WEINSTEIN A+U

2200 Western Avenue, Suite 301, Seattle, WA 98121
206.443.8606
weinsteinau.com

ADDENDUM 05

Project Name: South King Fire Administrative Building Improvements
Owner: South King Fire
Issued by: Lauren Rock, Weinstein A+U
Issue Date: June 3, 2025

To All Bidders: Attention is called to the following items effective June 3, 2025, which shall be added to, deleted from, or changed from the Contract Documents, thereby incorporating the addendum as part of the Contract Documents.

Attachments:

Sheets:
C1.1 TESC and Demolition Plan-R01
A101 Proposed Floor Plan – Level 1-R01
A701 Interior Vertical Assemblies-R01
E100 Legend-R03
E2B1Proposed Floor Plan – Garage – Lighting-R01
E201 Proposed Floor Plan - Level 1 – Lighting-R01
E202 Proposed Floor Plan – Level 2 – Lighting-R01
E3B1 Proposed Floor Plan – Garage – Power-R01
E301 Proposed Floor Plan – Level 1 – Power-R01
E500 One Line Diagram-R01
E600 Lighting Fixture Schedule-R02
E701 Panel Schedules-R01

Specifications:
10 28 19 Shower Enclosures
23 09 23 Controls-R01
23 31 13 Metal Ducts-R01
28 31 11 Fire Alarm System-R01

Approved Substitution Requests:
12 24 13 Roller Window Shades – Springs Window Fashions SL20

Drawing Items (changes have been clouded)

C1.1	Extent of asphalt removal updated.
A101	Revised vertical assembly callout at portion of infill wall.
A701	Added vertical assembly M3Z.0.
E100	Added detail for AV rough-in requirements.
E2B1	Comm G07: Revised light fixture to SL-1E.
E201	Reception 101: Revised two RL-2 light fixtures to RL-3.
	Lunch/Break 110: Revised four RL-2 light fixtures to PL-1.

	General: Added callouts for egress lighting fixtures.
E202	Kitchen 202: Revised lighting fixture type to RL-3.
	Floor Plan: Added callouts for egress lighting fixtures.
E3B1	Elec G08: Added fused disconnects for Panel D and Panel F feeders and added Transformer #3.
E301	Mech 122: Added Panel F1.
E500	One Line Diagram: Revised selected breaker and feeder sizes. Added Transformer #3 and fused disconnects (at Transformers #2 and #3).
	Feeder Size Chart: Added 125T and 175T feeders.
E600	Lighting Fixture Schedule: Added fixture types PL-1E, RL-3E, RL-5E and SL-1E for egress lighting.
E701	Main Switchboard: Revised Panel F breaker to 175/3.
	Panel A: Revised to 100 amps.
	Panel C: Revised to main breaker.
	Panel F: Revised to 400 amps.

Specification Items (changes have been tracked)

10 28 19	Shower Enclosures section added.
23 09 23	Sequence of Operation and Points List added.
23 31 13	Item 3.10 Duct Cleaning removed.
28 31 11	Items 2.2.A.1 and 2.2.A.2: Revised language to clarify where open cabling is allowed for fire alarm.

Questions

01.	Question: Please provide specification sections and model numbers for the shower pans and the shower doors listed for the Men's and Women's shower stalls. The material list has them under Toilet Accessories, however, they are not listed in any specification section.
	Answer: Spec section 10 28 19 has been issued in addendum-05. Refer also to A921 Finish Schedule.
02.	Question: Per spec section 233113 3.10 is to duct clean all the ductwork. We typically don't perform duct cleaning on brand new ductwork. Is duct cleaning required? If so, what ductwork is expected to get cleaned.
	Answer: No duct cleaning required on new ducts. See revised spec section 23 31 13. Protect new and existing ducts to remain during construction per 233113 3.1 L.
03.	Question: In the spec 23 09 00 Controls, it calls out sheet M-003, but after reviewing drawings and the spec, it doesn't look like we have any document that matches that sheet name. can we get clarification on this? See the attached.
	Answer: See revised spec section 23 09 23.
04.	Question: HVAC Demo Level 02 Keynote states equipment and duct are to be removed. There is no indication of existing duct to base an estimate for. Please provide additional information.
	Answer: Existing building plans from 1984 have been provided. Current as-built drawings are not available.

05. Question: I don't see any egress lighting on the plans, and I didn't notice a generator backup. Shouldn't there be some lighting with an integral battery to satisfy the requirement for egress lights?

Answer: Addressed in Addendum 05. See revised sheets E2B1, E201, E202 and E600.

06. Question: The specs say that the Fire Alarm needs to be 100% in conduit, but the plans say that open cable is allowed above accessible ceilings. Please confirm if open cable is allowed.

Answer: Addressed in Addendum 05. Open cable is allowed as per plans. See revised spec 283111.Plan sheet C3.1 requires the Fire Connection and FDC in accordance with NFPA 24, of which, Section 10.10 includes testing and certification requirements.

07. Question: Can you please provide a vendor(s) that supports the existing Hochiki fire alarm system?

Answer: Suggest contacting Hochiki directly for vendors.

08. Question: Kitchen 202 has a fixture type RL-1 but it only scales 4' long, should this be a type RL-3?

Answer: Revised to RL-3 in Addendum 05.

09. Question: Reception 101 has (2) type RL-2 and Lunch/Break 110 has (4) RL-2 which are to be 6' long but only scales 4' long. Please confirm which fixture are to be used at these locations?

Answer: Revised fixture types in Addendum 05.

10. Question: The one-line shows panels F and F1 as 480/277vv panels fed from the main switchboard, but the panel schedules show these panels as 208/120v. Please provide how these panels are 208/120v without a transformer?

Answer: Added transformer for Panel F in Addendum 05.

11. Question: Is it possible to provide a location for Panel F1 on the floor plan? The panel schedule says Mech 122, but it is not shown.

Answer: Added panel location in Mech 122 in Addendum 05.

12. Question: On the 1-line E500, the feed to Panel F is called out to be 400a but it is fed by a 225a breaker in Main Switchboard, and the panel schedule E701shows this panel as a 200a breaker. Please clarify the breaker, feeder size, and panel amperage for Panel F.

Answer: Revised one line to address these details in Addendum 05.

13. Question: Addendum 2 clarifies extents of the fire sprinkler system indicated for the Garage, Level 1, as well as the stub up for future at Level 2. Addenda 2 Drawing F102 (or original drawing F102) do not show any sprinkler work at the Large Conference Room & Kitchen space that is part of Alternate 1. Please confirm if costs for a fire sprinkler system should be included in Alternate 1 for the Level 2 Conference space.

Answer: Fire sprinkler scope is correct as indicated. Sprinkler is not included in Alternate 1.

14. Existing Tenants occupy part of level 2. We are required as part of the base bid to renovate the public restrooms at level 2. Please clarify if there are any restrictions with regard to renovating the restrooms with regard to the existing tenants. It is assumed it is acceptable for existing tenants not to have use of restrooms while renovation is occurring. Please confirm.

Answer: Construction should be sequenced to allow tenants use of first or second floor bathrooms at all times during construction.

15. Question: Drawing AD1B1 shows walls to be demolished. The existing drawings do not show these walls so we cannot tell if these walls run to structure or to underside of the ceiling. The reflected ceiling drawings appear to show that the ceilings run continuously at these walls. Contractor assumes that walls to be demolished run to underside of the ceilings and that after wall demolition ceiling patch

and repair is not required. Please confirm. If incorrect please revise reflected ceiling drawing to show new ceilings required at the garage and provide specifications.

Answer: Garage walls to be demolished at storage closets stop at underside of ceiling. Ceiling patch and repair as needed.

16. Question: Drawing AD2B1 indicates “existing 1-hr rated ceiling panels to be removed, protected, and reinstalled as needed for plumbing and installation of other ceiling fixtures. No other work this clg”. Detail 1 on A702 shows the existing construction and appears to show a batt insulation adhered to the underside of the plywood. Please confirm this insulation is not required to be replaced and only removed and reinstalled where needed for MEP attachment to structure. Please confirm method of attachment of existing insulation.

    Answer: Remove and reinstall existing batt insulation. Method of attachment is unknown. Existing building plans show insulation located at the underside of Level 1 floor, but limited site observation shows it resting on wire rods immediately above the ceiling tile at the observed location.

17. Question: Detail 1 on A702 shows a ¾” gypcrete topping. Our bid documents include specification section 035413 Gypsum Cement Underlayment which specifies a gypcrete topping and acoustic mat. Is the intent to demolish the existing gypcrete and install a complete new topping and mat. Please clarify scope required for new gypcrete topping and mat specified in 03 54 13.

    Answer: No new gypcrete is intended. Specification provided in the event that construction necessitates gypcrete patching. Sound mat is not required. See Addendum-04 for revision of section 03 54 13.

18. Question: Sheet Note 2 on Drawing E202 indicates “Level 2 Work Shall be Provided Under Additive Alternate 1”. Please confirm that work in the Large Conference Room, Kitchen, and DOAS Closet is to be included in the alternate. Restroom work and work in Mech/Elec room is part of base bid. Please confirm.

    Answer: Confirmed.

19. Question: Floor plan A101 show wall type W4.1. This wall type does not show up on drawing A701 (Interior Vertical Assemblies). Please clarify. It appears it might be a wood stud; however no rough carpentry specification is provided.

    Answer: A101 has been updated to indicate wall type M4.1

20. Question: Floor plan A101 shows (in several locations) wall type M3Z.0. This wall type does not show up on drawing A701 (Interior Vertical Assemblies). Please clarify. It appears to be a full stud with gypsum board on one side (shown at end of Supply 111 where meets FMO Open 117).

    Answer: M3Z.0 has been added to A701.

21. Question: TESC and Demo Plan C1.1 shows the limits of asphalt removal. Drawing C2.1 shows new AC paving. Drawings C1.1 and C2.1 do not appear to align with what is being demolished versus what is new. Please clarify.

    Answer: Paving and Grading Plan C2.1 is correct. TESC and Demolition Plan C1.1 have been updated to match.

22. Question: Drawing E101 shows locations for shore power outlets on the West side of the building. Please provide mounting details.

    Answer: Refer to Section 262726 Item 2.7.A.

23. Question: Model Clarification. The basis of design is not a high speed coiling grille. It is a standard motor operated door. Please confirm if a high speed coiling grille is required and if so please update the model.

    Answer: BOD is standard speed overhead coiling grille. High-speed coiling grille not required.

24. Question: FMO Open 117 to workstations. Please provide details on whether this power raceway is to be an undercarpet raceway that EC provides or if this cable tray is actually part of the workstation furniture that is provided by others.

    Answer: Cable tray will be a component of the workstation furniture.

25. Question: Please provide the location for new panel F1 fed from panel F located in the mechanical room 122.

    Answer: Addressed in Addendum 05.

26. Question: Several of the offices and conference rooms have this symbol and there is no spec regarding the AV for this project. Is the intention that these rooms will have an HDMI cable with an input plate on the wall and another HDMI input plate behind the display?

    Answer: AV will be rough in only. Added AV Detail indicating requirements in Addendum 05.

27. Question: Several of the offices and conference rooms are showing grayed out AV displays on the wall. Are these displays existing? Is AV SOW in contract for this project? Is there any additional AV required for these rooms? If yes, can a specification or basis of design be provided?

    Answer: Note on floor plan states TV FOIO (furnished by owner installed by owner). Required power for TVs is shown on Electrical drawings. There is no AV scope in this project beyond rough-in.

Substitution Requests – APPROVED

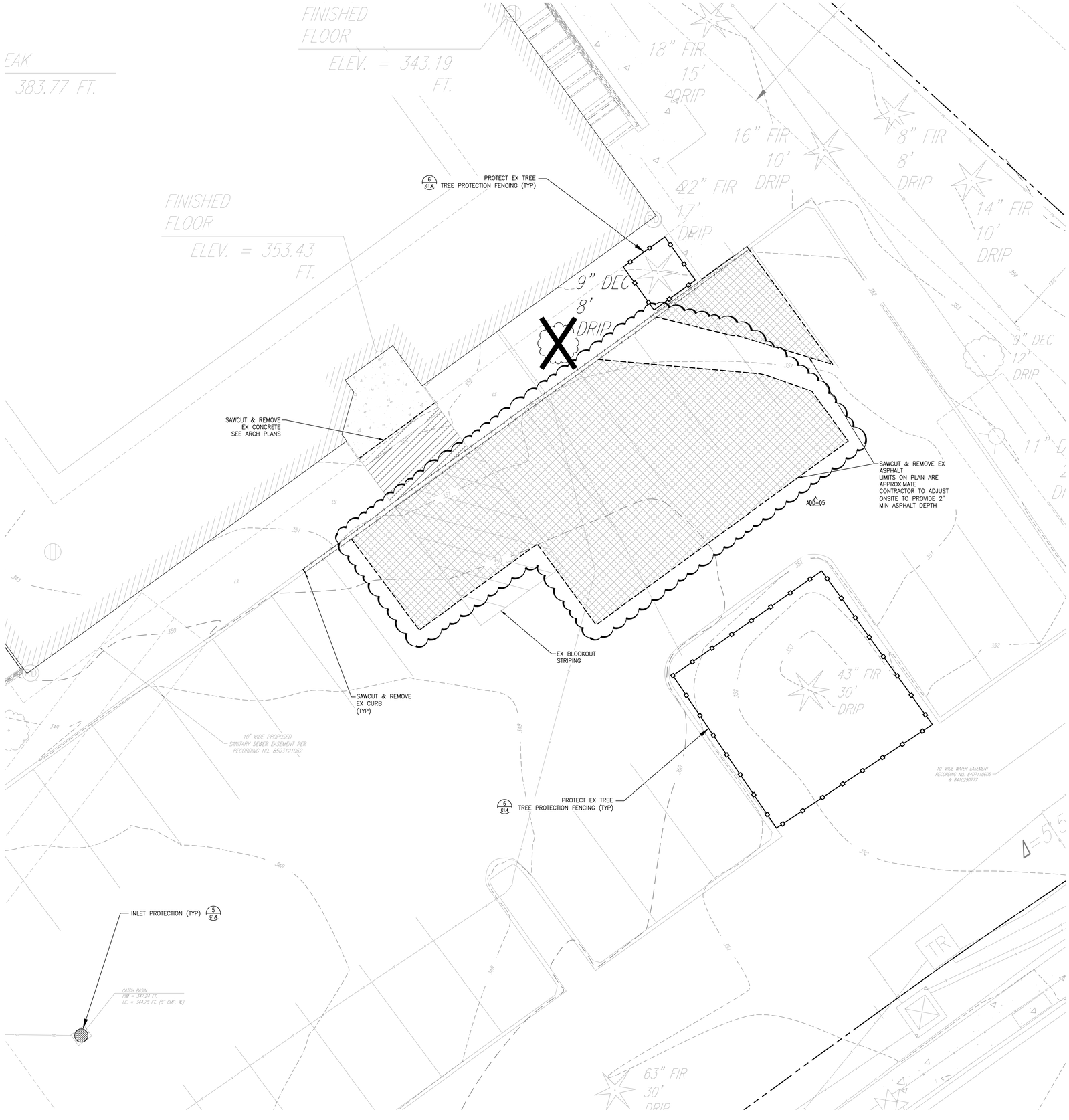
Note: Acceptance of Substitution Requests does not relieve the contractor from meeting any requirements of the bid document specifications. Submitted Substitution Request Forms are attached for reference.

