withstand 600-volt breakdown test.
      d. Construct of galvanized steel with threaded end connections to match connecting piping.
      e. Suitable for the required operating pressures and temperatures.
   3. Unions:
      a. 1/2 to 1 Inches: Brass solder to galvanized FPT.
      b. 1/2 to 2 Inches: Brass solder to galvanized FPT.
      c. 1/2 to 1 Inches: Brass to galvanized FPT or FIP (Female Iron Pipe).
      d. 3/4 to 1/2 Inch Reducer: Brass solder to galvanized FPT.
      e. Service: 250 psi, minus 20 to 180 deg F.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment using jointing system specified.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

E. After completion, fill, clean, and treat systems. See Section 23 25 00 for additional requirements.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Route piping in orderly manner, parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and to avoid interference with use of space.

D. Group piping whenever practical at common elevations.

E. Sleeve pipe passing through partitions, walls, and floors.

F. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified.

G. Slope piping and arrange to drain at low points.

H. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 23 05 16.

I. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
   2. Support horizontal piping as scheduled.
   3. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
   4. Place hangers within 12 inches of each horizontal elbow.
   5. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
   8. Provide copper plated hangers and supports for copper piping.
   9. Prime coat exposed steel hangers and supports. See Section 09 9123. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
   2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
   3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
   5. 3 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
   6. 4 Inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.

B. Hanger Spacing for Steel Piping.
   1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
   2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
   3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
   4. 2 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.

5. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
6. 3 Inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
7. 4 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.

END OF SECTION

SECTION 23 83 00
RADIANT HEATING AND COOLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Radiant heating hydronic piping.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 08 31 00 - Access Doors and Panels.

C. Section 23 09 93 - Sequence of Operations for HVAC Controls.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

B. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing 2022a, with Editorial Revision.

C. ASTM F1281 - Standard Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe 2017, with Editorial Revision (2021).

D. ASTM F1807 - Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps, for SDR9 Cross-Linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing 2023.

E. ASTM F1974 - Standard Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe 2023.

F. DIN 4726 - Warm Water Surface Heating Systems and Radiator Connecting Systems - Plastics Piping Systems and Multilayer Piping Systems 2017.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

A. See Section 01 33 23 - Submittals for City of Madison required submittal procedures.

B. Product Data: Provide data for in-floor heating system products.

C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions of equipment and controls, installation instructions, maintenance and repair data, and parts listings.

D. Submit shop drawings indicating detailed layout of system, including equipment, tubing locations, loop lengths, critical dimensions, tubing/slab penetration details, fittings, and details for protected exposed PEX tubing. Provide pressure drops at design flow rates for all equipment including loops, manifolds, isolation valves, and control valves. Provide detailed flow, pressure, and electrical power requirements of radiant system pump.

E. Submit manufacturer's technical instructions including specific installation instructions for system installation in the specific construction of the radiant panel or slab. Include details at slab construction joints and expansion joints.

F. Submit installer’s certifications of training for installation of PEX floor heating systems.

G. Submit data indicating tube sizing and panel performance at tube spacing and warm water temperatures selected.

H. Submit independent certification results for the tubing systems from a recognized testing laboratory.

I. Submit catalog data on all supports, tube guides, spacers, fittings, and associated items necessary for the installation of the tubing and manifolds.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Deliver and store tubing and specialties in shipping containers with labeling in place. Do not expose to ultraviolet light for more than 90 days.

C. Protect tubing and specialties from entry of contaminating material by installing tape or plugs in all open tube ends until installation and/or maintain tubing in the original shipping boxes or packaging until usage.

D. Unprotected tubes shall not be dragged across the ground or concrete surfaces, and shall be stored on a flat surface with no sharp edges.

E. Tube shall be protected from oil, grease, direct sunlight, paint, and other elements as recommended by manufacturer.

1.07 WARRANTY

A. See Section 01 78 36 - Warranties, for additional warranty requirements.

B. Provide 5 year manufacturer's warranty for tubing, connectors and manifolds.

PART 2 PRODUCTS

2.01 RADIANT-HEATING HYDRONIC PIPING

~~Applications:~~

~~Provide the following types of hydronic, radiant heating piping for the applications described:~~

~~Piping in Interior Reinforced Concrete Floors: PEX/AL/PEX.~~

~~Piping in Level Fill Concrete Floors (Not Reinforced): PEX/AL/PEX.~~

~~Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX/AL/PEX) Pipe and Fittings:~~

~~Pipe Material: PEX plastic bonded to the inside and outside of a welded aluminum tube according to ASTM F1281.~~

~~Oxygen Barrier: Limit oxygen diffusion through the pipe to maximum 0.0000436996 grains per cu ft/day at 104 degrees F according to DIN 4726.~~

~~Fittings: ASTM F1974, metal insert fittings with split ring and compression nut (compression joint) or metal insert fittings with copper crimp rings (crimp joint).~~

~~Flame Spread and Smoke Developed Indexes: 25 and 50 or less, respectively, when tested in accordance with ASTM E84.~~

~~Pressure/Temperature Rating: Minimum 100 psig and 210 degrees F.~~

A. Tube:

1.

2. The tube shall be manufactured in accordance with ASTM standard specification F876. The tube shall be listed to ASTM by independent third party testing laboratory.

3. The tube shall be of cross-linked polyethylene with a minimum degree of cross-linking of 80% or multi-layer, elastomeric, industrial grade EPDM rubber hose. The tube shall have an oxygen diffusion barrier capable of limiting oxygen diffusion through the tube to no greater than 0.10g/m3/day @ 104ºF water temperature.

4. The tube dimensions shall be: 5/8" nominal inside diameter or 3/4” nominal inside diameter in accordance with ASTM standard specification, as pertaining to paragraph 2.

5. The minimum bend radius for cold bending of the tube shall not be less than six (6) times the outside diameter. Bends with a radius less than stated shall require the use of a bend support as supplied by the tube manufacturer.

6. All Components: Components of the buried tubing system shall be provided by one manufacturer, including; tube, fittings, manifolds, controls, and other ancillary items required for a complete installation.

B. Distribution Manifolds (Manufacturer's Standard):
   1. Manifold: Minimum 1 inch, brass, copper, or stainless steel.
   2. Main Shutoff Valves:
      a. Factory installed on supply and return connections.
      b. Two-piece brass or bronze body.
      c. Ball: Chrome-plated bronze.
      d. Seals: PTFE.
      e. CWP Rating: 150 psig.
      f. Maximum Operating Temperature: 225 degrees F.
   3. Manual Air Vents:
      a. Body to consist of bronze or brass.
      b. Internal Parts: Nonferrous.
      c. Operator: Key furnished with valve or screwdriver bit.
      d. Inlet Connection: 1/2 inch.
      e. Discharge Connection: 1/8 inch.
      f. CWP Rating: 150 psig.
      g. Maximum Operating Temperature: 225 degrees F.
   4. Balancing Valves:
      a. Body: Provide plastic or bronze, plug or globe cartridge type.
      b. Plug: EPDM.
      c. Globe Cartridge and Washer: Brass with EPDM composition washer.
      d. Seat: PTFE.
      e. Visual Flow Indicator: Flowmeter with visible indication in a clear plastic cap at top of valve.
      f. Differential Pressure Gauge Connections: Integral seals for portable meter to measure loss across calibrated orifice.
      g. Handle Style: Knob, with memory stop to retain set position if used for shutoff.
      h. CWP Rating: Minimum 125 psig.
      i. Maximum Operating Temperature: 250 degrees F.
   5. Zone Control Valves:
      a. Body: Provide brass or bronze, plug, globe, or cartridge type.
      b. Plug: EPDM.
      c. Globe Cartridge and Washer: Brass with EPDM composition washer.
      d. Seat: PTFE.
      e. Actuator: Replaceable electric motor.
      f. CWP Rating: Minimum 125 psig.
      g. Maximum Operating Temperature: 250 degrees F.
   6. Thermometers:
      a. Mounted on supply and return connections.
      b. Case: Dry type, metal or plastic, 2 inch diameter.
      c. Element: Bi-metallic coil.
      d. Movement: Mechanical, connecting element and pointer.
      e. Dial: Satin-faced, non-reflective aluminum with permanently etched scale markings.
      f. Pointer: Black metal.
      g. Window: Plastic.
      h. Connector: Rigid, back type.
      i. Thermal System: Bi-metallic coil.
      j. Accuracy: Plus or minus 1 percent of range or 1 scale division to maximum of 1.5 percent of range.