01. The following manufacturers/products are *approved* for 12 24 13 Roller Window Shades:

    - Springs Window Fashions SL20

End of Addendum 05.

Template version: WAI-AC27-MAIN Server Path: //VolumesFileServer/Office/ProjectResources/5-Design/01-Archive/27-Resources/01-AC27-Templates/WAU-AC27-MAIN.tpl
Release date: 03/20/2024



LEGEND

- PROPERTY LINE
- EX CONTOUR (INDEX)
- EX CONTOUR
- EX BUILDING
- SAWCUT LINE
- ASPHALT REMOVAL
- CONCRETE REMOVAL
- COMPOST FILTER SOCK
- EX TREE TO REMAIN
- EX TREE TO BE REMOVED
- TREE PROTECTION
- EX CURB TO BE REMOVED
- INLET PROTECTION CATCH BASIN INSERT

Rev	Date	Issue
01	06/03/2025	ADD-05

LPD engineering pllc
1932 First Ave
Suite 500
Seattle, WA 98101
p. 206.725.1211
f. 206.973.5344
www.lpdengineering.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2024 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

MARC J. SERVI — STATE OF WASHINGTON — 24182 — REGISTERED PROFESSIONAL ENGINEER
9/28/25

BID SET
Issue

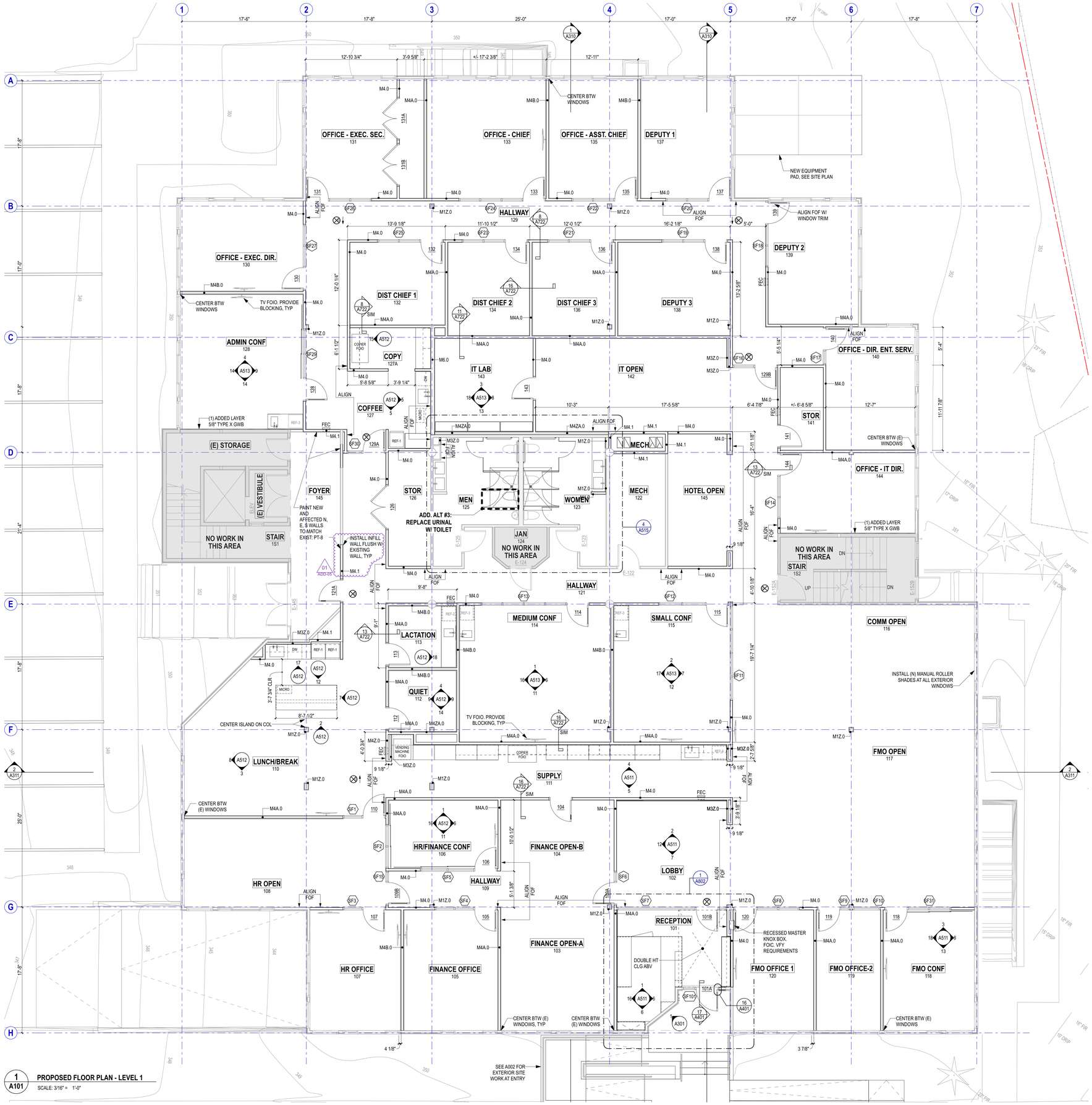
05-02-2025
Issue Date

TESC AND DEMOLITION PLAN
Sheet Title

C1.1

811 Know what's **below.** **Call** before you dig. Dial 811

WeinsteinAU.com
206.443.8606



1 A101 **PROPOSED FLOOR PLAN - LEVEL 1**
SCALE: 3/16" = 1'-0"

GENERAL FLOOR PLAN NOTES

1. DIMENSIONS ARE TO:
   FOF - FACE OF FINISH (AT EXISTING WALLS)
   FOC - FACE OF CONCRETE or
   FOS - FACE OF STUD UNLESS NOTED AS "CLR" (CLEAR) OR "FIN" (FINISH)
2. FOR LIST OF ABBREVIATIONS SEE COVER SHEET **G001**
3. FOR INTERIOR VERTICAL ASSEMBLIES SEE SHEET **A701**
4. FOR INTERIOR HORIZONTAL ASSEMBLIES SEE SHEET **A702**
5. FOR DOOR SCHEDULE SEE SHEET **A901**
6. FOR STOREFRONT SCHEDULE SEE SHEET **A412**
7. EXISTING WALL LOCATIONS ARE APPROXIMATE. FIELD VERIFY.

ASSEMBLY SYMBOL

W6A.0 (INTERIOR WALLS)

W6A.0
- FIRE RATING AS APPLICABLE
- ASSEMBLY KEY
- FRAMING SIZE
- FRAMING TYPE

SCOPE OF WORK:

EXTENTS OF WORK

AREA OUTSIDE OF SCOPE OF WORK

Rev	Date	Issue
01	06/03/25	ADD-05

CONSULTANT'S LOGO

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

3300 REGISTERED ARCHITECT
EDWARD WEINSTEIN
State of Washington

BID SET
Issue

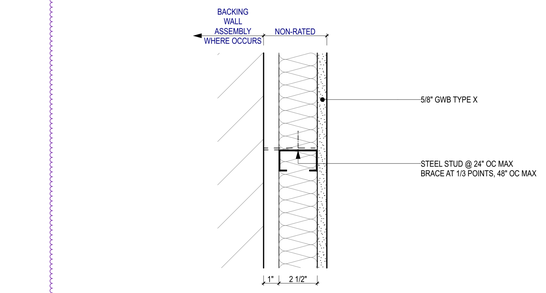
05/02/25
Issue Date

PROPOSED FLOOR PLAN - LEVEL 1
Sheet Title

A101

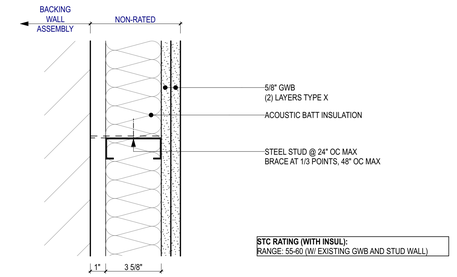
PLAN NORTH

WEINSTEIN A+U
WeinsteinAU.com
206.443.8606

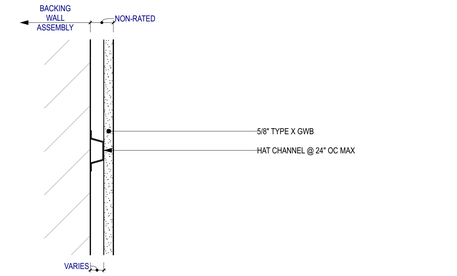


01
ADD-05

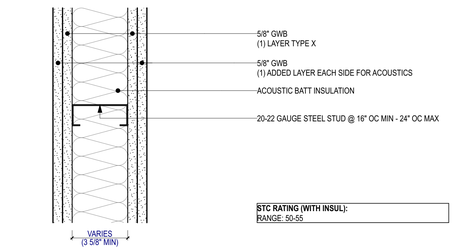
M3Z **FURRING WALL - LIGHT-GAUGE METAL STUDS** 0-HR: M3Z.0



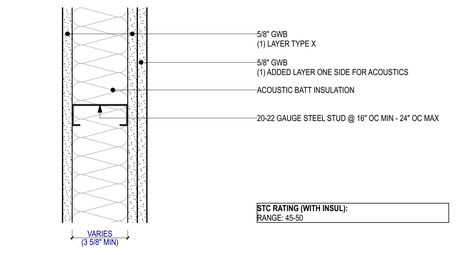
M4ZA **ACOUSTIC FURRING WALL - LIGHT-GAUGE METAL STUDS** 0-HR: M4ZA.0



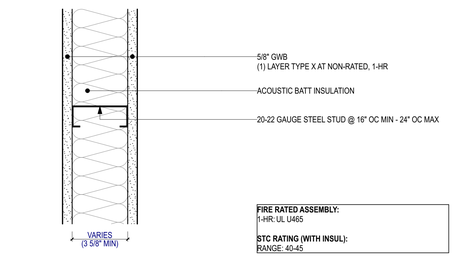
M1Z
M2Z **FURRING WALL - METAL HAT CHANNEL** 0-HR: M1Z.0 / M2Z.0



M4B
M6B **LIGHT GAUGE METAL-FRAMED WALL - HEAVY ACOUSTIC** NR: M4.0 / M6.0



M4A
M6A **LIGHT GAUGE METAL-FRAMED WALL - LIGHT ACOUSTIC** NR: M4.0 / M6.0

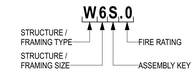


M4, M4.1
M6 **LIGHT GAUGE METAL-FRAMED WALL** NR: M4.0 / M6.0
1-HR: M4.1 / M6.1

GENERAL NOTES - INT. WALLS

1. SEE G001 FOR GENERAL NOTES AND ABBREVIATIONS.
2. SEE G201 BUILDING CODE DIAGRAMS FOR REQUIRED FIRE RATINGS.
3. **GWB IS TYPE 'X' UNO.**
4. STUD SIZES ARE PER PARTITION TYPES.
5. OPENINGS AND PERIMETERS AT RATED PARTITIONS WILL BE SEALED WITH APPROVED FIRESTOP ASSEMBLIES FOR THE SAME HOUR RATING AS THE PARTITION.
6. WHERE ENDS OF PARTITION ABUT OTHER CONSTRUCTION, PROVIDE RELIEF JOINT.
7. PROVIDE BACKING PER INTERIOR ELEVATIONS. SEE A600-SERIES SHEETS.
8. ALL FURRED WALLS SHALL HAVE VERTICAL AND LATERAL DRAFTSTOPPING PER IBC 718.3.
9. ALL EXPOSED GWB TO BE LEVEL 4 FINISH UNO.
10. STUD CAVITIES IN ACOUSTIC WALLS TO BE FILLED WITH LOW DENSITY FIBERGLASS INSULATION.
11. AVOID BACK TO BACK ELECTRICAL OUTLETS IN STUD CAVITY. PROVIDE ACOUSTIC PUTTY PADS BEHIND ELECTRICAL BOXES IN WALLS RATED STC-45 OR HIGHER.
12. SEAL OPENINGS AROUND PIPE AND DUCT PENETRATIONS WITH NON-HARDENING ACOUSTICAL SEALANT.
13. ASSEMBLY KEY PER DETAIL BELOW