7. Mounting Brackets: Provide copper, plastic, or rubber-clad steel, where in contact with manifold.

C. Manufacturers:
1. Uponor
2. Rehau
~~Viega LLC~~
3. Watts
4. Viega LLC
5. Substitutions: ~~See Section 01 25 13 - Product Substitution Procedures~~See Section 01 25 13 – Product Substitution Procedures.

PART 3 EXECUTION

3.01 EXAMINATION

A. Hydronic Radiant Heating Piping:
1. Examine surfaces and substrates to receive radiant heating piping for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
a. Ensure that surfaces and pipes in contact with radiant heating piping are free of burrs and sharp protrusions.
b. Ensure that surfaces and substrates are level and plumb.
2. Proceed with installation only after unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Clean all surfaces prior to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's recommendations.

B. Hydronic Radiant Heating Piping:
1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
2. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
3. Install piping as indicated unless deviations to layout are approved on shop drawings or coordination drawings.
4. Install radiant heating piping continuous from the manifold through the heated panel and back to the manifold without piping joints in heated panels.
5. All fittings should be accessible for maintenance. Tubing loops shall be installed without splices, as a minimum, from the point at which the tubing enters the panel to the point at which it exits the panel. No splices shall occur underground
6. Connect radiant piping to manifold in a reverse-return arrangement.
7. Do not bend pipes in radius smaller than manufacturer's minimum bend radius dimension.
8. Comply with requirements in Sections 23 21 13 and 23 21 14 for pipes and connections to hydronic systems and for glycol-solution fill requirements.
9. Piping in Interior Reinforced Concrete Floors:
a. Secure piping in concrete floors by attaching pipes to reinforcement using cable ties.
b. Space cable ties a maximum of 18 inches and at center of turns or bends.
c. Maintain 2 inch minimum cover.
d. Install a sleeve of 3/8 inch thick, foam type insulation or PE pipe around tubing and extending for a minimum of 10 inches on each side of slab joints to protect the tubing passing through expansion or control joints.
e. Maintain minimum 40 psig pressure in piping during concrete placement and continue for 24 hours after placement.
10. Piping in Level Fill Concrete Floors (Not Reinforced):

a. Secure piping in concrete floors by attaching pipes to subfloor using tracks, clamps, or staples.
b. Space tracks, clamps, or staples a maximum of 18 inches on center and at center turn of bends.
c. Maintain 3/4 inch minimum cover.
d. Install a sleeve of 3/8 inch thick, foam type insulation or PE pipe around tubing and extending for a minimum of 10 inches on each side of slab joints to protect the tubing passing through expansion or control joints.
e. Maintain minimum 40 psig pressure in piping during the concrete pour and continue for 24 hours during curing.

11. Revise locations and elevations from those indicated as required to suit field conditions and ensure integrity of piping and as approved by Architect.
12. After system balancing has been completed, mark balancing valves to permanently indicate final position.
13. Perform the following adjustments before operating the system:
    a. Open valves to fully open position.
    b. Check operation of automatic valves.
    c. Set temperature controls so all zones call for full flow.
    d. Purge air from piping.

C. Provide warning labels in mechanical equipment spaces to alert future building remodelers of the presence of in-slab tubing.

D. Any deviations from shop drawing layout must be accurately dimensioned for Owner’s records.

E. Contractor shall take detailed photographs of installation and provide to owner as part of record documents in digital format for future reference.

3.04 FIELD QUALITY CONTROL

A. See Section 01 45 16 - Field Quality Control Procedures, for additional requirements.

B. Provide manufacturer's field representative to test, inspect, instruct, and observe.

C. Hydronic Radiant Heating Piping:
1. Prepare radiant heating piping for testing as follows:
    a. Open all isolation valves and close bypass valves.
    b. Open and verify operation of zone control valves.
    c. Flush with clean water and clean strainers.
2. Perform the following tests and inspections with the assistance of a factory authorized service representative:
    a. Leak Test:
        1) After installation, charge system and test for leaks.
        2) Subject piping to hydrostatic test pressure that is not less than 1.5 times the design pressure but not more than 100 psig for a period of 8 hours.
        3) Repair leaks and retest until no leaks exist.
    b. Test and adjust controls and safeties.
    c. Replace damaged and malfunctioning controls and equipment.
    d. Notify owner 24 hours prior to pressure testing.
3. Execute, complete, and pass required radiant-heating piping tests and inspections to accept installed piping.
4. Prepare test and inspection reports.
5. Protect hydronic piping system from damage during construction.

3.05 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL DEVICES - LUTRON

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Devices and associated accessories for automatic control of lighting and other loads:
   1. Wallbox timers.
   2. Wallbox occupancy sensors.
   3. Wired wallbox occupancy sensors with wireless communication inputs.
   4. Wired occupancy sensors.
   5. Wireless occupancy/vacancy sensors.
   6. Wireless daylight sensors.
   7. Wired load control modules with wireless communication inputs for wireless sensors and control stations.
   8. Wired wall dimmers and switches with wireless communication inputs.
   9. Wireless control stations.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices current edition.

B. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments 2019.

C. ASTM E308 - Standard Practice for Computing the Colors of Objects by Using the CIE System 2022.

D. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements 2011, with Amendment (2015).

E. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test 2008.

F. ISO 9001 - Quality Management Systems — Requirements 2015.

G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

H. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

I. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).

J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Current Edition, Including All Revisions.

L. UL 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.
   2. Coordinate the placement of wall controls with actual installed door swings.
   3. Coordinate the placement of daylight sensors with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.

4. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.
5. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:
1. Do not install sensors and wall controls until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 33 23 - Submittals for City of Madison required submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.
2. Wall Dimmers: Include derating information for ganged multiple devices.

C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual installed locations and settings for lighting controls.

E. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

F. Warranty: Submit sample of manufacturer's Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications:
1. Company with not less than ten years of experience manufacturing lighting controls, including products using wireless communication between devices.
2. Registered to ISO 9001, including in-house engineering for product design activities.
3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.
4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.08 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.
1. Basis of Design System Requirements - Lutron, Unless Otherwise Indicated:
a. Ambient Temperature:
1) Lighting Controls: Between 32 and 104 degrees F.
b. Relative Humidity: Less than 90 percent, non-condensing.
c. Protect lighting controls from dust.

1.09 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer's Standard Warranty:
   1. Manufacturer Lighting Control System Components, Except Wallbox Occupancy Sensors, Wireless Sensors, Ballasts/Drivers and Ballast Modules: One year 100 percent parts coverage, no manufacturer labor coverage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design Manufacturer: Lutron Electronics Company, Inc; www.lutron.com/#sle.

B. Substitutions: ~~See Section 01 60 00 - Product Requirements~~See Section 01 25 13 – Product Substitution Procedures.

C. Crestron Zum wired or wireless lighting controls are a prior approved equal.

2.02 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL) as suitable for the purpose indicated.

B. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.

C. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F to 104 degrees F and 90 percent non-condensing relative humidity.

D. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

E. Power Failure Recovery: When power is interrupted for periods up to 10 years and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.

F. Wireless Devices:
   1. Capable of diagnosing system communications.
   2. Capable of having addresses automatically assigned to them.
   3. Receives signals from other wireless devices and provides feedback to user.
   4. Capable of determining which devices have been addressed.
   5. RF Frequency: 434 MHz; operate in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
   6. RF Range: 60 feet line-of-sight or 30 feet through typical construction materials between RF transmitting devices and compatible RF receiving devices.
   7. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.

G. Device Finishes:
   1. Standard Colors: Comply with NEMA WD 1 where applicable.
   2. Color Variation in Same Product Family: Maximum delta E of 1, CIE L*a*b color units per ASTM E308.
   3. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

2.03 WALLBOX TIMERS

A. Provide warning to occupant of impending load turn-off.

B. Product(s):

1. Type - Wallbox Timer; Lutron Maestro Series Countdown Timer Control Switch, Model MA-T51: 120 V, 600 W/VA (5 A) lighting (incandescent/halogen, magnetic low voltage), 3 A general purpose fan; adjustable from 5 to 60 minutes with option for untimed full on; minimum load requirement.

2.04 WALLBOX OCCUPANCY SENSORS

A. General Requirements:
   1. Passive Infrared Sensing:
      a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
      b. Passive infrared coupled with technology for sensing fine motions; Lutron XCT Technology. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
   2. Ultrasonic Sensing: Utilize an operating frequency of 32 kHz or 40 kHz, crystal-controlled to operate within plus/minus 0.005 percent tolerance.
   3. Dual Technology Sensing: Passive infrared and ultrasonic sensing coupled with technology for sensing very fine motions; Lutron XCT Technology. Signal processing technology detects fine-motion passive infrared (PIR) and ultrasonic signals without the need to change the sensor's sensitivity threshold.

B. Wall Switch Occupancy/Vacancy Sensors; Lutron Maestro Series:
   1. General Requirements:
      a. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.
      b. Switches at point of minimum energy to maximize relay life, actively adapting to variations in relay timing.
      c. Suitable for incandescent, halogen, electronic low-voltage, magnetic low-voltage, compact fluorescent, LED, magnetic fluorescent, electronic fluorescent, and fan loads.
   2. Passive Infrared Wall Switch Combination Occupancy/Vacancy Sensors:
      a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
      b. Adjustable sensitivity (high, low presets).
      c. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be adaptive utilizing occupant feedback; Lutron Smart Ambient Light Detection.
      d. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; when room is vacated, returns to normal automatic-on operation after time delay period.
   3. Passive Infrared Wall Switch Vacancy-Only Sensors:
      a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.
      b. Adjustable sensitivity (high, low presets).
   4. Dual Technology Wall Switch Combination Occupancy/Vacancy Sensors:
      a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
      b. Adjustable sensitivity (high, medium, low, and off presets) individually for passive infrared and ultrasonic sensing.
      c. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and ultra low presets).

d. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms.

5. Dual Technology Wall Switch Vacancy-Only Sensors:
   a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.
   b. Adjustable sensitivity (high, medium, low, and off presets) individually for passive infrared and ultrasonic sensing.
6. Dual-Circuit Passive Infrared Wall Switch Combination Occupancy/Partial-On Sensors:
   a. Each circuit programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a partial-on sensor (manual-on and automatic-off).
   b. Adjustable sensitivity (high, low presets).
   c. Selectable option to enable low light feature (automatic-on when ambient light is below threshold) or to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; applicable for auto-on only. Ambient light threshold to be adaptive utilizing occupant feedback; Lutron Smart Ambient Light Detection.
   d. Timeout settings to be individually adjustable for each circuit.
   e. Independent manual switching for each circuit.
7. Dual-Circuit Passive Infrared Wall Switch Partial-On Sensors:
   a. Operates only as a partial-on sensor (one circuit auto-on and auto-off and one circuit manual-on and automatic-off) in accordance with California Title 24 requirements.
   b. Adjustable sensitivity (high, low presets).
   c. Selectable option to enable low light feature (automatic-on when ambient light is below threshold) or to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; applicable for auto-on only. Ambient light threshold to be adaptive utilizing occupant feedback; Lutron Smart Ambient Light Detection.
   d. Timeout settings to be individually adjustable for each circuit.
   e. Independent manual switching for each circuit.
8. Dual-Circuit Dual Technology Wall Switch Combination Occupancy/Partial-On Sensors:
   a. Each circuit programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a partial-on sensor (manual-on and automatic-off).
   b. Adjustable sensitivity (high, medium, low, and off presets) individually for passive infrared and ultrasonic sensing.
   c. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and ultra low presets); applicable for auto-on only.
   d. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; applicable for auto-on only.
   e. Timeout settings to be individually adjustable for each circuit.
   f. Independent manual switching for each circuit.
9. Companion Switches: Provide as required for multi-location control as indicated.
   a. Product(s): As specified in Section 26 27 26.

C. Wall Dimmer Occupancy Sensors; Lutron Maestro LED+ Sensor Dimmer Series:
   1. General Requirements;
      a. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472.
      b. Adjustable sensitivity (high, low presets).

c. Adjustable auto-on light level (100 percent, 50 percent, last light level, locked presets).
d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 3, 5, 15, and 30 minutes.
e. Provide fade-to-off operation to warn occupant of impending load turn-off.
f. Suitable for dimmable incandescent, halogen, compact fluorescent, and LED loads.

2. Passive Infrared Wall Dimmer Combination Occupancy/Vacancy Sensors:
a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
b. Selectable options to enable low light feature (automatic-on when ambient light is below threshold) or to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms (applicable for auto-on only). Ambient light threshold to be adaptive utilizing occupant feedback; Lutron Ambient Smart Light Detection.

3. Passive Infrared Wall Dimmer Vacancy-Only Sensors:
a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

4. Companion Dimmers: Provide as required for multi-location control as indicated.
a. Product(s): As specified in Section 26 27 26.

D. Wall Dimmer Occupancy Sensors; Lutron Maestro Occupancy Sensor Dimmer Series:
1. General Requirements;
a. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472.
b. Adjustable sensitivity (high, low presets).
c. Dimmer Features: Locked preset, fade-to-on, fade-to-off.
d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 3, 5, 15, and 30 minutes.
e. Provide selectable option to dim lights by 50 percent to warn occupant of impending load turn-off.
f. Suitable for dimmable incandescent and halogen loads.

2. Passive Infrared Wall Dimmer Combination Occupancy/Vacancy Sensors:
a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).

3. Passive Infrared Wall Dimmer Vacancy-Only Sensors:
a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

4. Companion Dimmers: Provide as required for multi-location control as indicated.
a. Product(s): As specified in Section 26 27 26.

E. 0-10 V Wall Dimmer Occupancy Sensors; Lutron Maestro 0-10 V Dimmer Sensor Series:
1. General Requirements;
a. Compatible with sourcing electronic 0-10 V ballasts/drivers, as per IEC 60929 Annex E.2 0-10 V protocol.
b. Adjustable sensitivity (high, medium, low, and minimum presets).
c. Adjustable high/low end trims.
d. Selectable dimming curve (linear or square law).
e. Dimmer Features: Locked preset, fade-to-on, fade-to-off.
f. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.

g. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and minimum presets); applicable for auto-on only.
h. Fades lights to off over period of 10 seconds to warn occupant of impending load turn-off.
i. Provides visual alert for miswire and incompatible load.