ASSEMBLY SYMBOL



Rev	Date	Issue
01	06/03/25	ADD-05

CONSULTANT'S LOGO

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

3300 REGISTERED ARCHITECT
EDWARD WEINSTEIN
State of Washington

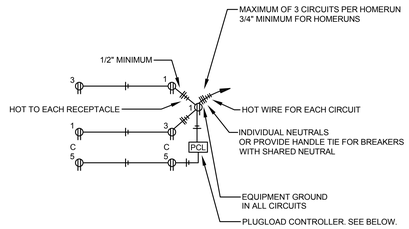
BID SET
Issue

05/02/25
Issue Date

INTERIOR VERTICAL ASSEMBLIES
Sheet Title

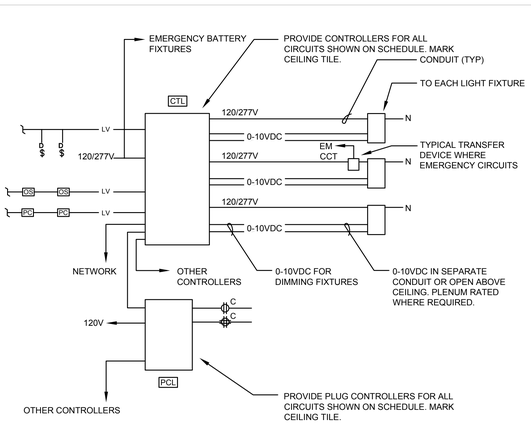
A701

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com



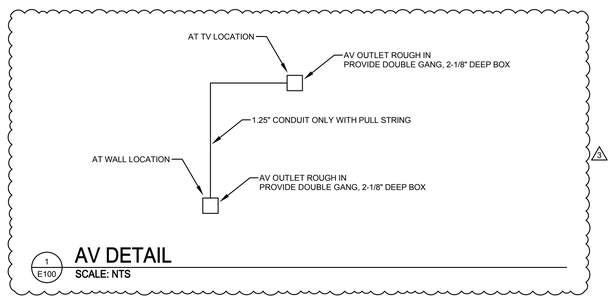
TYPICAL RECEPTACLE CIRCUITING DETAIL

SCALE: NONE



TYPICAL LIGHTING CONTROL DETAIL

SCALE: NONE



1 E100

AV DETAIL

SCALE: NTS

LEGEND

- CONDUIT CONCEALED IN CEILING OR WALLS
- CONDUIT CONCEALED UNDERGROUND, UNDER FLOOR, OR IN WALL
- 3/4" CONDUIT, NUMBER OF MARKS SHOWS NUMBER OF #12 WIRES. NO MARKS=2#12
- HOME RUN WITH DESTINATION INDICATED, MINIMUM 3/4"
- SURFACE OR PENDANT MOUNTED FIXTURE
- RECESSED LIGHT FIXTURE
- SURFACE OR PENDANT LIGHT FIXTURE
- WALL MOUNTED FIXTURE
- VANITY LIGHT, WALL MOUNTED
- UNDERCABINET LIGHT WITH INTEGRAL SWITCH
- EXIT SIGN LIGHT FIXTURE TYPE X, EXCEPT AS NOTED
- FIXTURE WITH INTEGRAL EMERGENCY BATTERY
- WALL SWITCH, 1-POLE
- WALL SWITCH WITH INTEGRAL OCCUPANCY SENSOR
- DIGITAL WALL SWITCH
- DIMMER WALL SWITCH WITH INTEGRAL OCCUPANCY SENSOR
- OCCUPANCY SENSOR
- PHOTOCELL
- RELAY PACK
- XXX XXXX LIGHTING FIXTURE TYPE DESIGNATOR, SEE LIGHT FIXTURE SCHEDULE
- CTL LIGHTING ROOM CONTROLLER
- PCL PLUG LOAD CONTROLLER
- DUPLEX RECEPTACLE
- DUPLEX RECEPTACLE ABOVE COUNTER
- CONTROLLED DUPLEX RECEPTACLE
- CONTROLLED DUPLEX RECEPTACLE ABOVE COUNTER
- DOUBLE DUPLEX RECEPTACLE
- CONTROLLED DOUBLE DUPLEX RECEPTACLE
- GROUND FAULT INTERRUPTER RECEPTACLE
- WEATHERPROOF DUPLEX RECEPTACLE (GFI TYPE)
- SPLIT-WIRED RECEPTACLE
- FLUSH FLOOR DUPLEX RECEPTACLE
- DRYER OUTLET, NEMA 14-30R, SINGLE PHASE
- HOOD OUTLET
- RANGE OUTLET, NEMA 14-50R, 208V, SINGLE PHASE
- THERMOSTAT
- EQUIPMENT CONNECTION
- MOTOR CONNECTION
- DISCONNECT SWITCH
- FUSED DISCONNECT SWITCH
- POKE THROUGH WITH DEVICES AS SHOWN
- FSD FIRE SMOKE DAMPER CONNECTION, TO CLOSE ONLY ON LOCAL SMOKE DETECTION
- FA FIRE ALARM CONNECTION
- S SMOKE DETECTOR
- FA HORN/STROBE
- FA SPEAKER, WEATHER PROOF
- FA STROBE
- D DOOR HOLD, RELEASE ON BUILDING FA SIGNAL OR LOCAL SMOKE DETECTION; SEE PLANS
- F FIRE ALARM PULL STATION
- FLOW OR TAMPER SWITCH
- FS SPRINKLER FLOW SWITCH CONNECTION
- TS SPRINKLER TAMPER SWITCH CONNECTION
- AV AV OUTLET. ROUGH IN ONLY. SEE AV DETAIL 3
- SINGLE PORT DATA OUTLET
- TWO PORT DATA OUTLET
- WAP SINGLE PORT DATA OUTLET FOR WIRELESS ACCESS POINT
- TV OUTLET
- CCTV CAMERA
- CR CARD READER
- LR LONG RANGE CARD READER
- EL ELECTRIC LOCK
- DS DOOR SWITCH
- REX REQUEST TO EXIT DEVICE
- K KEYPAD FOR SECURITY SYSTEM (MOTION DETECTION)
- MS MOTION SENSOR
- 208 VOLT PANEL
- 480 VOLT PANEL
- WP WEATHERPROOF
- GFI GROUND FAULT CIRCUIT INTERRUPTER
- A/B DETAIL INDICATOR WITH SHEET WHERE DRAWN INDICATED
- 1 FLAG NOTE
- EXIST DEVICE/FIXTURE AS INDICATED
- EXIST DEVICE/FIXTURE AS INDICATED TO BE REMOVED

Rev	Date	Issue
3	6/3/2025	ADDENDUM 05
2	5/30/2025	ADDENDUM 04
1	5/22/2025	ADDENDUM 03

TFWB ENGINEERS
Travis Fitzmaurice Wartelle Balangue Engineers Inc.
1200 Westlake Ave. N., #509
Seattle, WA 98109
p. 206.285.7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

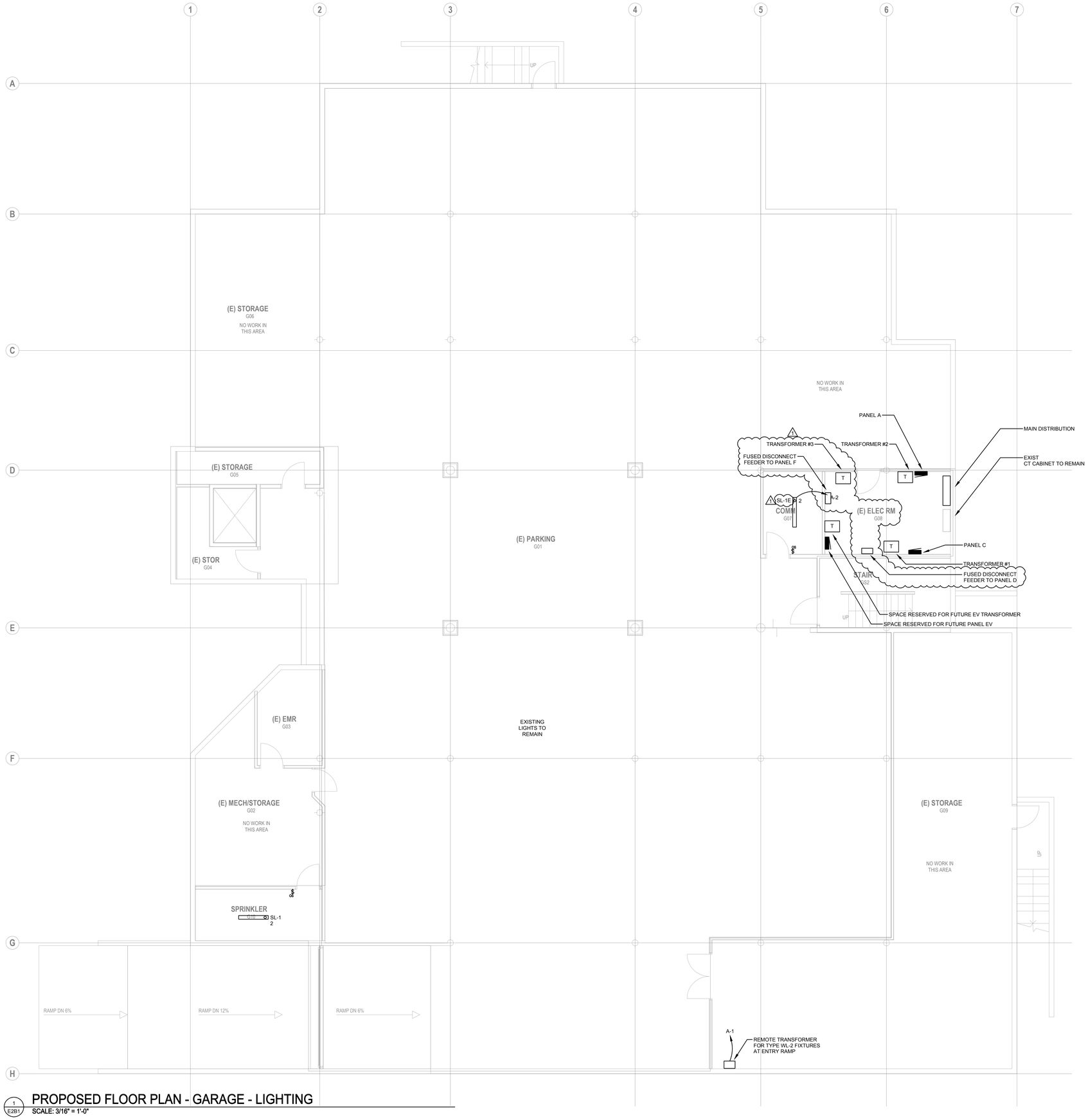
5/2/25
Issue Date

LEGEND
Sheet Title

E100

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com

Template version: WAU-AC22f MAIN Release date: 03/20/2024 Server Path: J:\Volumes\FileServer\Office\Projects\Resources\5 Design\01-Archicad 27 Resources\01-AC27 Templates\WAU-AC27 MAIN.tpl
O:\CAD\South King Fire Admin Bldg 7 - 24-078\E100.dwg 2/2/2017 2:03 PM



1 E2B1 PROPOSED FLOOR PLAN - GARAGE - LIGHTING

SCALE: 3/16" = 1'-0"

Rev	Date	Issue
1	6/3/2025	ADDENDUM 05

TFWB ENGINEERS
Travis Fitzmaurice Wartelle Balangue Engineers Inc.
1000 Westlake Ave. N., #309
Seattle, WA 98109
p: 206-285-7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

5/2/25
Issue Date

PROPOSED FLOOR PLAN - GARAGE - LIGHTING
Sheet Title

E2B1

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com

Template version: WAU-ACZ27-MAIN Release date: 03/20/2024 Server Path: \\Volumes\FileServer\Office\Projects\Resources\5 Design\01-Archicad 27 Resources\01-AC27 Templates\WAU-AC27-MAIN.tpl
O:\CAD\South King Fire Admin Bldg 71 24-0176\E2B1.dwg
2/2/2025 2:03 PM



1 E201 PROPOSED FLOOR PLAN - LEVEL 1 - LIGHTING

SCALE: 3/16" = 1'-0"

SHEET NOTES:

1. COORDINATE EXACT FIXTURE LOCATIONS, ALIGNMENTS, AND ELEVATIONS WITH ARCHITECTURAL RCP.

Rev	Date	Issue
1	6/3/2025	ADDENDUM 05

TFWB ENGINEERS
Travis Fitzmaurice Wartelle Balangue Engineers Inc.
1325 Westlake Ave. N., #200
Seattle, WA 98109
p: 206.285.7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

5/2/25
Issue Date

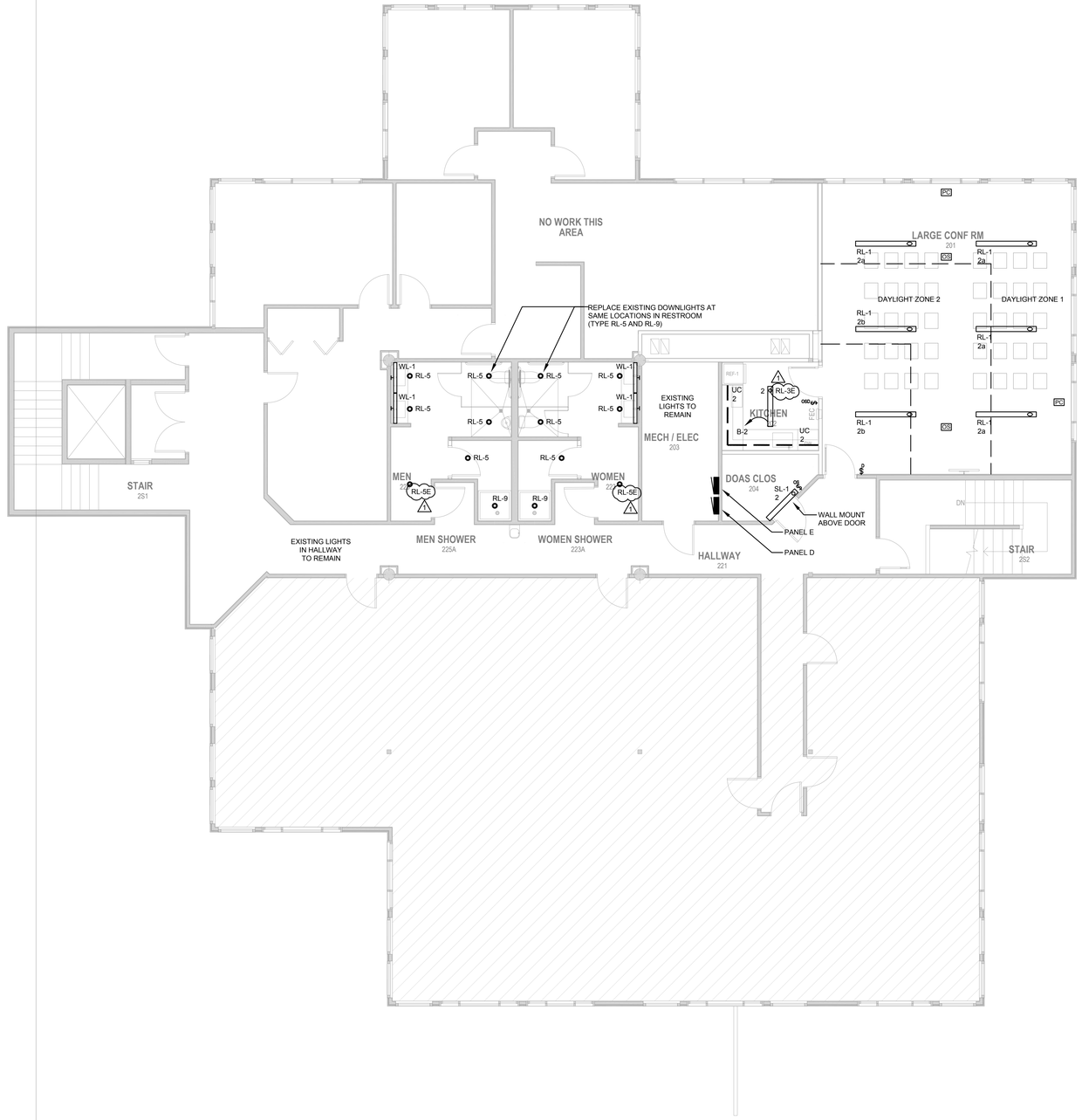
PROPOSED FLOOR PLAN - LEVEL 1 - LIGHTING
Sheet Title

E201

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com

Template version: WAU-AC27-MAIN Release date: 03/20/2024 Server Path: \\Autodesk\FileServer\Office\Projects\Resources\5 Design\01-Archicad 27 Resources\01-AC27 Templates\WAU-AC27-MAIN.tpl
01-24\South King Fire Admin Bldg 71 24-079\E201.pln 2/5/2025 2:03 PM

Template version: WAU-AC27 MAIN Release date: 03/20/2024 Server Path: //Volumes/FileServer/Office/Projects/Resources/5-Design/01-Archicad 27 Resources/01-AC27 Templates/WAU-AC27 MAIN.tpl
O:\ADM\South King Fire Admin Bldg 71 24-079\E202.pkg
2/2/2025 2:33 PM



1 E202 PROPOSED FLOOR PLAN - LEVEL 2 - LIGHTING

SCALE: 3/16" = 1'-0"

SHEET NOTES:

1. COORDINATE EXACT FIXTURE LOCATIONS, ALIGNMENTS, AND ELEVATIONS WITH ARCHITECTURAL RCP.
2. LEVEL 2 WORK SHALL BE PROVIDED UNDER ADDITIVE ALTERNATE 1.
6. EXISTING LIGHTING TO REMAIN IN ALL AREAS EXCEPT LARGE CONF RM 201 AND KITCHEN 202.

Rev	Date	Issue
1	6/3/2025	ADDENDUM 05

Travis Fitzmaurice Wartelle Bolangue Engineers Inc.
1000 Westlake Ave. N., #326
Seattle, WA 98109
p: 206-285-7228 | info@tfwb.com

TFWB ENGINEERS

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

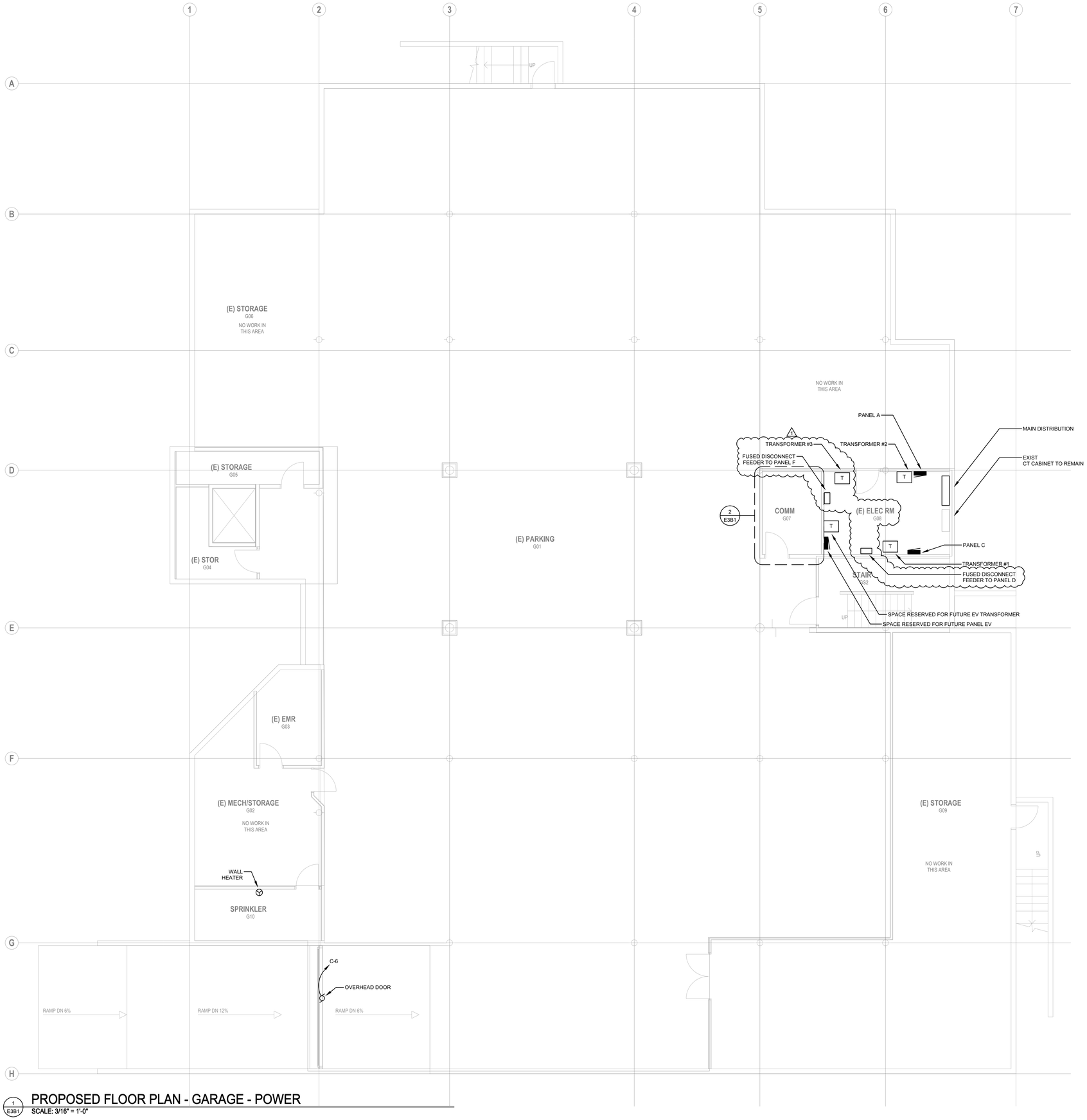
BID SET
Issue

5/2/25
Issue Date

PROPOSED FLOOR PLAN - LEVEL 2 - LIGHTING
Sheet Title

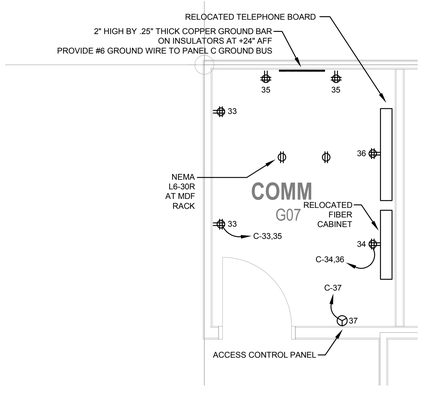
E202

WeinsteinAU.com
206.443.8606
WEINSTEIN A+U



1 E3B1 PROPOSED FLOOR PLAN - GARAGE - POWER

SCALE: 3/16" = 1'-0"



2 E3B1 ENLARGED COMM G07 - POWER

SCALE: 3/8" = 1'-0"

Rev	Date	Issue
1	6/3/2025	ADDENDUM 05

TFWB ENGINEERS
Travis Fitzmaurice Wartelle Balangue Engineers Inc.
1200 Westlake Ave. N., #509
Seattle, WA 98109
p: 206.285.7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

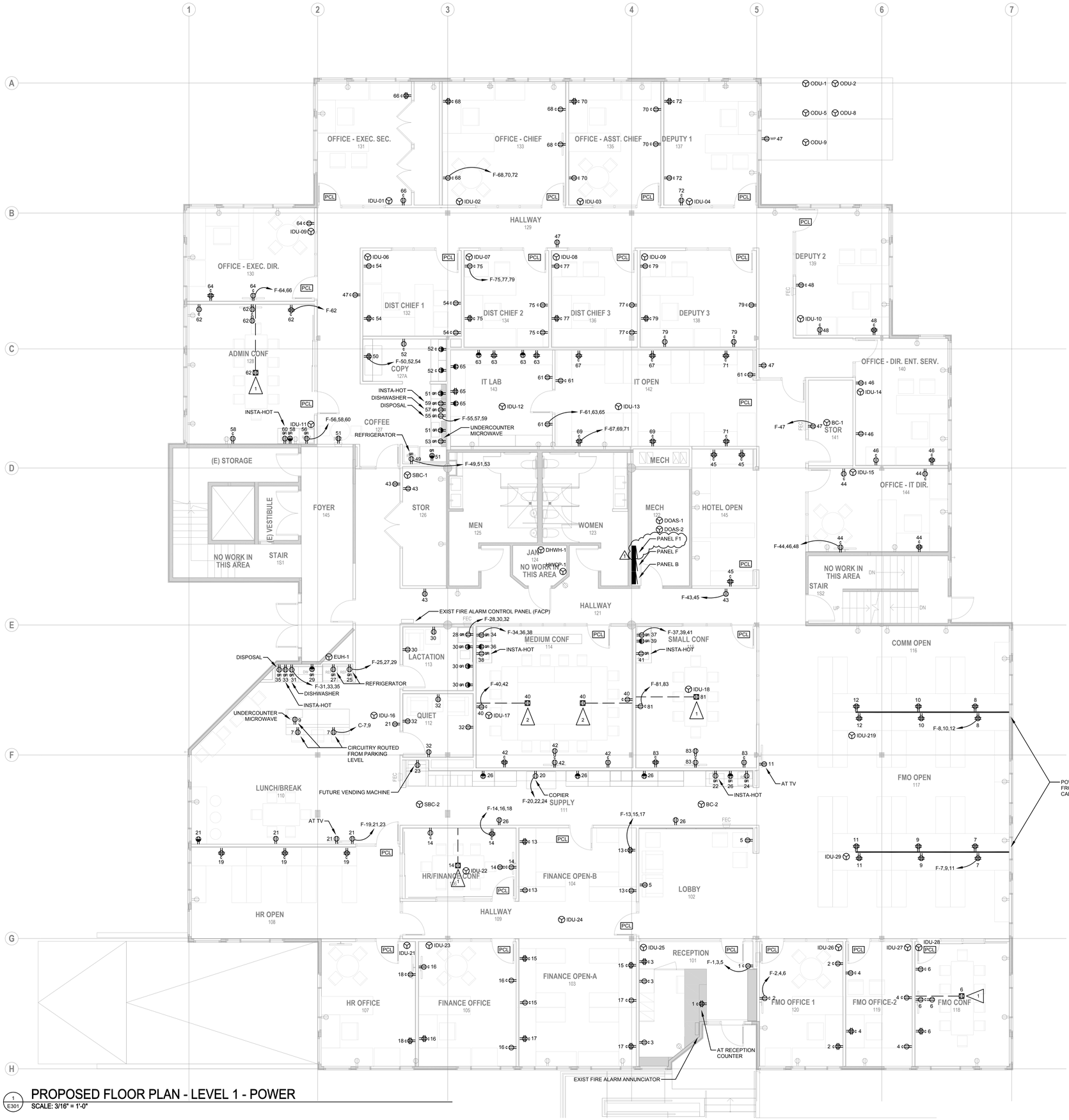
5/2/25
Issue Date

PROPOSED FLOOR PLAN - GARAGE - POWER
Sheet Title

E3B1

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com

Template version: WAU-AC27-MAIN Release date: 03/20/2024 Server Path: //Volumes/FileServer/Office/Projects/Resources/Standards/Design/01-Archicad 27 Resources/01-AC27 Templates/WAU-AC27-MAIN.tpl
O:\CAD\South King Fire Admin Bldg 71 24-078\E3B1.dwg
2/2/2025 2:03 PM



SHEET NOTES:

1. CONTRACTOR SHALL CONFIRM EXISTING RECEPTACLES TO REMAIN ARE OPERATIONAL PRIOR TO BEGINNING WORK.

FLAG NOTES:

1. THREAD UNDERCARPET CIRCUITRY SYSTEM. NEMA MONUMENT STANDARD RECEPTACLE.
2. THREAD UNDERCARPET CIRCUITRY SYSTEM. LOW PROFILE PROPRIETARY RECEPTACLE.

1 E301 PROPOSED FLOOR PLAN - LEVEL 1 - POWER
SCALE: 3/16" = 1'-0"

Rev	Date	Issue
1	6/3/2025	ADDENDUM 05

Travis Fitzmaurice Wartelle Balangue Engineers Inc.
5335 Meridian Ave. N., #326
Seattle, WA 98103
p: 206-285-7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

5/2/25
Issue Date

PROPOSED FLOOR PLAN - LEVEL 1 - POWER
Sheet Title

E301

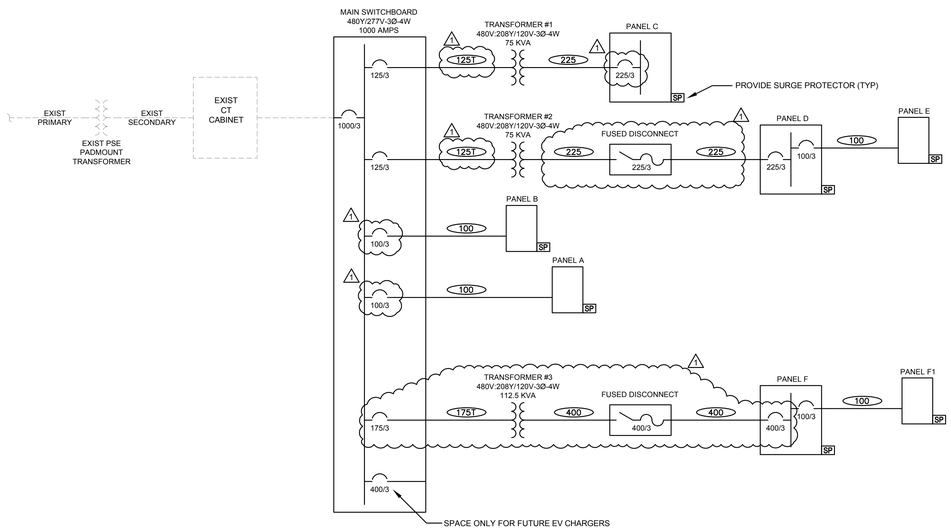
WEINSTEIN A+U
206.443.8606
WeinsteinAU.com

Server Path: //Volumes/FileServer/Office/Projects/Revisources/5-Design/01-Archicad 27/ Revisources/01-AC27 Templates/WAU-AC27-MAIN.tpl
Template version: WAU-AC27-MAIN Release date: 03/20/2024
O:\ADS\South King Fire Admin Bldg 71- 24-079\E301.dwg
2/3/2025 2:33 PM

Template version: MAU-AC27-MAIN Release date: 03/20/2024 Server Path: \\Volumes\FileServer\Office\Projects\Resources\5 Design\01 Archicad 27 Resources\01-AC27 Templates\MAU-AC27-MAIN.tpl
O:\CAD\South King Fire Admin Bldg 71 24-079\E500.dwg
2/2/2025 2:03 PM

FEEDER SIZE CHART

	COPPER – THWN EMT/ PVC	WIRES	GND	ALUMINUM – XHHW–COMPACT EMT/ PVC	WIRES	GND
100	1.25	–#2	–#6	2	–#1/0	–#6
125	1.5	–#1	–#4	2	–#2/0	–#2
125T	1.5	–#1	–#6	2	–#2/0	–#4
175T	2	–#2/0	–#6	2.5	–#4/0	–#4
225	2.5	–#4/0	–#6	3	–#300	–#1/0
400	(2)	–#3/0	–#2/0	(2) 2.5	–#250	–#4/0



1 E500 ONE LINE DIAGRAM
SCALE: NTS

Rev	Date	Issue
1	6/3/2025	ADDENDUM 05

TFWB ENGINEERS
Travis Fitzmaurice Wartelle Balangue Engineers Inc.
1100 Westlake Ave. N., #509
Seattle, WA 98109
p: 206-285-7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

5/2/25
Issue Date

ONE LINE DIAGRAM
Sheet Title

E500

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com

Template version: WAU-AC27.MAIN Release date: 03/20/2024 Server Path: X:\Volumes\FileServer\Office\Project\Resources\e'S Design\01-Archicad 27 Resources\01-AC27 Templates\WAU-AC27.MAIN.tpl
O:\CAD\South King Fire Admin Bldg\11 24-079\E600.dwg
2/2/2025 2:03 PM