2. Passive Infrared 0-10 V Wall Dimmer Combination Occupancy/Vacancy Sensors:
   a. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
3. Passive Infrared 0-10 V Wall Dimmer Vacancy-Only Sensors:
   a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.
4. Companion Switches: Provide as required for multi-location control as indicated.

2.05 WIRED WALLBOX OCCUPANCY SENSORS WITH WIRELESS COMMUNICATION INPUTS

A. 0-10 V Wall Dimmer/Switch Combination Occupancy/Vacancy Sensors with Wireless Communication Inputs; Lutron Maestro Wireless 0-10 V Dimmer Sensor/Maestro Wireless Sensor Switch Series.
   1. Communicates via radio frequency with up to ten compatible wireless occupancy/vacancy sensors, ten wireless control stations, and one wireless daylight sensor.
   2. Compatible with sourcing electronic 0-10 V ballasts/drivers, as per IEC 60929 Annex E.2 0-10 V protocol.
   3. Selectable option to enable low light feature (automatic-on when ambient light is below threshold). Ambient light threshold to be selectable as either adaptive utilizing occupant feedback (Lutron Smart Ambient Light Detection) or as fixed (high, medium, low, and minimum presets).
   4. Occupancy/Vacancy Sensors:
      a. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
      b. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions; Lutron XCT Technology. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
      c. Programmable to operate as an occupancy sensor (automatic-on and automatic-off) or a vacancy sensor (manual-on and automatic-off).
      d. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area; adjustable timeout settings (1, 5, 15, and 30 minutes).
      e. Adjustable sensitivity (high, medium, low, and minimum presets).
      f. Selectable option to inhibit automatic turn-on of lights after manual-off operation while room is occupied for applications such as presentation viewing in conference rooms and classrooms; when room is vacated, returns to normal automatic-on operation after time delay period.
      g. Selectable walk-through mode to override selected timeout and automatically turn off lights if no motion is detected within 3 minutes after initial occupancy for applications where space may be briefly occupied.
   5. Vacancy-Only Sensors:
      a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.
      b. Adjustable sensitivity (high, medium, low, and minimum presets).
   6. Dimmer Features:
      a. Adjustable high/low end trims.
      b. Selectable dimming curve (linear or switched).
      c. Selectable fade on/fade off times (15, 5, 2.5, or 0.75 sec).
      d. Adjustable auto-on light level (fully adjustable from one to 100 percent).
   7. Dimmer Control: Multi-function tap switch with small, raised rocker for dimmer adjustment.
      a. Rocker raises/lowers light level, with new level becoming the current preset level.

b. Switch single tap raises lights to preset level or fades lights to off.
c. Switch double tap raises light to full on level.

8. Switch Control: Switch single tap turns lights on/off.

2.06 WIRED OCCUPANCY SENSORS

A. General Requirements:
1. Connects directly to compatible ballasts and modules without the need of a power pack or other interface.
2. Turns off or reduces lighting automatically after reasonable time delay when a room or area is vacated by the last person to occupy the space.
3. Accommodates all conditions of space utilization and all irregular work hours and habits.
4. Comply with UL 94.
5. Self-Adaptive: Continually adjusts sensitivity and timing to ensure optimal lighting control for any use of the space.
6. Furnished with field-adjustable controls for time delay and sensitivity to override any adaptive features.
7. Power Failure Memory: Settings and learned parameters to be saved in non-volatile memory and not lost should power be interrupted and subsequently restored.
8. Furnished with all necessary mounting hardware and instructions.
9. Class 2 devices.
10. Ceiling-Mounted Sensors: Indicate viewing directions on mounting bracket.
11. Wall-Mounted Sensors: Provide swivel-mount base.
12. Color: White.

B. Wired Passive Infrared Sensors:
1. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
2. Ceiling-Mounted Sensors: Provide customizable mask to block off unwanted viewing areas.

C. Wired Ultrasonic Sensors:
1. Utilize an operating frequency of 32 kHz or 40 kHz, crystal-controlled to operate within plus/minus 0.005 percent tolerance.

D. Wired Dual Technology Sensors:
1. Passive Infrared Sensing: Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
2. Ultrasonic Sensing: Utilize an operating frequency of 32 kHz or 40 kHz, crystal-controlled to operate within plus/minus 0.005 percent tolerance.
3. Ceiling-Mounted Sensors: Provide customizable mask to block off unwanted viewing areas.
4. Isolated Relay: Provide an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging and other control options where indicated.
5. Integral Photocell: Provide an integral photocell with adjustable sensitivity to prevent lights from turning on when there is sufficient natural light where indicated.

E. Power Packs for Wired Sensors:
1. Provide sensor power packs where required for power connection to sensors.
2. For ease of mounting, installation and future service, power pack(s) to be able to mount through a 1/2 inch knockout in a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Transformer to provide power to a minimum of three sensors.
3. Plenum-rated.
4. Control Wiring Between Sensors and Control Units: Class 2, 18-24 AWG, stranded UL Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.

2.07 WIRELESS SENSORS

A. General Requirements:
   1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.
   2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
   3. Does not require external power packs, power wiring, or communication wiring.
   4. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:
   1. General Requirements:
      a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.
      b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
      c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions; Lutron XCT Technology. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
      d. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity.
      e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.
      f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.
      g. Color: White.
      h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
      i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be designed for easy, damage-free removal.
      j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.
      k. Ceiling-Mounted Sensors:
         1) Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
         2) Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.
      l. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.
   2. Wireless Combination Occupancy/Vacancy Sensors:
      a. Ceiling-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one footcandle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).
      b. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).
   3. Wireless Vacancy-Only Sensors:
      a. Operates only as a vacancy sensor (manual-on and automatic-off) in accordance with California Title 24 requirements.

C. Wireless Daylight Sensors:
   1. Product: Lutron Radio Powr Savr Series, Model LFR2-DCRB-WH.

2. Open-loop basis for daylight sensor control scheme.
3. Stable output over temperature from 32 degrees F to 104 degrees F.
4. Partially shielded for accurate detection of available daylight to prevent fixture lighting and horizontal light component from skewing sensor detection.
5. Provide linear response from 2 to 150 footcandles.
6. Color: White.
7. Mounting:
   a. Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.
   b. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
   c. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be designed for easy, damage-free removal.
8. Meets California Title 24 requirements.

2.08 WIRED WALL DIMMERS AND SWITCHES WITH WIRELESS COMMUNICATION INPUTS

A. General Requirements:
   1. Utilize air gap off, activated when user selects "off" at any control to disconnect the load from line supply.
   2. Provide air gap service switch accessible without removing faceplate.
   3. Operates at the rated capacity across the full ambient temperature range including modified capacities for ganged configurations which require removal of fins.
   4. Provide radio frequency interference suppression.
   5. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 200 amps according to IEEE C62.41.2 without impairment to performance.
   6. Dimmers: Provide full range, continuously variable control of light intensity.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as shown on the drawings.

B. Verify that ratings and configurations of devices are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive devices.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of devices provided under this section.

C. Where multiple devices are installed at the same location and at the same mounting height, gang devices together under a common wall plate.

D. Install products in accordance with manufacturer's instructions.

E. Install permanent barrier between ganged devices when voltage between adjacent devices exceeds 300 V.

F. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

3.04 FIELD QUALITY CONTROL

A. See Section 01 45 16 - Field Quality Control Procedures for City of Madison additional requirements.

B. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.05 ADJUSTING

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

3.08 PROTECTION

A. Protect installed products from subsequent construction operations.

END OF SECTION

SECTION 26 27 29
ELECTRIC VEHICLE CHARGING STATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This specification provides information as it relates to the complete installation of Electric Vehicle Charging Stations (EVCS) and related components.

1.02 RELATED REQUIREMENTS

A. Section 00 31 46 - Permits.

B. Section 01 31 13 - Project Coordination.

C. Section 01 31 19 - Project Meetings.

D. Section 01 33 23 – Submittals.

E. Section 01 73 29 - Cutting and Patching.

F. Section 01 74 13 - Progress Cleaning.

G. Section 01 76 00 - Protecting Installed Construction.

H. Section 01 78 13 - Completion and Correction List.

I. Section 01 78 23 - Operation and Maintenance Data.

J. Section 01 78 36 – Warranties.

K. Section 01 78 39 - As-Built Drawings.

L. Section 01 78 43 - Spare Parts and Extra Materials.

M. Section 01 79 00 - Demonstration and Training.

1.03 REFERENCE STANDARDS

A. ISO/IEC 14443-4 - Cards and Security Devices for Personal Identification – Contactless Proximity Objects – Part 4: Transmission Protocol - Amendment 1: Dynamic Power Level Management; 2018, with Amendment (2021).

B. ISO/IEC 15693-2 - Cards and Security Devices for Personal Identification - Contactless Vicinity Objects - Part 2: Air Interface and Initialization; 2019.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2020.

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. SAE J1772 - SAE Electric Vehicle and Plug in Hybrid Electric Vehicle Conductive Charge Coupler; 2024.

F. UL 2202 - Standard for Electric Vehicle (EV) Charging System Equipment; Current Edition, Including All Revisions.

G. UL 2231-1 - Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements; Current Edition, Including All Revisions.

H. UL 2231-2 - Standard for Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems; Current Edition, Including All Revisions.

I. UL 2594 - Standard for Electric Vehicle Supply Equipment; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate this work with other installers to provide required electric power for specified charging units and accessory equipment being installed at designated locations.

2. Coordinate this work with other installers to provide readily accessible location for disconnection as indicated and as required by NFPA 70.
3. Notify Architect of any conflicts with or deviations from Contract Documents and obtain documented directions before proceeding with this work.

B. Manufacturer's charges associated with providing Cloud-Based Services subscriptions as necessary for charging unit operation to be paid by Owner.

C. Preinstallation Meetings:
1. Conduct meeting with facility representatives to review charging unit and accessory equipment locations and require attendance by each affected installer.

D. Sequencing: Do not install charging unit until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's standard catalog and data sheets for charging units and installed accessories; include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.

C. Manufacturer's Installation Instructions: Submit necessary application conditions and limitations of use stipulated by product testing agency; include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

D. Manufacturer’s detailed field testing procedures.

E. Field quality control test reports.

F. Maintenance Contracts.

G. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

H. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

I. Project Record Documents: Record actual locations of system components and installed wiring arrangements and routing.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company with minimum three years documented experience with similar charging units; manufacturer's authorized installer.

C. Maintenance Contractor Qualifications: Same entity as installer.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

E. Maintain at project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Upon completion and acceptance of the contract the Electrical Contractor shall provide a one (1) workmanship warranty from the date of substantial completion.

C. The Electrical Contractor shall also provide completed Manufacturer's Warranty for the equipment and durations noted within the products section of this specification.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. OpConnect Supported Electric Vehicle Charging Units (Level 2):
   1. ABB
   2. BTC Power:
   3. ClipperCreek/Enphase - HCS-XX-N and CS-XX-N network chargers manufactured by available exclusively from OpConnect
   4. CMI
   5. Dunimas
   6. LiteOn (private labeled OpConnect)
   7. LG
   8. Samsung
   9. WallBox
   10. Substitutions: See Section 01 25 13 – Product Substitution Procedures.
   11. Source Limitations: Furnish electric vehicle charging units and accessory equipment produced by single manufacturer and obtained from single supplier.

2.02 ELECTRIC VEHICLE CHARGING UNITS

A. Provide electric vehicle charging units in compliance with NFPA 70 and including required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides functional intent indicated.

B. General Requirements:
   1. Listed and labeled as complying with UL 2594 or UL 2202.
   2. Provide personnel protection in accordance with UL 2231-1 and UL 2231-2.
   3. Enclosure Environment Type: In compliance with NEMA 250, Type 3R or Type 4, unless otherwise indicated.
   4. Service Conditions: Provide charging units suitable for operation between minus 22 and 122 degrees Fahrenheit (50 degrees Celsius) without derating.

C. Electric Vehicle Charging Unit:
   1. Electric Supply: Single phase 208 VAC, 40 A, 60 Hz.
   2. Input Cable: 2 ft with NEMA 14-50 plug.
   3. Output Cable & Connector: 25 ft cable with J1772 standard compliant connector. Provide with cable/connector support while not in use.
   4. Communication: Built in Wi-Fi connectivity (802.11 b/g/n 2.4 GHz)
   5. Display: LEDs for charging status, fault indication, and Wi-Fi connectivity.
   6. Enclosure: Minimum NEMA 3R
   7. Configuration: Single port, wall mount.
   8. Charging: AC Level 2 with SAE J1772 connector(s).
   9. Charging: DC Fast with SAE J1772 Combo connector(s).
   10. Warranty: 3-year product warranty.
   11. Software:
      a. OpConnect
         1) Support management of driver authentication, payment methods, and pricing models.
         2) Allow driver to access station availability and status.
   12. Features:
      a. Overhead cable management.
      b. Liquid crystal display (LCD) driver interface.

c. Card reader with ISO/IEC 15693-2 (vicinity card), ISO/IEC 14443-4 (proximity card), and NFC support.
d. Integral surge protection.
e. Locking holster(s).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that ratings of charging units are consistent with indicated requirements.

C. Verify that charging unit locations indicated are free from obstructions and meet manufacturer's minimum clearance requirements.

D. Verify that mounting surfaces are ready to receive charging units.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to charging units.

F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and all code requirements.

B. Provide panel and circuit labels for all circuits servicing the electric vehicle charging station.

C. Provide setup, testing, and configuration of Wi-Fi connection per manufacturer instructions.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Provide services of a manufacturer's authorized representative to observe installation and assist in inspection and testing. Include manufacturer's detailed testing procedures and field reports with submittals.

C. Prepare and start system in accordance with manufacturer's instructions.

D. Program system parameters according to requirements of Owner.

E. Confirm network connectivity.

F. Test system for proper operation.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

H. Submit detailed reports indicating inspection and testing results and corrective actions taken.

3.04 CLEANING

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

B. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Demonstration: Demonstrate proper operation of system to Owner, and correct deficiencies or make adjustments as directed.

D. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.
1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of two hours of training.

3. Instructor: Manufacturer's authorized representative.
4. Location: At project site.

3.06 PROTECTION

A. Protect installed system components from subsequent construction operations.

3.07 MAINTENANCE

A. See Section 01 7000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

B. Provide to Owner, a proposal as an alternate to the base bid, a separate maintenance contract for service and maintenance of charging units for one year from Date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

C. Provide trouble call-back service upon notification by Owner:
   1. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   2. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

END OF SECTION

SECTION 27 51 16
LIBRARY AUDIO VISUAL SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.

B. This section includes furnishing and installing AV systems including speakers, controls and other equipment required for complete operating systems.
   1. Local programming and Zoom-room system for the Community Room 107.
   2. Local programming and Zoom-room system for Classroom 109.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. **Section 26 05 29 - Electrical Hangers and Supports**

C. **Section 26 05 33.13 - Conduit for Electrical Systems**

D. **Section 26 05 33.16 - Boxes for Electrical Systems**

E. **Section 26 05 33.23 - Surface Raceways for Electrical Systems**

F. **Section 27 00 05 - Communications Cabling**

G. **Section 27 41 00 - Professional Audio/Video Systems**

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SYSTEM DESCRIPTION

A. Community Room 107
   1. Provide voice lift for local meetings.
   2. Play program material from patrons' devices on overhead speakers and flat screen displays.
   3. Participate via Zoom in remote meetings using audio from overhead ceiling microphone arrays**, wireless microphones** and a local camera.