LIGHTING FIXTURE SCHEDULE

TYPE	LAMPS	MANUFACTURER	DESCRIPTION
B	LED 12.5W 3000K	SISTEMALUX MINI LOOK	8.5" ALUMINUM BOLLARD. PROVIDE CONCRETE BASE FOR MOUNTING. UL LISTED FOR WET LOCATIONS.
GL-1	LED 7W 3500K	B-K LIGHTING DELTA STAR LED	ROTATABLE GROUND MOUNTED FLOOD LIGHT. POWER PIPE MOUNTED WITH KNUCKLE. MEDIUM FLOOD DISTRIBUTION. TYPE TR SERIES REMOTE MOUNTED, TRANSFORMER. DIMMABLE.
PL-1	LED	FINELITE	AIRCRAFT CABLE HUNG 2" WIDE X 4' LONG LINEAR DIRECT. SUSPEND FLUSH WITH WOOD SLAT CEILING OPENING.
2 PL-1E			SAME AS PL-1 EXCEPT WITH INTEGRAL BATTERY BALLAST FOR EGRESS LIGHTING.
PL-2	LED	FINELITE	AIRCRAFT CABLE HUNG 2" WIDE X 2' LONG LINEAR DIRECT. SUSPEND FLUSH WITH WOOD SLAT CEILING OPENING.
PL-3	LED 13W 3500K	BETA CALCO EXY MIDNIGHT BLUE	DECORATIVE CABLE HUNG PENDANT. SMALL 6.3" DIAMETER.
PL-4	LED 26W 3500K	BETA CALCO EXY RED	DECORATIVE CABLE HUNG PENDANT. LARGE 15" DIAMETER. MOUNTING ACCESSORIES FOR SLOPED CEILING.
RL-1	LED 18.4W 3500K	PINNACLE EV4D	RECESSED 4" X 6' LED FIXTURE WITH LENS. COMPATIBLE WITH ARMSTRONG TECH ZONE CEILING SYSTEM. PROVIDE REQUIRED RECESSED MOUNTING TRIMS. 0-10V DIMMING DRIVER. SHALLOW DEPTH.
RL-2	LED 18.4W 3500K	PINNACLE EV4D	SAME AS RL-1 EXCEPT MOUNT IN GWB CEILING.
RL-3	LED 18.4W 3500K	PINNACLE EV4D	RECESSED 4" X 4' LED FIXTURE WITH LENS. COMPATIBLE WITH ARMSTRONG TECH ZONE CEILING SYSTEM. PROVIDE REQUIRED RECESSED MOUNTING TRIMS. 0-10V DIMMING DRIVER. SHALLOW DEPTH.
2 RL-3E			SAME AS RL-3 EXCEPT WITH INTEGRAL BATTERY BACKUP FOR EGRESS LIGHTING.
RL-4	LED 18.4W 3500K	PINNACLE EV4D	RECESSED 4" X 8' LED FIXTURE WITH LENS. COMPATIBLE WITH ARMSTRONG TECH ZONE CEILING SYSTEM. PROVIDE REQUIRED RECESSED MOUNTING TRIMS. 0-10V DIMMING DRIVER. SHALLOW DEPTH.
RL-5	LED 11.8W 3500K	GOTHAM EVO SERIES	4 INCH ROUND RECESSED LED DOWNLIGHT WITH SPECULAR CLEAR ALZAK REFLECTOR. SHALLOW DEPTH.
2 RL-5E			SAME AS RL-5 EXCEPT INTEGRAL BATTERY BACKUP FOR EGRESS LIGHTING.
RL-6	LED 11.8W 3500K	GOTHAM EVO SERIES	SAME AS RL-5 EXCEPT WALL WASH DISTRIBUTION
RL-7	LED 11.8W 3500K	GOTHAM EVO SERIES	4 INCH ROUND RECESSED LED DOWNLIGHT WITH SPECULAR CLEAR ALZAK REFLECTOR. SHALLOW DEPTH. UL LISTED FOR WET LOCATIONS.
RL-8	LED 18.4W 3500K	PINNACLE EV4D	RECESSED 4" X 3' LED FIXTURE WITH LENS. COMPATIBLE WITH ARMSTRONG TECH ZONE CEILING SYSTEM. PROVIDE REQUIRED RECESSED MOUNTING TRIMS. 0-10V DIMMING DRIVER. SHALLOW DEPTH.
RL-9	LED 11.8W 3500K	GOTHAM EVO SERIES	4 INCH ROUND RECESSED LED DOWNLIGHT WITH SHOWER RATED TRIM. SHALLOW DEPTH.
SL-1	LED 22W 3500K	LITHONIA BLWP	SURFACE MOUNTED WRAPAROUND
2 SL-1E			SAME AS SL-1 EXCEPT INTEGRAL BATTERY BACKUP FOR EGRESS LIGHTING.
WL	LED	RELYTE 409 I	UNDERCOUNTER LINEAR STRIP. PROVIDE SWITCH AND OCCUPANCY SENSOR AT FIXTURE.
WL-1	LED 18W 3500K	WAC LIGHTING BRINK BATHROOM SCONCE	36" WIDE VANITY FIXTURE
WL-2	LED 5W/FT 3000K	PURE EDGE LIGHTING FN LRT7	FLEXIBLE LED STRIP WITH 3 SIDED LENS AND UNIFORM ILLUMINATION. CONTINUOUS ROW. SURFACE MOUNTED. PROVIDE WITH REMOTE POWER SUPPLY. UL LISTED FOR WET LOCATIONS.
WL-3	LED 18W 3500K	LUMINII KLW	KENDO L SURFACE WET LINEAR ILLUMINATION SYSTEM WITH ADJUSTABLE HINGED BRACKET. 4' LONG. STATIC WHITE. UL LISTED FOR WET LOCATIONS.
X	LED 1W	PHILIPS 45V SERIES BEGHELLI OL2 SERIES EMERGILITE WLSNX SERIES	CEILING/WALL MOUNT EDGE LIT LED EXIT SIGN WITH BATTERIES, SELF DIAGNOSTICS AND ALL MOUNTING ACCESSORIES REQUIRED. PROVIDE ARROWS AND FACES AS SHOWN ON DRAWINGS. PROVIDE WHITE BODY WITH GREEN LETTERS AND UNIFORM LENS OVER LED.

ALL COLORS, FINISHES, ETC. ARE BY ARCHITECT FROM MANUFACTURER'S STANDARD COLOR OPTIONS

Rev	Date	Issue
2	6/3/2025	ADDENDUM 05
1	5/9/2025	ADDENDUM 01

TFWB ENGINEERS
Travis Fitzmaurice Wartelle Balangue Engineers Inc.
1200 Westlake Ave. N. #309
Seattle, WA 98109
p: 206.285.7228 | info@tfwb.com

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

5/2/25
Issue Date

LIGHTING FIXTURE SCHEDULE

Sheet Title

E600

206.443.8606 WeinsteinAU.com
WEINSTEIN A+U

MAIN SWITCHBOARD
LOCATION ELEC G08
MOUNTING SURFACE
AIC 65,000
FED FROM UTILITY

VOLTS 480 /277 3 PHASE, 4 WIRE, WYE
AMPS 1000
MAIN CIRCUIT BREAKER
GROUND BUS
UL SERVICE LABEL
PROVIDE SURGE PROTECTOR

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	100/3	PANEL A	3.30	2	100/3	PANEL B	6.49
3	125/3	PANEL C	41.22	4	125/3	PANEL D	23.97
5	⚠ 175/3	PANEL F	79.51	6	225/3	SPACE ONLY	0.00
7	400/3	SPACE ONLY-FUTURE EV	0.00	8	400/3	SPACE ONLY	0.00
9	100/3	SPACE ONLY	0.00	10	60/3	SURGE PROTECTOR	0.00

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	9.99	125%	12.49	15.02
RECEPTS 10 KVA	10.00	100%	10.00	12.03
RECEPTS >10 KVA	65.96	50%	32.98	39.67
HEATING	15.10	100%	15.10	18.16
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	24.74	100%	24.74	29.75
MISCELLANEOUS	6.10	100%	6.10	7.34
KITCH. APPLIANCES	22.60	65%	14.69	17.67
	154.49		116.09	139.64

PANEL A
LOCATION ELEC G08
MOUNTING SURFACE
AIC 35,000
FED FROM MAIN SWBD

VOLTS 480 /277 3 PHASE, 4 WIRE, WYE
⚠ AMPS 100
MAIN LUGS ONLY
GROUND BUS

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	20/1	EXTERIOR LIGHTS	0.50	2	20/1	LIGHTS	0.20
3	20/1	EXIST EXTERIOR POLE LTS	1.50	4	20/1	SPARE	0.00
5	20/1	EXIST EXTERIOR POLE LTS	1.60	6	20/1	SPARE	0.00
7	20/1	EXIST PARK GARAGE LTS	0.50	8	20/1	SPARE	0.00
9	20/1	EXIST PARK GARAGE LTS	0.50	10	20/1	SPARE	0.00
11	20/1	SPARE	0.00	12	20/1	SPARE	0.00
13	20/1	SPARE	0.00	14	20/1	SPARE	0.00
15	20/1	SPARE	0.00	16	20/1	SPARE	0.00
17	20/1	SPARE	0.00	18		SPACE	
19	20/1	SPARE	0.00	20		SPACE	
21		SPACE		22		SPACE	
23		SPACE		24		SPACE	
25		SPACE		26		SPACE	
27		SPACE		28		SPACE	
29		SPACE		30		SPACE	
31		SPACE		32		SPACE	
33		SPACE		34		SPACE	
35		SPACE		36		SPACE	
37		SPACE		38		SPACE	
39		SPACE		40		SPACE	
41		SPACE		42		SPACE	

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	3.30	125%	4.13	4.96
RECEPTACLES	0.00	100%	0.00	0.00
HEATING	0.00	100%	0.00	0.00
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	0.00	100%	0.00	0.00
MISCELLANEOUS	0.00	100%	0.00	0.00
KITCH. APPLIANCES	0.00	65%	0.00	0.00
	3.30		4.13	4.96

PANEL B
LOCATION MECH 122
MOUNTING SURFACE
AIC 22,000
FED FROM MAIN SWBD

VOLTS 480 /277 3 PHASE, 4 WIRE, WYE
AMPS 100
MAIN LUGS ONLY
GROUND BUS

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	20/1	LIGHTS	2.20	2	20/1	LIGHTS	0.92
3	20/1	LIGHTS	4.09	4	20/1	EXIST LIGHTS	0.80
5	20/1	RECEPTS	0.00	6	20/1	EXIST LIGHTS	0.68
7	20/1	SPARE	0.00	8	20/1	SPARE	0.00
9	20/1	SPARE	0.00	10	20/1	SPARE	0.00
11	20/1	SPARE	0.00	12	20/1	SPARE	0.00
13	20/1	SPARE	0.00	14	20/1	SPARE	0.00
15		SPACE ONLY		16	20/1	SPARE	0.00
17		SPACE ONLY		18	20/1	SPARE	0.00
19		SPACE ONLY		20		SPACE ONLY	
21		SPACE ONLY		22		SPACE ONLY	
23		SPACE ONLY		24		SPACE ONLY	
25		SPACE ONLY		26		SPACE ONLY	
27		SPACE ONLY		28		SPACE ONLY	
29		SPACE ONLY		30		SPACE ONLY	
31		SPACE ONLY		32		SPACE ONLY	
33		SPACE ONLY		34		SPACE ONLY	
35		SPACE ONLY		36		SPACE ONLY	
37		SPACE ONLY		38		SPACE ONLY	
39		SPACE ONLY		40		SPACE ONLY	
41		SPACE ONLY		42		SPACE ONLY	

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	6.49	125%	8.11	9.76
RECEPTACLES	0.00	100%	0.00	0.00
HEATING	0.00	100%	0.00	0.00
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	0.00	100%	0.00	0.00
MISCELLANEOUS	0.00	100%	0.00	0.00
KITCH. APPLIANCES	0.00	65%	0.00	0.00
	6.49		8.11	9.76

PANEL C
LOCATION ELEC G08
MOUNTING SURFACE
AIC 10,000
FED FROM MAIN SWBD

VOLTS 208 /120 3 PHASE, 4 WIRE, WYE
AMPS 225
⚠ MAIN BREAKER
GROUND BUS
PROVIDE SURGE PROTECTOR

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	20/1	SHORE POWER RECEPTS	0.72	2	20/1	FLAG POLE	0.20
3	20/1	SHORE POWER RECEPTS	0.54	4	30/1	READER BOARD	0.50
5	20/1	SHORE POWER RECEPTS	0.54	6	20/1	OVERHEAD DOOR	1.00
7	20/1	RECEPTS	0.36	8	20/1	FACP	1.00
9	20/1	MICROWAVE	1.00	10	15/2	EUH-1	2.00
11	50/3	ODU-1	9.79	12			
13				14	20/1	EXIST RECEPTS	0.72
15				16	20/1	EXIST RECEPTS	0.72
17	50/3	ODU-2	9.79	18	20/1	EXIST RECEPTS	0.72
19				20	20/1	EXIST RECEPTS	0.72
21				22	20/1	EXIST RECEPTS	0.72
23	20/1	EXIST RECEPTS	0.72	24	20/1	EXIST RECEPTS	0.36
25	20/1	EXIST RECEPTS	0.72	26	20/1	EXIST RECEPTS	0.54
27	20/1	EXIST RECEPTS	0.54	28	20/1	EXIST RECEPTS	0.72
29	20/1	EXIST RECEPTS	0.72	30	20/1	EXIST RECEPTS	1.08
31	20/1	EXIST RECEPTS	0.72	32	20/1	EXIST RECEPTS	0.90
33	20/1	RECEPTS	0.72	34	20/1	RECEPTS	0.36
35	20/1	RECEPTS	0.72	36	20/1	RECEPTS	0.36
37	20/1	ACCESS CONTROL PANEL	1.00	38	20/1	SPARE	0.00
39	20/1	SPACE ONLY	0.00	40	20/1	SPARE	0.00
41	20/1	SPACE ONLY		42	20/1	SPARE	0.00
43		SPACE ONLY	0.00	44		SPACE ONLY	
45		SPACE ONLY		46		SPACE ONLY	
47		SPACE ONLY		48		SPACE ONLY	
49		SPACE ONLY	0.00	50		SPACE ONLY	
51		SPACE ONLY		52		SPACE ONLY	
53		SPACE ONLY		54		SPACE ONLY	
55		SPACE ONLY	0.00	56		SPACE ONLY	
57		SPACE ONLY		58		SPACE ONLY	
59		SPACE ONLY		60		SPACE ONLY	
61		SPACE ONLY	0.00	62		SPACE ONLY	
63		SPACE ONLY		64		SPACE ONLY	
65		SPACE ONLY		66		SPACE ONLY	
67		SPACE ONLY	0.00	68		SPACE ONLY	
69		SPACE ONLY	0.00	70		SPACE ONLY	
71		SPACE ONLY	0.00	72		SPACE ONLY	
73		SPACE ONLY	0.00	74		SPACE ONLY	
75		SPACE ONLY	0.00	76		SPACE ONLY	
77		SPACE ONLY	0.00	78		SPACE ONLY	
79		SPACE ONLY		80	30/3	SURGE PROTECTOR	0.00
81		SPACE ONLY		82			
83		SPACE ONLY		84			

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	0.20	125%	0.25	0.69
RECEPTACLES	14.94	100%	14.94	41.47
HEATING	2.00	100%	2.00	5.55
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	19.58	100%	19.58	54.35
MISCELLANEOUS	3.50	100%	3.50	9.72
KITCH. APPLIANCES	1.00	65%	0.65	1.80
	41.22		40.92	113.58

PANEL D
LOCATION MECH 203
MOUNTING SURFACE
AIC 10,000
FED FROM MAIN SWBD

VOLTS 208 /120 3 PHASE, 4 WIRE, WYE
AMPS 225
MAIN BREAKER
GROUND BUS
PROVIDE SURGE PROTECTOR

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	20/1	RECEPTS	0.72	2	20/1	RECEPTS	0.72
3	20/1	MICROWAVE	1.00	4	20/1	RECEPTS	0.72
5	20/1	REFRIG	0.70	6	20/1	RECEPTS	0.72
7	20/1	INSTAHOT	1.00	8	20/1	BOTTLE FILLER	0.50
9	20/1	DISHWASHER	1.00	10	15/2	IDU-30	0.05
11	20/1	DISPOSAL	1.00	12			0.00
13	20/1	SPARE	0.00	14	20/1	SPARE	0.00
15	20/1	SPARE	0.00	16	20/1	SPARE	0.00
17	20/1	SPARE	0.00	18	20/1	SPARE	0.00
19	20/1	SPARE	0.00	20	20/1	SPARE	0.00
21	20/1	SPARE	0.00	22	20/1	SPARE	0.00
23		SPACE		24		SPACE	
25		SPACE		26		SPACE	
27		SPACE		28		SPACE	
29		SPACE		30		SPACE	
31		SPACE		32		SPACE	
33		SPACE		34		SPACE	
35		SPACE		36		SPACE	
37	100/3	PANEL E	15.84	38	30/3	SURGE PROTECTOR	0.00
39				40			
41				42			