   4. Facilitate future upgrade toType 1 meetings and civic engagement.
   5. These functions shall be available from the Crestron touch-screens:

      a. Power-on flat screens
      b. Initiate Zoom meeting
      c. Select sound sources
      d. **Select device input**
      e. Select volume level

B. Classroom 109
   1. Provide voice lift for local meetings.
   2. Play program material from patrons' devices on overhead speakers and flat screen display.
   3. Participate via Zoom in remote meetings using audio from overhead ceiling microphone arrays, a wireless microphone, and local cameras.

   4. These functions shall be available from the Crestron touch-screen:
      a. Power-on flat screen
      b. Select sound source
      c. Select volume level
      d. Initiate Zoom meeting

C. Input components:
1. Community Room 107
a. Body pack microphones.
b. Handheld microphones.
c. Overhead ceiling microphone arrays and a local camera when in Zoom mode.
d. Patrons' devices via HDMI connection **or B connection**.
2. Classroom 109
a. **Bodypack** microphones.
b. Overhead ceiling microphone array and local cameras when in Zoom mode.
c. Patrons' devices via HDMI connection **or USB connection**.

1.05 SUBMITTALS

A. See Section 27 41 00 - Professional Audio/Video Systems.

1.06 QUALITY ASSURANCE

A. See Section 27 41 00 - Professional Audio/Video Systems .

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 BIDDER QUALIFICATIONS

A. See Section 27 41 00 - Professional Audio/Video Systems.

PART 2 PRODUCTS

2.01 BILL OF MATERIAL - COMMUNITY ROOM 107

A. See plans including sheets T701 through T704 for materials.

B. See plans including sheets T701 through T704 for materials.

2.02 BILL OF MATERIAL - CLASSROOM 109

A. Dante enabled.

2.03 AMPLIFICATION AND CONTROL EQUIPMENT

A. Microphone Inputs: Two low impedance inputs with 600 microvolt sensitivity and noise level at least 55 dB below rated output.

B. System Frequency Response: 50 to 15,000 Hz, plus or minus 2 dB.

C. System Distortion: Less than 1.5 percent, 100 to 100,000 Hz at rated power.

D. System Output: 4 ohms 25 volts.

E. Volume Controls: One for each input and one master volume.

F. Bass Control: Plus 8 dB to minus 12 dB at 50 Hz.

G. Treble Control: Plus 8 dB to minus 12 dB at 10,000 Hz.

H. Program Selector: Provide program , listen-talk, and mode selector switches.

I. System Cabinet: Console mounted.

2.04 COMPONENTS

A. Speakers: ~~8 inch coaxial speaker with integral crossover circuit.~~**See plans.**
~~Power Rating: 20 watts.~~
~~Frequency Range: 45 to 18,000 Hz.~~
~~Sound Pressure Level: 95 dB at 3 feet with 1 watt input.~~
~~Magnet: Ceramic; 10 ounces low frequency unit; 3 ounces high frequency unit.~~
~~Dispersion: Minus 3 dB at 90 degrees, minus 5 dB at 110 degrees.~~

B. Speaker Baffles and Enclosure: **See plans.**~~Round, painted steel, with uniform perforations.~~
~~Size: 12 inch.~~

~~Finish: White.~~
~~Speaker Backbox: Insulated with sound-deadening material.~~

C. Matching Transformers: Tapped from 0.5 to 4 watts in 1 watt steps, with primary/secondary ratio to match amplifier to speaker impedances.

D. Volume Pads: Transformer type rated 10 watts.

E. Microphone Cord: 20 AWG stranded copper conductor, 600 volt insulation, rated 60 degrees C, two conductor shielded cable with rubber jacket.

2.05 WIRE AND CABLE

A. Speaker Wire and Cable: 22 AWG copper conductor, 300 volt insulation, rated 60 degrees C, paired conductors twisted together shielded and covered with a PVC jacket.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mounting Heights: Coordinate locations of outlet boxes specified in Section 26 05 33.16 to obtain mounting heights indicated.

C. Splice cable only in accessible junction boxes or at terminal block units.

D. Make cable shields continuous at splices and connect speaker circuit shield to equipment ground only at amplifier.

E. Install input circuits in separate cables and raceways from output circuits.

F. Provide protection for exposed cables where subject to damage.

G. Use armored cable for outside speaker circuits.

H. Support cables above accessible ceilings to keep them from resting on ceiling tiles. Use spring metal clips or plastic cable ties to support cables from structure for ceiling suspension system. Include bridle rings or drive rings.

I. Use suitable cable fittings and connectors.

J. Connect reproducers to amplifier with matching transformers.

K. Ground and bond equipment and circuits in accordance with Section 26 05 26.

3.02 FIELD QUALITY CONTROL

A. See Section 27 41 00 - Professional Audio/Video Systems.

B. Adjust transformer taps for appropriate sound level.

3.03 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. See Section 27 41 00 - Professional Audio/Video Systems.

3.04 CLOSEOUT ACTIVITIES

END OF SECTION

SECTION 27 51 23
FLAT SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flat screen displays in various locations to display owner generated content via the local area network.

B. ~~NUC's to provide HDMI outputs for the displays.~~

C. Cabling.

D. Licenses. **Provide a one-year BrightSign Network Pass for each BrightSign player.**

E. ~~Install a City furnished~~**At each display, provide a** ~~-~~Brightsign player and connect to displays.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

D. Section 26 05 33.13 - Condit for Electrical Systems,

E. Section 26 05 53 - Identification of Electrical Systems.

F. Section 27 00 05 - Communications Cabling

G. Section 27 41 00 - Professional Audio/Video Systems

1.03 SUBMITTALS

A. Shop Drawings: Indicate cable routing and connections.

B. Product Data: For each item of equipment.

1.04 QUALITY ASSURANCE

A. Products: Listed, classified, and labeled as suitable for the purpose intended.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 DISPLAYS

A. Manufacturers:
1. Samsung ~~65~~**55"** PM-H (basis of design).
2. Sharp.
3. Sony
4. Christie
5. NEC.
6. Philips.
7. Panasonic.

B. Specifications:
1. Diagonal size: ~~65"~~**55"**.
2. Operations hours: 24/7.
3. Resolution: 1920 x 1080 (full HD)..
4. Type: 60 Hz E-LED BLU.
5. Brightness: 500 nit.
6. Viewing angle: 178:178.
7. Contrast ratio: 4000:1.

8. Pixel pitch: 0.21 mm x 0.63 mm.
9. Display colors: (10 bit dithering) - 1.07 Billion.
10. Built-in speaker.
11. Inputs: RGB, HDMI 2.0 (2), HDCP, USB 2.0 (2).

C. Provide ~~similar for 55" displays.~~ **Samsung QMR 65 for 65" displays.**

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify field measurements are as indicated on drawings.

C. Verify that required utilities are available, in proper location, and ready for use.

D. Beginning of installation means installer accepts conditions.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Wiring Method:
1. Use listed plenum rated cables in spaces used for environmental air.
2. Install wiring in conduit where required for rough-in, where required by authorities having jurisdiction, and where exposed to damage.
3. Conduit: Comply with Section 26 05 33.13.
4. Conceal all cables unless specifically indicated to be exposed.
5. Cables in the following areas may be exposed, unless otherwise indicated:
   a. Equipment closets.
   b. Within joists in areas with no ceiling.
6. Route exposed cables parallel or perpendicular to building structural members and surfaces.