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	0.00	125%	0.00	0.00
RECEPTACLES	18.72	100%	18.72	51.96
HEATING	0.00	100%	0.00	0.00
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	0.05	100%	0.05	0.14
MISCELLANEOUS	0.50	100%	0.50	1.39
KITCH. APPLIANCES	4.70	65%	3.06	8.48
	23.97		22.33	61.97

PANEL E
LOCATION MECH 203
MOUNTING SURFACE
AIC 10,000
FED FROM PANEL D

VOLTS 208 /120 3 PHASE, 4 WIRE, WYE
AMPS 100
MAIN LUGS ONLY
GROUND BUS
PROVIDE SURGE PROTECTOR

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	20/1	EXIST RECEPTS	0.54	2	20/1	EXIST RECEPTS	0.72
3	20/1	EXIST RECEPTS	0.72	4	20/1	EXIST RECEPTS	0.72
5	20/1	EXIST RECEPTS	1.08	6	20/1	EXIST RECEPTS	1.08
7	20/1	EXIST RECEPTS	1.08	8	20/1	EXIST RECEPTS	0.72
9	20/1	EXIST RECEPTS	0.90	10	20/1	EXIST RECEPTS	0.72
11	20/1	EXIST RECEPTS	0.36	12	20/1	EXIST RECEPTS	0.90
13	20/1	EXIST RECEPTS	0.72	14	20/1	EXIST RECEPTS	0.36
15	20/1	EXIST RECEPTS	0.72	16	20/1	EXIST RECEPTS	1.08
17	20/1	EXIST RECEPTS	0.72	18	20/1	EXIST RECEPTS	0.54
19	20/1	EXIST RECEPTS	0.72	20	20/1	EXIST RECEPTS	0.72
21	20/1	SPARE	0.00	22	20/1	EXIST RECEPTS	0.72
23	20/1	SPARE	0.00	24	20/1	SPARE	0.00
25	20/1	SPARE	0.00	26	20/1	SPARE	0.00
27	20/1	SPARE	0.00	28	20/1	SPARE	0.00
29	20/1	SPARE	0.00	30	20/1	SPARE	0.00
31		SPACE ONLY	0.00	32	20/1	SPARE	0.00
33		SPACE ONLY	0.00	34		SPACE ONLY	
35		SPACE ONLY	0.00	36		SPACE ONLY	
37		SPACE ONLY	0.00	38	30/3	SURGE PROTECTOR	0.00
39		SPACE ONLY	0.00	40			
41		SPACE ONLY	0.00	42			

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	0.00	125%	0.00	0.00
RECEPTACLES	15.84	100%	15.84	43.97
HEATING	0.00	100%	0.00	0.00
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	0.00	100%	0.00	0.00
MISCELLANEOUS	0.00	100%	0.00	0.00
KITCH. APPLIANCES	0.00	100%	0.00	0.00
	15.84		15.84	43.97

PANEL F
LOCATION MECH 122
MOUNTING SURFACE
AIC 10,000
FED FROM MAIN SWBD

VOLTS 208 /120 3 PHASE, 4 WIRE, WYE
⚠ AMPS 400
MAIN BREAKER
GROUND BUS
PROVIDE SURGE PROTECTOR

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	20/1	RECEPTS	0.54	2	20/1	RECEPTS	0.72
3	20/1	RECEPTS	0.72	4	20/1	RECEPTS	0.90
5	20/1	RECEPTS	0.36	6	20/1	RECEPTS	0.90
7	20/1	RECEPTS	0.72	8	20/1	RECEPTS	0.72
9	20/1	RECEPTS	0.72	10	20/1	RECEPTS	0.72
11	20/1	RECEPTS	0.90	12	20/1	RECEPTS	0.72
13	20/1	RECEPTS	1.08	14	20/1	RECEPTS	1.08
15	20/1	RECEPTS	0.90	16	20/1	RECEPTS	0.90
17	20/1	RECEPTS	0.90	18	20/1	RECEPTS	0.54
19	20/1	RECEPTS	1.08	20	20/1	COPIER	0.80
21	20/1	RECEPTS	0.90	22	20/1	INSTAHOT	1.00
23	20/1	VENDING MACHINE	0.50	24	20/1	REFRIG	0.70
25	20/1	REFRIG	0.70	26	20/1	RECEPTS	1.08
27	20/1	REFRIG	0.70	28	20/1	REFRIG	0.70
29	20/1	RECEPTS	0.18	30	20/1	RECEPTS	0.90
31	20/1	DISHWASHER	1.00	32	20/1	RECEPTS	0.72
33	20/1	INSTAHOT	1.00	34	20/1	REFRIG	0.70
35	20/1	DISPOSAL	1.00	36	20/1	RECEPTS	0.18
37	20/1	REFRIG	1.00	38	20/1	INSTAHOT	1.00
39	20/1	RECEPTS	0.18	40	20/1	RECEPTS	0.72
41	20/1	INSTAHOT	1.00	42	20/1	RECEPTS	0.72
43	20/1	RECEPTS	0.72	44	20/1	RECEPTS	1.08
45	20/1	RECEPTS	1.08	46	20/1	RECEPTS	0.90
47	20/1	RECEPTS	0.72	48	20/1	RECEPTS	0.54
49	20/1	REFRIG	0.70	50	20/1	RECEPTS	0.36
51	20/1	RECEPTS	0.72	52	20/1	RECEPTS	0.54
53	20/1	MICROWAVE	1.00	54	20/1	RECEPTS	0.90
55	20/1	DISPOSAL	1.00	56	20/1	REFRIG	0.70
57	20/1	DISHWASHER	1.00	58	20/1	RECEPTS	0.36
59	20/1	INSTAHOT	1.00	60	20/1	INSTAHOT	1.00
61	20/1	RECEPTS	0.72	62	20/1	RECEPTS	1.08
63	20/1	RECEPTS	1.08	64	20/1	RECEPTS	0.72
65	20/1	RECEPTS	0.72	66	20/1	RECEPTS	0.54
67	20/1	RECEPTS	0.72	68	20/1	RECEPTS	0.90
69	20/1	RECEPTS	0.72	70	20/1	RECEPTS	0.90
71	20/1	RECEPTS	0.72	72	20/1	RECEPTS	0.72
73	20/1	SPARE	0.00	74	100/3	PANEL F1	19.01
75	20/1	RECEPTS	0.90	76			
77	20/1	RECEPTS	0.90	78			
79	20/1	RECEPTS	1.08	80	30/3	SURGE PROTECTOR	
81	20/1	RECEPTS	0.36	82			
83	20/1	RECEPTS	0.90	84			

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	0.00	125%	0.00	0.00
RECEPTACLES	42.30	100%	42.30	117.41
HEATING	13.10	100%	13.10	36.36
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	5.11	100%	5.11	14.17
MISCELLANEOUS	2.10	100%	2.10	5.83
KITCH. APPLIANCES	16.90	100%	16.90	46.91
	79.51		79.51	220.68

PANEL F1
LOCATION MECH 122
MOUNTING SURFACE
AIC 10,000
FED FROM PANEL F

VOLTS 208 /120 3 PHASE, 4 WIRE, WYE
AMPS 100
MAIN LUGS ONLY
GROUND BUS

CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA	CCT NO.	CCT BRKR	DESCRIPTION	LOAD KVA
1	15/2	BC-1	0.20	2	15/2	BC-2	0.20
3				4			
5	15/2	SBC-1	0.20	6	15/2	SBC-2	0.20
7				8			
9	15/2	DOAS-1	0.85	10	15/2	DOAS-2	0.85
11				12			
13	15/2	DOAS-3	0.24	14	15/2	IDU'S	0.50
15				16			
17	15/2	IDU'S	0.50	18	15/2	IDU'S	0.45
19				20			
21	20/1	HWCP-1	0.86	22	20/1	SPARE	0.00
23	20/1	CP-1	0.86	24	20/1	SPARE	0.00
25	50/2	DHWH-1	9.00	26	20/1	SPARE	0.00
27				28	20/1	SPARE	0.00
29	25/2	DHWH-2	4.10	30	20/1	SPARE	0.00
31				32		SPACE ONLY	
33	20/1	SPARE	0.00	34		SPACE ONLY	
35	20/1	SPARE	0.00	36		SPACE ONLY	
37	20/1	SPARE	0.00	38		SPACE ONLY	
39	20/1	SPARE	0.00	40		SPACE ONLY	
41	20/1	SPARE	0.00	42		SPACE ONLY	

CONNECTED LOAD KVA		DEMAND FACTOR	DEMAND LOAD KVA	AMPS
LIGHTS	0.00	125%	0.00	0.00
RECEPTACLES	0.00	100%	0.00	0.00
HEATING	13.10	100%	13.10	36.36
LARGEST MOTOR	0.00	125%	0.00	0.00
OTHER MOTORS	5.11	100%	5.11	14.17
MISCELLANEOUS	0.80	100%	0.80	2.22
KITCH. APPLIANCES	0.00	100%	0.00	0.00
	19.01		19.01	52.75

Rev	Date	Issue
2	6/3/2025	ADDENDUM 05

TFWB ENGINEERS, LLC
Travis Fitzmaurice Wartelle Ballangrue Engineers Inc.
1325 Westlake Ave. N., #220
Seattle, WA 98109
p: 206.285.7228 | info@tfwb.net

SOUTH KING FIRE ADMINISTRATIVE BUILDING IMPROVEMENTS

720 S 333rd Street
Federal Way, WA 98003

24022
Project #

Weinstein A+U
2200 Western Avenue, Suite 301
Seattle, WA 98121
206.443.8606
www.weinsteinau.com

© 2025 Weinstein A+U - These documents have been prepared specifically for the above named project. They are not suitable for use on other projects or in other locations without the approval and participation of the Architect.

JURISDICTIONAL APPROVAL STAMP

BID SET
Issue

5/2/25
Issue Date

PANEL SCHEDULES

Sheet Title

E701

WEINSTEIN A+U
206.443.8606 WeinsteinAU.com

Server Path: N:\Business\FileServer\Office\Project\Resources\5 Design\01-Architect\27 Resources\01-AC27 Templates\WAU-AC27 MAIN.rpt
Template version: WAU-AC27 MAIN Release date: 03/20/2024
D:\ACPublish King Fire Admin Bldg 71_24-016790.dwg
2/5/2025 2:03 PM

SECTION 102819 - SHOWER ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shower bas and shower doors.

B. Related Requirements:

1. Section 102800 “Toilet, Bath, and Laundry Accessories” for grab bars and bath accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.

C. Samples for Verification:

1. Sample of shower base material.
2. Shower doors.

a. Glass and glazing; 12 inches square.
b. Trim; 12-inch lengths.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For shower bases, shower doors and hardware include in maintenance manuals.

1.5 FIELD CONDITIONS

A. Verify dimensions by field measurements before fabrication and indicate on Shop Drawings.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period without monetary limitation.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection.
b. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHOWER BASE

A. Description: ANSI B compliant transfer type shower base with reinforcing bottom plate, slip-resistant floor, and return flange.

B. Products: Subject to compliance with requirements, provide the following:

1. Everfab; SP3937RFB.

C. Standard: IAPMO Z124.1.2/ANSI Z124.1.2.

D. Material: Gel coated fiberglass.

1. Color: White.

E. Size: 39-1/2 inches wide by 37-1/4 inches deep by 5 inches high.

F. Accessories: Stainless steel 24 inch grab bar and drain.

2.2 SHOWER DOORS

A. Semi frameless glass panels with perimeter frames of extruded aluminum with screw-fastened corners. Minimum 3/8-inch penetration of glass into frame. Framing members of thickness required to support imposed loads.

1. Products: Subject to compliance with requirements, provide the following:

a. Agalite Shower & Bath Enclosures; Accent Collection.

B. Frames, Hardware, and Trim: Manufacturer's standard units as indicated and as required for a complete installation.

1. Materials: Aluminum; ASTM B221.
2. Finish: Matte black.

C. Swinging Doors: Top-and-bottom pivot hinges. Manufacturer's standard pulls and latch. Water diverter at bottom.

D. Glazing: Safety glazing materials complying with 16 CFR 1201, Category II, with permanently etched identification acceptable to authorities having jurisdiction.

1. Glass Nominal Thickness: 1/4 inches (6mm).
2. Clear Glass: ASTM C1048, Type I, Quality-Q3, Class I (clear), Kind FT (fully tempered),

E. Fasteners: Manufacturer's standard stainless steel or other noncorrosive fasteners.

F. Sealant: Mildew-resistant, single-component, nonsag, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, for Use NT.

1. Sealant shall have a VOC content of 250 g/L or less.

G. Options: 6 inch by 24 inch mitered D-pull with integral towel bar on opposing side.

1. Refer to Drawings for configuaration.

PART 3 - EXECUTION

3.1 SHOWER BASE INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Ensure that there is adequate blocking for installation of grab bars and accessories.

3.2 SHOWER DOOR INSTALLATION

A. Prepare and install as recommended in manufacturer's written instructions unless more stringent requirements are contained in GANA's "Glazing Manual."

B. Clean substrates, removing projections, filling voids, and sealing joints.

C. Set units level, plumb, and true to line, without warp or rack of frames and panels, and anchor securely in place.

D. Fasten components securely in place, with provisions for thermal movement. Install with concealed fasteners unless otherwise indicated.

E. Install components to drain and return water to shower.

F. Install doors to produce smooth operation and tight fit at contact points.

G. Repair, refinish, or replace components damaged during installation.

3.3 ADJUSTING AND CLEANING

A. Adjust operating parts and hardware for smooth, quiet operation and watertight closure. Lubricate hardware and moving parts.

B. Remove nonpermanent labels, and clean surfaces immediately after installation.

END OF SECTION 102819

SECTION 23 09 00 - CONTROLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Scope: Furnish all labor, materials, and equipment necessary for a complete and operating Building Management System (BMS) utilizing Direct Digital Controls as shown on the drawings and as described herein. Drawings are diagrammatic only. All controllers furnished in this section shall communicate on a peer-to-peer bus over a single BACnet open protocol bus.
   1. The intent of this specification is to provide a system that is consistent with the BMS systems installed under BACnet protocols.
   2. The system will control all heating, cooling, and ventilation systems described in the drawings and noted in the specifications below.
   3. System architecture shall fully support a multi-vendor environment and be able to integrate third party systems via existing vendor protocols including, as a minimum, BACnet, and Modbus.
   4. System architecture shall provide secure web access using current released versions of Firefox, Microsoft Edge and Chrome browser from any computer on the owner's LAN.
   5. All control devices furnished with this Section shall be programmable directly from the Niagara N4 Workbench upon completion of this project. The use of configurable or programmable controllers that require additional software tools for post-installation maintenance shall not be acceptable.
   6. Any control vendor that must provide additional BMS server software shall be unacceptable. Only systems that utilize the Niagara N4 Framework shall satisfy the requirements of this section.
   7. The BMS server shall host all graphic files for the control system. All graphics and navigation schemes for this project shall be submitted for approval and reviewed with the Owner prior to implementation.
   8. Engineering/Programming software to modify Operating System Server BMS programs and graphics shall be provided and installed on campus-standard laptops.
   9. Controls contractors shall coordinate with Network Services to configure the JACE and BMS laptop security settings to meet Network Services requirements prior to being connected to the campus IT network.
   10. Remote access to the BMS via the Internet shall only be allowed if it can be properly secured with encryption, logging and authentication.
   11. Initial installation shall be left standalone at the building level throughout warranty period. Integration into the existing network will occur at the end of the warranty period.
   12. All certificates and passwords shall be turned over to the Owner. No portion of the final installation shall be left "locked" after turn over.

1.3 SUBMITTALS

A. Product Data: Provide the number of copies required by the General Conditions of this contract. Should the General Conditions not define the number of copies, include at least 5 copies. Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
   1. Each control device labeled with setting or adjustable range of control.
   2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, and method of field assembly, components, and location and size of each field connection.

3. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
4. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
5. Details of control panel faces, including controls, instruments, and labeling.
6. Written description of sequence of operation.
7. Schedule of dampers including size, leakage, and flow characteristics.
8. Schedule of valves including close-off and flow characteristics.
9. Trunk cable schematic showing programmable control unit locations and trunk data conductors.
10. Listing of connected data points, including connected control unit and input device.
11. System graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations.
12. System configuration showing peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
13. Samples: For each color required, of each type of thermostat cover.
14. Software and Firmware Operational Documentation: Include the following:

B. Engineering, Installation, Operation and Maintenance manuals.

C. Program Software Backup: On a magnetic media or compact disc, complete with data files.
1. Device address list.
2. Printout of software application and graphic screens.
3. Licenses, guarantee, and warranty documents for all equipment and systems.

D. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

E. Maintenance Data: For systems to include in maintenance manuals specified in Division 1. Include the following:
1. Maintenance instructions and lists of spare parts for each type of control device and compressed air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.
6. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
7. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors. Revise Shop Drawings to reflect actual installation and operating sequences.

1.4 QUALITY ASSURANCE

A. All bidders must be Systems Integrators and specialty control contractors in the business of installing direct digital temperature controls.

B. All bidders shall be factory owned branch office or factory authorized, independent installing contractor or Certified Systems Integrator of the manufacturers specified.

C. The system manufacturer shall, as a minimum, manufacture and supply the Custom Application Controller, Application Specific Controller, Equipment Direct Digital Controller, Unitary Equipment Controller, Advanced Application Controller, Graphical User Interface, damper actuators, and valve actuator assemblies.

D. All work described in this section shall be installed, wired, circuit tested and calibrated by factory certified technicians qualified for this work and in the regular employment of the temperature control system manufacturer's local field office.

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
F. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilation Systems."
G. All the work of this contract shall conform to the General and Supplementary Conditions Provisions under Division 1 of the Specifications.
H. This contract shall conform to the Specifications Section 23 05 00 Common Work HVAC.
   1. Smoke Detectors (through alarm relay contacts).
I. Power and Wiring Work Required Under Division 16 Related to This Section:
   1. This contract is responsible to arrange and pay for all power and for all power wiring to and for control components and all line and low voltage interconnections. This contract shall arrange coordinate installation of power for all control components, as it is not known in advance of the bid the power requirements for all various system elements. Include the scope in the bid for this contract of the following:
   2. Power wiring to line side of motor starters, disconnects or variable frequency drives.
   3. Provision and wiring of smoke detectors and other devices relating to fire alarm system.
   4. Campus LAN (Ethernet) connection adjacent to JACE network management controller.

1.5 AGENCY AND CODE APPROVALS

A. All products of the BMS shall be provided with the following agency approvals. Verification that the approvals exist for all submitted products shall be provided on request, with the submittal package. Systems or products not currently offering the following approvals are not acceptable.
   1. Federal Communications Commission (FCC), Rules and Regulations, Volume II -July 1986 Part 15 Class A Radio Frequency Devices
   2. FCC, Part 15, Subpart J, Class A Computing Devices
   3. UL 504 - Industrial Control Equipment
   4. UL 506 - Specialty Transformers
   5. UL 910 - Test Method for Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air-Handling Spaces
   6. UL 916 - Energy Management Systems All
   7. UL 1449 – Transient Voltage Suppression
   8. Standard Test for Flame Propagation Height of Electrical and Optical - Fiber Cables Installed Vertically in Shafts
   9. EIA/ANSI 232-E - Interface Between Data Technical Equipment and Data Circuit Terminal Equipment Employing Serial Binary Data Interchange
   10. EIA 455 - Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Connecting and Terminating Devices
   11. IEEE C62.41- Surge Voltages in Low-Voltage AC Power Circuits
   12. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems
   13. 13. NEMA 250 - Enclosures for Electrical Equipment
   14. NEMA ICS 1 - Industrial Controls and Systems
   15. NEMA ST 1 - Specialty Transformers
   16. NCSBC Compliance, Energy: Performance of control system shall meet or surpass the requirements of ASHRAE/IESNA 90.1-1999.

1.6 RELATED WORK SPECIFIED ELSEWHERE

A. Products Supplied and coordinated to be installed by others.:
   1. Wells, sockets and other inline hardware for water sensors (temperature, pressure, flow).
   2. Automatic control dampers, where not supplied with equipment.
   3. Airflow measuring stations.

B. Products Installed But Not Supplied Under This Section:
   1. None.
C. Products Not Furnished or Installed But Integrated with the Work of This Section:
   1. VRF Control System Controls and Monitoring.
   2. DOAS Controls and Monitoring.
   3. DHWH-1 Controls and Monitoring.
   4. In-line Meters (gas, water, power).

1.7 SOFTWARE OWNERSHIP

A. The Owner shall have full ownership and full access rights for all network management, operating system server, engineering and programming software required for the ongoing maintenance and operation of the BMS.

1.8 DELIVERY, STORAGE AND HANDLING

A. Maintain integrity of shipping cartons for each piece of equipment and control device through shipping, storage, and handling as required to prevent equipment damage. Store equipment and materials inside and protected from weather.

1.9 JOB CONDITIONS

A. Cooperation with Other Trades: Coordinate the Work of this section with that of other sections to insure that the Work will be carried out in an orderly fashion. It shall be this Contractor's responsibility to check the Contract Documents for possible conflicts between his Work and that of other crafts in equipment location, pipe, duct and conduit runs, electrical outlets and fixtures, air diffusers, and structural and architectural features.

1.10 QUALITY ASSURANCE

A. The manufacturer of the BMS digital controllers shall, if requested, provide documentation supporting compliance with ISO-9001 (Model for Quality Assurance in Design/Development, Production, Installation and Servicing).
B. The Control System Contractor shall have a full service DDC office within 50 miles of the job site. This office shall be staffed with applications engineers, software engineers and field technicians. This office shall maintain parts inventory and shall have all testing and diagnostic equipment necessary to support this Work, as well as staff trained in the use of this equipment.
C. Single Source Responsibility of Supplier: The Control System Contractor shall be responsible for the complete installation and proper operation of the control system. The Control System Contractor shall exclusively be in the regular and customary business of design, installation and service of computerized building management systems similar in size and complexity to the system specified. The Control System Contractor shall be the manufacturer of the primary DDC system components or shall have been the authorized representative for the primary DDC components manufacturer for at least 5 years. All control panels shall be assembled by the Control System Contractor in a UL-Certified 508A panel shop.
D. Equipment and Materials: Equipment and materials shall be cataloged products of manufacturers regularly engaged in the production and installation of HVAC control systems. Products shall be manufacturer's latest standard design and have been tested and proven in actual use.

1.11 SPECIFICATION NOMENCLATURE - ACRONYMS USED IN THIS SPECIFICATION ARE AS FOLLOWS:

Actuator:	Control device that opens or closes valve or damper in response to control signal.
AI	Analog Input

AO	Analog Output
Analog	Continuously variable state over stated range of values
BMS	Building Management System
DDC	Direct Digital Control
Discrete	Binary or digital state
DI	Discrete Input
DO	Discrete Output
FC	Fail Closed position of control device or actuator. Device moves to closed position on loss of control signal or energy source.
FO	Fail open (position of control device or actuator). Device moves to open position on loss of control signal or energy source.
GUI	Graphical User Interface
HVAC	Heating, Ventilating and Air Conditioning
IDC	Interoperable Digital Controller
ILC	Interoperable Lon Controller
LAN	Local Area Network
Modulating	Movement of a control device through an entire range of values, proportional to an infinitely variable input value.
Motorized	Control device with actuator
NAC	Network Area Controller
NC	Normally closed position of switch after control signal is removed or normally closed position of manually operated valves or dampers.
NO	Normally open position of switch after control signal is removed; or the open position of a controlled valve or damper after the control signal is removed; or the usual position of a manually operated valve.
OSS	Operating System Server, host for system graphics, alarms, trends, etc.
Operator	Same as actuator
PC	Personal Computer
Peer-to-Peer	Mode of communication between controllers in which each device connected to network has equal status and each shares its database values with all other devices connected to network
P	Proportional control; control mode with continuous linear relationship between observed input signal and final controlled output element.
PI	Proportional-Integral control, control mode with continuous proportional output plus additional change in output based on both amount and duration of change in controller variable (reset control).
PICS	BACnet Product Interoperability Compliance Statement
PID	Proportional-Integral-Derivative control, control mode with continuous correction of final controller output element versus input signal based on proportional error, its time history (reset) and rate at which it's changing (derivative).
Point	Analog or discrete instrument with addressable database value
WAN	Wide Area Network

PART 2 MATERIALS

2.1 GENERAL

A. The Building Management System (BMS) shall be comprised of a network of interoperable, stand-alone digital controllers, a network area controller, graphics and programming, and other control devices for a complete system as specified herein.

B. The installed system shall provide secure password access to all features, functions and data contained in the overall BMS.

2.2 OPEN, INTEROPERABLE, INTEGRATED ARCHITECTURE

A. The intent of this specification is to provide a peer-to-peer networked, stand-alone, distributed control system utilizing the BACnet ~~or Niagara N4 technology~~ communication protocol in one open, interoperable system.
B. The supplied computer software shall employ object-oriented technology (OOT) for representation of all data and control devices within the system. Physical connection of any BACnet control equipment, such as chillers, shall be via Ethernet.
C. All components and controllers supplied under this contract shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.
D. All components and controllers supplied under this contract shall be true “peer-to-peer” communicating devices. Components or controllers requiring “polling” by a host to pass data shall not be acceptable.
E. The supplied system must incorporate the ability to access all data using HTML5 enabled browsers without requiring proprietary operator interface and configuration programs. An Open Database Connectivity (ODBC) or Structured Query Language (SQL) compliant server database is required for all system database parameter storage. This data shall reside on the existing Operating System Server currently located in the Facilities Office on the LAN. Systems requiring proprietary database and user interface programs shall not be acceptable.
F. A hierarchical topology is required to assure reasonable system response times and to manage the flow and sharing of data without unduly burdening the customer’s internal Intranet network. Systems employing a “flat” single tiered architecture shall not be acceptable.
    1. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 5 seconds for network connected user interfaces.
    2. Maximum acceptable response time from any alarm occurrence (at the point of origin) to the point of annunciation shall not exceed 60 seconds for remote or dial-up connected user interfaces.

2.3 SYSTEM NETWORK CONTROLLER (SNC)

A. These controllers are designed to manage communications between the programmable equipment controllers (PEC), application specific controllers (ASC), and advanced unitary controllers (AUC) which are connected to its communications trunks, manage communications between itself and other system network controllers (SNC) and with any operator workstations (OWS) that are part of the BAS, and perform control and operating strategies for the system based on information from any controller connected to the BAS.
B. The controllers must be fully programmable to meet the unique requirements of the facility it must control.
C. The controllers must be capable of peer-to-peer communications with other SNC’s and with any OWS connected to the BAS, whether the OWS is directly connected, connected via the Internet.
D. The communication protocols utilized for peer-to-peer communications between SNC’s will be Niagara N4 FoxS, BACnet TCP/IP and SNMP. Use of a proprietary communication protocol for peer-to-peer communications between SNC’s is not allowed.
E. The SNC shall be capable of executing application control programs to provide:
    1. Calendar functions
    2. Scheduling
    3. Trending
    4. Alarm monitoring and routing
    5. Time synchronization
    6. Integration of BACnet, and ModBus controller data
    7. Network management functions for all SNC, PEC and ASC based devices
F. The SNC must provide the following hardware features as a minimum:
    1. One Ethernet Port-10/100 Mdps

2. One RS-232/485 port
3. One BACnet Interface Port
4. Battery Backup
5. Flash memory for long term data backup (If battery backup or flash memory is not supplied, the controller must contain a hard disk with at least 1 gigabyte storage capacity)

G. The SNC shall support standard Web browser access via the Intranet/Internet. It shall support a minimum of 16 simultaneous users.

H. The SNC shall provide alarm recognition, storage, routing, management and analysis to supplement distributed capabilities of equipment or application specific controllers.

I. The SNC shall be able to route any alarm condition to any defined user location whether connected to a local network or remote via dial-up, telephone connection, or wide-area network.
   1. Alarm generation shall be selectable for annunciation type and acknowledgement requirements including but not limited to:
      a. Alarm,
      b. Return to normal,
      c. To default.
   2. Alarms shall be annunciated in any of the following manners as defined by the user:
      a. Screen message text,
      b. Email of complete alarm message to multiple recipients.
      c. Pagers via paging services that initiate a page on receipt of email message.
      d. Graphics with flashing alarm object(s).
   3. The following shall be recorded by the SNC for each alarm (at a minimum):
      a. Time and date
      b. Equipment (air handler #, accessway, etc.)
      c. Acknowledge time, date, and user who issued acknowledgement.

J. Programming software and all controller “Setup Wizards” shall be embedded into the SNC.

2.4 PROGRAMMABLE EQUIPMENT CONTROLLER (PEC)

A. HVAC control shall be accomplished using BACnet™ based devices where the application has a BACnet profile defined.

B. For each Bacnet device that does not have Bacnet certification, the device supplier must provide an XIF file for the device. The controller platform shall provide options and advanced system functions, programmable and configurable using Niagara N4 Framework™, that allow standard and customizable control solutions required in executing the “Sequence of Operation”.

C. All PECs shall be application programmable and shall at all times maintain their Bacnet certification. All control sequences within or programmed into the ILC shall be stored in non-volatile memory, which is not dependent upon the presence of a battery to be retained.

D. The PECs shall communicate with the SNC at a baud rate of not less than 78.8K baud. The PEC shall provide LED indication of communication and controller performance to the technician, without cover removal.

E. The following integral and remote Inputs/Outputs shall be supported per each PEC:
   1. Eight integral dry contact digital inputs.
   2. Any two digital inputs may be configured as pulse counters with a maximum pulse read rate of 15 Hz.
   3. Eight integral analog inputs (configurable as 0-10V, 0-10,000 ohm or, 20K NTC).
   4. Six integral 4-20 ma analog outputs.
   5. Eight integral 24 Vac Triac digital outputs, configurable as maintained or floating motor control outputs.
   6. One integral 20 Vdc, 65-mA power supply for auxiliary devices.