C. Provide grounding and bonding in accordance with Section 26 05 26.

D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

E. Identify system wiring and components in accordance with Section 26 05 53.

F. Provide all licenses necessary for displays.

G. Provide all components necessary to interface displays with Owner's program source.

3.03 FIELD QUALITY CONTROL

A. See Section 01 45 16 - Field Quality Control Procedures for City of Madison additional requirements.

B. Perform operational test on completed installation to verify proper operation.

C. Replace equipment, components, and wiring to eliminate audible noise, clicks, pops, or hum when system is in standby or operation.

3.04 ADJUSTING

A. Adjust controls and configuration switches for operation as indicated.

3.05 DEMONSTRATION

A. Provide systems demonstration and instructions. Allow minimum of one (1) hours.

END OF SECTION

SECTION 28 46 00
FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.

B. Transmitters for communication with supervising station.

C. Circuits from protected premises to supervising station, including conduit.

D. Maintenance of fire alarm system under contract for specified warranty period.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping: Materials and methods for work to be performed by this installer.

B. Section 08 71 00 - Door Hardware: Electrically operated locks and door holder devices to be monitored and released by fire alarm system.

C. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.

D. Section 23 33 00 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.

C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits 2002 (Corrigendum 2012).

D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.

F. NFPA 76 - Standard for the Fire Protection of Telecommunications Facilities 2020.

G. UL 268 - Standard for Smoke Detectors for Fire Alarm Systems Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 33 23 - Submittals for City of Madison required submittal procedures.

B. Proposal Documents: Submit the following with cost/time proposal:
   1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
   2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
   3. Certification by Contractor that the system design will comply with Contract Documents.
   4. Proposed maintenance contract.

C. Drawings must be prepared. Using AutoCAD 2023

D. Evidence of designer qualifications.

E. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
   1. Copy (if any) of list of data required by authority having jurisdiction.
   2. NFPA 72 "Record of Completion", filled out to the extent known at the time.

3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
4. System zone boundaries and interfaces to fire safety systems.
5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
7. List of all devices on each signaling line circuit, with spare capacity indicated.
8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
9. Air-Sampling Smoke Detection Systems: Include air-sampling pipe network layout with sampling ports identified; include calculations demonstrating compliance with specified requirements.
10. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
11. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
12. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
13. Certification by Contractor that the system design complies with Contract Documents.

F. Evidence of installer qualifications.

G. Evidence of instructor qualifications; training lesson plan outline.

H. Evidence of maintenance contractor qualifications, if different from installer.

I. Inspection and Test Reports:
   1. Submit inspection and test plan prior to closeout demonstration.
   2. Submit documentation of satisfactory inspections and tests.
   3. Submit NFPA 72 "Inspection and Test Form," filled out.

J. Operating and Maintenance Data: See Section 01 78 00 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
   1. Complete set of specified design documents, as approved by authority having jurisdiction.
   2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
   3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
   4. List of recommended spare parts, tools, and instruments for testing.
   5. Replacement parts list with current prices, and source of supply.
   6. Detailed troubleshooting guide and large scale input/output matrix.
   7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
   8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

K. Project Record Documents: See Section 01 78 00 for additional requirements; have one set available during closeout demonstration:
   1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
   2. "As installed" wiring and schematic diagrams, with final terminal identifications.
   3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

L. Closeout Documents:

1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
3. Certificate of Occupancy.
4. Maintenance contract.
5. Report on training results.

M. Maintenance Materials, Tools, and Software: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Furnish spare parts of same manufacturer and model as those installed; deliver in original packaging, labeled in same manner as in operating and maintenance data and place in spare parts cabinet.
3. In addition to the items in quantities indicated in PART 2, furnish the following:
   a. All tools, software, and documentation necessary to modify the fire alarm system using Owner's personnel; minimum modification capability to include addition and deletion of devices, circuits, and zones, and changes to system description, operation, and evacuation and instructional messages.
   b. One copy, on CD-ROM, of all software not resident in read-only-memory.

1.05 QUALITY ASSURANCE

A. Copies of Design Criteria Documents: Maintain at the project site for the duration of the project, bound together, an original copy of NFPA 72, the relevant portions of applicable codes, and instructions and guidelines of authorities having jurisdiction; deliver to Owner upon completion.

B. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer , with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

C. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
4. Contract maintenance office located within 50 miles of project site.
5. Certified in the State in which the Project is located as fire alarm installer.

D. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.

E. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

1.06 WARRANTY

A. See Section 01 77 00 - Closeout Submittals for City of Madison additional warranty requirements.

B. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.

C. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units and Accessories - Basis of Design: Notifier.

B. Fire Alarm Control Units and Accessories - Other Acceptable Manufacturers:
1. Honeywell Security & Fire Solutions/Gamewell-FCI: www.gamewell-fci.com/#sle.
2. Honeywell Security & Fire Solutions/Fire-Lite: www.firelite.com/#sle.
3. Honeywell Security & Fire Solutions/Notifier: www.notifier.com/#sle.
4. Honeywell Security & Fire Solutions/Silent Knight: www.silentknight.com/#sle.
5. Honeywell Security & Fire Solutions/Vista: www.security.honeywell.com/#sle.
6. National Time & Signal: www.natsco.net/#sle.
7. Potter Electric Signal Company: www.pottersignal.com/#sle.
8. Siemens Building Technologies, Inc: www.usa.siemens.com/#sle.
9. Simplex, a brand of Johnson Controls: www.simplex-fire.com/#sle.
10. Edwards: www.edwardsfiresafety.com/en/us/
11. Provide control units made by the same manufacturer.

C. Initiating Devices and Notification Appliances:
1. Honeywell Security & Fire Solutions/Gamewell-FCI: www.gamewell-fci.com/#sle.
2. Honeywell Security & Fire Solutions/Fire-Lite: www.firelite.com/#sle.
3. Honeywell Security & Fire Solutions/Notifier: www.notifier.com/#sle.
4. Honeywell Security & Fire Solutions/Silent Knight: www.silentknight.com/#sle.
5. Honeywell Security & Fire Solutions/Vista: www.security.honeywell.com/#sle.
6. National Time & Signal: www.natsco.net/#sle.
7. Siemens Building Technologies, Inc: www.sbt.siemens.com/#sle.
8. Simplex, a brand of Johnson Controls: www.simplex-fire.com/#sle.
9. Edwards: www.edwardsfiresafety.com/en/us/
10. Same manufacturer as control units.

D. Substitutions: ~~See Section 01 60 00 - Product Requirements~~See Section 01 25 13 – Product Substitution Procedures.
1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents.

2.02 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
2. Protected Premises: Entire building shown on drawings.
3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
   a. ADA Standards.
   b. The requirements of the local authority having jurisdiction .
   c. Applicable local codes.
   d. Contract Documents (drawings and specifications).
   e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
5. Voice Notification: Provide emergency voice/alarm communications with multichannel capability; digital.

6. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.

B. Supervising Stations and Fire Department Connections:
   1. Public Fire Department Notification: By on-premises supervising station.
   2. On-Premises Supervising Station: Existing proprietary station operated by Owner, located at .
   3. Means of Transmission to On-Premises Supervising Station: Directly connected noncoded system.

C. Circuits:
   1. Initiating Device Circuits (IDC): Class B, Style A.
   2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
   3. Notification Appliance Circuits (NAC): Class B, Style W.

D. Spare Capacity:
   1. Initiating Device Circuits: Minimum 25 percent spare capacity.
   2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
   3. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.

E. Power Sources:
   1. Primary: Dedicated branch circuits of the facility power distribution system.
   2. Secondary: Storage batteries.
   3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
   4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 FIRE SAFETY SYSTEMS INTERFACES

A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
   1. Sprinkler water control valves.
   2. Dry-pipe sprinkler system pressure.
   3. Dry-pipe sprinkler valve room low temperature.

B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
   1. Sprinkler water flow.
   2. Duct smoke detectors.

C. HVAC:
   1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

D. Doors:
   1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 08 71 00.

2.04 COMPONENTS

A. General:
   1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
   2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.

C. Addressable Fire Alarm Control Unit - Basis of Design: Notifier.

D. Master Control Unit: As specified for Basis of Design above, or equivalent.

E. Remote Annunciators: Notifier.

F. Initiating Devices:
   1. Addressable Systems:
      a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
      b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
   2. Manual Pull Stations: Notifier.
   3. Smoke Detectors: Notifier.
   4. Duct Smoke Detectors: Notifier.
   5. Air-Sampling Smoke Detection Systems:
      a. Design and provide smoke detection system suitable for application and coverage area indicated, consisting of smoke detector unit with aspirator/fan that continuously draws air into sensing chamber through connected sampling pipe network and associated sampling ports.
      b. Comply with NFPA 72 and list and label as complying with UL 268.
      c. Comply with applicable requirements of NFPA 76 for Very Early Warning Fire Detection (VEWFD).
      d. Detector Unit:
         1) Sensitivity: Programmable; capable of meeting NFPA 76 requirements for Very Early Warning Fire Detection (VEWFD).
         2) Smoke Detection Method: Provide detector units employing laser-based light scattering mass detection.
         3) Alarm Levels: Programmable; as indicated or as required to perform alert, pre-alarm action, and alarm functions; minimum of three.
         4) Minimum Number of Output Relays Supported: Equivalent to basis of design.
         5) Display: Provides local annunciation of detector trouble and alarm status.
      e. Sampling Pipe Network:
         1) Use manufacturer's recommended sampling pipe and fittings; plenum rated; identified in accordance with NFPA 72.
         2) Designed using manufacturer's product-specific design software or based on manufacturer's pre-engineered design suitable for the application.

G. Notification Appliances:
   1. Bells: Notifier.
      a. Provide 1 extra.
   2. Speakers: Notifer.
      a. Provide 1 extra.
   3. Strobes: Notifier.
      a. Provide 1 extra.

H. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.

I. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.

J. Locks and Keys: Deliver keys to Owner.

K. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
   1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
   2. Provide one for each control unit where operations are to be performed.
   3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
   4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Obtain Owner's approval of locations of devices, before installation.

D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

H. Diagnostic Period: After successful completion of inspections and tests, Operate system in normal mode for at least 14 days without any system or equipment malfunctions.
   1. Record all system operations and malfunctions.
   2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
   3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
   4. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form."

3.03 OWNER PERSONNEL INSTRUCTION

A. Provide the following instruction to designated Owner personnel:
   1. Hands-On Instruction: On-site, using operational system.
   2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
   3. Factory Instruction: At control unit manufacturer's training facility.

B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
   1. Initial Training: 1 session pre-closeout.

C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.
   2. Refresher Training: 1 session post-occupancy.

D. Detailed Operation: Two-hour sessions for engineering staff; assume NICET level I qualifications or equivalent; combination of classroom and hands-on:
   1. Initial Training: 1 session pre-closeout.

E. Maintenance Technicians: Detailed training for electrical technicians, on programming, maintaining, repairing, and modifying; factory training:
   1. Initial Training: One 3-day session, pre-closeout.

F. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data available during instruction.

G. Provide means of evaluation of trainees suitable to type of training given; report results to Owner.

3.04 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

B. Occupancy of the project will not occur prior to Substantial Completion.

C. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
   1. Specified diagnostic period without malfunction has been completed.
   2. Approved operating and maintenance data has been delivered.
   3. Spare parts, extra materials, and tools have been delivered.
   4. All aspects of operation have been demonstrated to Owner.
   5. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
   6. Occupancy permit has been granted.
   7. Specified pre-closeout instruction is complete.

D. Perform post-occupancy instruction within 3 months after Substantial Completion.

3.05 MAINTENANCE

A. See Section 01 77 00 - Closeout Procedures, for City of Madison additional requirements relating to maintenance service.

B. Provide to Owner, at no extra cost, a written maintenance contract for entire manufacturer's warranty period, to include the work described below.

C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
   1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
   2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
   3. Record keeping required by NFPA 72 and authorities having jurisdiction.

D. Provide trouble call-back service upon notification by Owner:
   1. Provide on-site response within 2 hours of notification.
   2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
   3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.

E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.

G. Comply with Owner's requirements for access to facility and security.

END OF SECTION

SECTION 32 17 23
PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Painted pavement markings.

1.02 RELATED REQUIREMENTS

A. Section 32 12 16 - Asphalt Paving.

B. Section 32 16 23 - Sidewalks.

C. Section 32 17 13 - Parking Bumpers.

D. Section 32 17 26 - Tactile Warning Surfacing.

1.03 REFERENCE STANDARDS

A. AASHTO M 237 - Standard Specification for Epoxy Resin Adhesives for Bonding Traffic Markers to Hardened Portland Cement and Asphalt Concrete 2005 (Reapproved 2019).

B. AASHTO M 247 - Standard Specification for Glass Beads Used in Pavement Markings 2013 (Reapproved 2018).

C. AASHTO M 249 - Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form) 2012 (Reapproved 2020).

D. AASHTO MP 24 - Standard Specification for Waterborne White and Yellow Traffic Paints 2015 (Reapproved 2020).

E. ASTM D4505 - Standard Specification for Preformed Retroreflective Pavement Marking Tape for Extended Service Life 2012 (Reapproved 2017).

F. ASTM E303 - Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester 1993 (Reapproved 2018).

G. FHWA MUTCD - Manual on Uniform Traffic Control Devices 2009, with Editorial Revision (2022).

H. City of Madison - Standard Specifications for Public Works Construction (2025)

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate the work of this section with adjoining work.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver glass beads in containers suitable for handling and strong enough to prevent loss during shipment, accompanied by batch certificate.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.08 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

1.09 SEQUENCING

A. Allow new pavement surfaces to cure for a period of not less than 14 days before application of markings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ~~PAINTED THERMOPLASTIC~~PAINTED PAVEMENT MARKINGS

A. Comply with State of Wisconsin Highway Department standards.

B. Comply with City of Madison Specifications for Public Works Construction - Article 608

C. Furnish paint pavement markings confirming to WisDOT Section 646.2

D. Painted Pavement Markings: As indicated on the drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. Establish survey control points for locating and dimensioning of markings.

B. Place barricades, warning signs, and flags as necessary to alert approaching traffic.

C. Clean surfaces prior to installation.
   1. Remove dust, dirt, and other debris.

3.02 INSTALLATION

A. General:
   1. Position pavement markings as indicated on drawings.
   2. Field location adjustments require approval of Architect.

B. ~~Painted Pavement Markings:Thermoplastic~~ Painted Pavement Markings
   1. Apply in accordance with manufacturer's instructions.
   2. Apply in accordance with State of Wisconsin Highway Department standards.
   3. Apply in accordance with City of Madison Specifications for Public Works Construction - Article 608

3.03 TOLERANCES

A. Maximum Variation From True Position: 3 inches (76 mm).

B. Maximum Offset From True Alignment: 3 inches (76 mm).

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements for additional requirements.

B. Perform field inspection for deviations from true alignment or material irregularities.

C. If inspections indicate work does not meet specified requirements, rework and reinspect at no cost to Owner.

D. Allow the pavement marking to set at least the minimum time recommended by manufacturer.

3.05 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals for additional requirements.

3.06 PROTECTION

A. Prevent approaching traffic from crossing newly applied pavement markings.

B. Replace damaged or removed markings at no additional cost to Owner.

C. Preserve survey control points until pavement marking acceptance.

END OF SECTION