7. If a 20 Vdc 65-mA power supply terminal is not integral to the ILC, provide at each PEC a separate, fully isolated, enclosed, current limited and regulated UL listed auxiliary power supply for power to auxiliary devices

F. Each PEC shall have expansion ability to support additional I/O requirements through the use of remote input/output modules

G. PEC Controllers shall support the following control techniques:
1. Ten configurable general-purpose control loops that can incorporate Demand Limit Control strategies, Setpoint reset, adaptive intelligent recovery, and time of day bypass.
2. Ten general-purpose, non-linear control loops.
3. Eight start/stop Loops.
4. Thirty-two If/Then/Else logic loops.
5. Thirty six Math Function loops (MIN, MAX, AVG, SUM, SUB,SQRT, MUL, DIV, ENTHALPY).

2.5 ADVANCED UNITARY CONTROLLER

A. The advanced unitary controller (AUC) platform shall be designed specifically to control HVAC – ventilation, filtration, heating, cooling, humidification, and distribution. Equipment includes: constant volume air handlers, VAV air handlers, packaged RTU, heat pumps, unit vents, fan coils, natural convection units, and radiant panels. The controller platform shall provide options and advanced system functions, programmable and configurable using Niagara N4 Framework™, that allow standard and customizable control solutions required in executing the “Sequence of Operation”.

B. Minimum Requirements:
1. The controller shall be fully programmable with full functionality on any Niagara N4 brand platform.
   a. Support downloads to the controller from any brand of Niagara N4 platform.
   b. Support uploads from the controller to any brand of Niagara N4 platform.
   c. Support simulation/debug mode of the controller.
   d. Maintain native GUI.
   e. Native function-block programming within the Niagara N4 environment.
2. The controller shall be capable of either integrating with other devices or stand-alone operation.
3. The controller shall have two microprocessors. The Host processor contains on-chip FLASH program memory, FLASH information memory, and RAM to run the main HVAC application. The second processor for network communications. Controller memory minimum requirements include:
   a. FLASH Memory Capacity: 60 Kilobytes with 8 Kilobytes for application program.
   b. FLASH Memory settings retained for ten years.
   c. RAM: 2 Kilobytes
4. The controller shall have an FTT transformer-coupled communications port interface for common mode-noise rejection and DC isolation.
5. The controller shall have an internal time clock with the ability to automatically revert from a master time clock on failure.
   a. Operating Range: 24 hour, 365 day, multi-year calendar including day of week and configuration for automatic day-light savings time adjustment to occur on configured start and stop dates.
   b. Accuracy: ±1 minute per month at 77° F (25° C).
   c. Power Failure Backup: 24 hours at 32° to 122° F (0° to 50° C).
6. The controller shall have Significant Event Notification, Periodic Update capability, and Failure Detect when network inputs fail to be detected within their configurable time frame.
7. The controller shall have an internal DC power supply to power external sensors.

a. Power Output: 20 VDC ±10% at 75 mA.

8. The controller shall have a visual indication (LED) of the status of the devise:
   a. Controller operating normally.
   b. Controller in process of download.
   c. Controller in manual mode under control of software tool.
   d. Controller lost its configuration.
   e. No power to controller, low voltage, or controller damage.
   f. Processor and/or controller are not operating.
9. The minimum controller Environmental ratings
   a. Operating Temperature Ambient Rating: -40° to 150° F (-40° to 65.5° C).
   b. Storage Temperature Ambient Rating: -40° to 150° F (-40° to 65.5° C).
   c. Relative Humidity: 5% to 95% non-condensing.
10. The controller shall have the additional approval requirements, listings, and approvals:
   a. UL/cUL (E87741) listed under UL916 (Standard for Open Energy Management Equipment) with plenum rating.
   b. CSA (LR95329-3) Listed
   c. Meets FCC Part 15, Subpart B, Class B (radiated emissions) requirements.
   d. Meets Canadian standard C108.8 (radiated emissions).
   e. Conforms requirements European Consortium standard EN 61000-6-1; 2001 (EU Immunity)
   f. Conforms requirements European Consortium standard EN 61000-6-3; 2001 (EU Emission)
11. The controller housing shall be UL plenum rated mounting to either a panel or DIN rail (standard EN50022; 7.5mm x 35mm).
12. The controller shall have a mix of digital inputs (DI), digital Triac outputs (DO), analog outputs (AO), and universal inputs (UI).
   a. Analog outputs (AO) shall be capable of being configured as digital outputs (DO)
   b. Input and Output wiring terminal strips shall be removable from the controller without disconnecting wiring.
   c. Input and Output wiring terminals shall be designated with color coded labels.
   d. Universal inputs shall be capable of being configured as binary inputs, resistive inputs, voltage inputs (0-10 VDC), or current inputs (4-20 mA)
13. The controller shall provide for “user defined” Network Variables (NV) for customized configurations and naming using Niagara N4 Framework™.
   a. The controller shall support 62 Network Variables with a byte count of 31 per variable.
   b. The controller shall support 1,922 separate data values.
14. The controller shall provide “continuous” automated loop tuning with an Adaptive Integral Algorithm Control Loop.
15. The controller platform shall have standard HVAC application programs that are modifiable to support both the traditional and specialized “sequence of operations” as outlined in Section 4.
   a. Discharge air control and low limit
   b. Pressure-dependent dual duct without flow mixing.
   c. Variable air volume with return flow tracking.
   d. Economizer with differential enthalpy.
   e. Minimum airflow coordinated with CO2.
   f. Unit ventilator cycle (1,2,3) 2-pipe.
   g. Unit ventilator cycle (1,2,3) 2-pipe with face/bypass.
   h. Unit ventilator cycle (1,2,3) 4-pipe.

i. Unit ventilator cycle (1,2,3) 4-pipe with EOC valve.

2.6 OTHER CONTROL SYSTEM HARDWARE

A. Motorized control dampers that will not be integral to the equipment shall be furnished by the Control System Contractor. Control damper frames shall be constructed of galvanized steel, formed into changes and welded or riveted. Dampers shall be galvanized, with nylon bearings. Blade edge seals shall be vinyl. Blade edge and tip seals shall be included for all dampers. Blades shall be 16-gauge minimum and 6 inches wide maximum and frame shall be of welded channel iron. Damper leakage shall not exceed 10 CFM per square foot, at 1.5-inches water gauge static pressure.

B. Control damper actuators shall be furnished by the Control System Contractor. Two-position or proportional electric actuators shall be direct-mount type sized to provide a minimum of 5 in-lb torque per square foot of damper area. Damper actuators shall be spring return type. Operators shall be heavy-duty electronic type for positioning automatic dampers in response to a control signal. Motor shall be of sufficient size to operate damper positively and smoothly to obtain correct sequence as indicated. All applications requiring proportional operation shall utilize truly proportional electric actuators.

C. Wall Mount Room Temperature sensors: Each room temperature sensor shall provide temperature indication to the digital controller, provide the capability for a software-limited occupant set point adjustment (warmer-cooler slider bar or switch) and limited operation override capability. Room Temperature Sensors shall be 20,000-ohm thermistor type with a temperature range of -40 to 140 degrees F. The sensor shall be complete with a decorative cover and suitable for mounting over a standard electrical utility box. These devices shall have an accuracy of 0.5 degrees, F., over the entire range.

D. Duct-mounted and Outside Air Temperature Sensors: 20,000-ohm thermistor temperature sensors with an accuracy of ± 0.2ºC. Outside air sensors shall include an integral sun shield. Duct-mounted sensors shall have an insertion measuring probe of a length appropriate for the duct size, with a temperature range of -40 to 160 degrees F. The sensor shall include a utility box and a gasket to prevent air leakage and vibration noise. For all mixed air and preheat air applications, install bendable averaging duct sensors with a minimum 8 - foot long sensor element. These devices shall have accuracy of 0.5 degrees, F., over the entire range.

2.7 INTEGRATION WITH OWNER'S SOFTWARE SYSTEMS

A. The Owner operates facility management software is a Niagara based system. The objective is to build the new system standalone and to integrate with existing system including many management and maintenance tracking functions on this platform in the future.

B. Data will be passed between the BMS system and the Niagara N4 software by a .csv file. The file shall be of "flat" format and not the output from Excel or some other application that may be subject to a revised format.

C. The format of the .csv file will be established between the BMS vendor and the Owner.

D. The BMS Contractor shall coordinate with Niagara N4 and coordinate data transfer requirements, and all aspects of the BMS system necessary to integrate successful data transfer from the BMS to Niagara N4.

E. The BMS Contractor shall coordinate with the owner to insure the that the data is competent and correctly represented in the manner expected by the Owner for their use.

2.8 BAS GUI SYSTEM OVERVIEW

A. The BAS Contractor shall provide system software based on server/thin-client architecture, designed around the open standards of web technology. The BAS server shall communicate using Ethernet and TCP. Server shall be accessed using a web browser over Owner intranet and remotely over the Internet. Update web browser specifications to match with basic requirements for Niagara N4.

B. The intent of the thin-client architecture is to provide the operator(s) complete access to the BAS system via a web browser. The thin-client web browser Graphical User Interface (GUI) shall be browser and operating system agnostic, meaning it will support HTML5 enabled browsers without requiring proprietary opearator interface and configuration programs of browser plug-ins. Current released versions of Microsoft Edge, Firefox, and Chrome browsers shall be used, and Windows as well as non-Window operating systems.
C. The BAS server software must support at least the following server platforms (Windows 7 or later, Server 12). The BAS server software shall be developed and tested by the manufacturer of the system stand-alone controllers and network controllers/routers.
D. The web browser GUI shall provide a completely interactive user interface and must offer and shall provide a HTML5 experience that supports the following features as a minimum:
    1. Trending
    2. Scheduling
    3. Electrical demand limiting
    4. Duty Cycling
    5. Downloading Memory to field devices
    6. Real time 'live' Graphic Programs
    7. Tree Navigation
    8. Parameter change of properties
    9. Setpoint Adjustments
    10. Alarm / Event information
    11. Configuration of operators
    12. Execution of global commands
    13. Add, delete, and modify graphics and displayed data
E. Software Components: All software shall be the most current version. All software components of the BAS system software shall be provided and installed as part of this project .BAS software components shall include:
    1. Server Software, Database and Web Browser Graphical User Interface
    2. <1, 3, or 5> Year Software Maintenance License. Labor to implement not included.
    3. Embedded System configuration Utilities for future modifications to the system and controllers.
    4. Embedded Direct Digital Control software
    5. Embedded Application Software
    6. Embedded Graphical Programming Tools.
    7. Any required third party software
    8. If licensing credits are required provide a minimum of 10% additional to as built control system requires.
F. BAS Server Database: The BAS server software shall utilize a database compatible with the existing systems, and suitable for future expansion, such as: Current released version of Microsoft SQL Server. BAS systems written to Non -Standard and/or Proprietary databases are NOT acceptable.
G. Database Open Connectivity: The BAS server database shall allow real time access of data via the following standard mechanisms:
    1. Open protocol standard like SOAP
    2. OLE/OPC (for Microsoft Client's/Server platform only)
    3. Import/Export of the database from or to XML (eXtensible Mark-up Language)
H. Communication Protocol(s): The native protocol for the BAS server software shall be TCP/IP over Ethernet. Proprietary protocols over TCP/IP are NOT acceptable.
I. Thin Client – Web Browser Based: The GUI shall be thin client or browser based and shall meet the following criteria:
    1. Web Browser's for PC's: Current released versions of Microsoft Edge, Firefox, and Chrome browsers will be required as the GUI, and a valid connection to the server

network. No installation of any custom software shall be required on the operator's GUI workstation/client. Connection shall be over an intranet or the Internet.

2. Secure Socket Layers: Communication between the Web Browser GUI and BAS server shall offer encryption using 128-bit encryption technology within Secure Socket Layers (SSL). Communication protocol shall be Hyper-Text Transfer Protocol (HTTP)

2.9 WEB BROWSER GRAPHICAL USER INTERFACE

A. Web Browser Navigation: The Thin Client web browser GUI shall provide a comprehensive user interface. Using a collection of web pages, it shall be constructed to "feel" like a single application, and provide a complete and intuitive mouse/menu driven operator interface. It shall be possible to navigate through the system using a web browser to accomplish requirements of this specification. The Web Browser GUI shall (as a minimum) provide for navigation, and for display of animated graphics, schedules, alarms/events, live graphic programs, active graphic setpoint controls, configuration menus for operator access, reports, and reporting actions for events.

B. Login: On launching the web browser and selecting the appropriate domain name or IP address, the operator shall be presented with a login page that will require a login name and password. Navigation in the system shall be dependent on the operator's role privileges, and geographic area of responsibility.

C. Navigation: Navigation through the GUI shall be accomplished by clicking on appropriate level of a navigation tree (consisting of expandable and collapsible tree control like Microsoft's Explorer program), and/or by selecting dynamic links to other system graphics. Both the navigation tree and action pane shall be displayed simultaneously, enabling the operator to select a specific system or equipment, and view the corresponding graphic. The navigation tree shall as a minimum provide the following views: Geographic, Network, Groups and Configuration.

1. Geographic View shall display a logical geographic hierarchy of the system including: cities, sites, buildings, building systems, floors, equipment and objects.
2. Groups View shall display Scheduled Groups and custom reports.
3. Configuration View shall display all the configuration categories (Operators, Schedule, Event, Reporting and Roles).

D. Action Pane: The Action Pane shall provide several functional views for each HVAC or mechanical/electrical subsystem specified. A functional view shall be accessed by clicking on the corresponding button:

1. Graphics: Using graphical format suitable for display in a web browser, graphics shall include aerial building/campus views, color building floor-plans, equipment drawings, active graphic setpoint controls, web content, and other valid HTML elements. The data on each graphic page shall automatically refresh.
2. Properties: Shall include graphic controls and text for the following: Locking or overriding objects, demand strategies, and any other valid data required for setup. Changes made to the properties pages shall require the operator to depress an 'accept/cancel' button.
3. Schedules: Shall be used to create, modify/edit and view schedules based on the systems geographical hierarchy (using the navigation tree).
4. Alarms: Shall be used to view alarm information geographically (using the navigation tree), acknowledge alarms, sort alarms by category, actions and verify reporting actions.
5. Trends: Shall be used to display associated trend and historical data, modify colors, date range, axis and scaling
6. Logic - Live Graphic Programs: Shall be used to display' live' graphic programs of the control algorithm, (micro block programming) for the mechanical/electrical system selected in the navigation tree.
7. Other actions such as Print, Help, Command, and Logout shall be available via a drop-down window.

E. Color Graphics: The Web Browser GUI shall make extensive use of color in the graphic pane to communicate information related to setpoints and comfort. Animated .gifs or .jpg, vector scalable, active setpoint graphic controls shall be used to enhance usability. Graphics tools used to create Web Browser graphics shall be non-proprietary and conform to the following basic criteria:
   1. Display Size: The GUI workstation software shall graphically display in 1024 by 768 pixels 24 bit True Color.
   2. General Graphic: General area maps shall show locations of controlled buildings in relation to local landmarks.
   3. Color Floor Plans: Floor plan graphics shall show heating and cooling zones throughout the buildings in a range of colors, as selected by Owner. Provide a visual display of temperature relative to their respective setpoints. The colors shall be updated dynamically as a zone's actual comfort condition changes.
   4. Mechanical Components: Mechanical system graphics shall show the type of mechanical system components serving any zone through the use of a pictorial representation of components. Selected I/O points being controlled or monitored for each piece of equipment shall be displayed with the appropriate engineering units. Animation shall be used for rotation or moving mechanical components to enhance usability.
   5. Minimum System Color Graphics: Color graphics shall be selected and displayed via a web browser for the following:
      a. Each piece of equipment monitored or controlled including each terminal unit
      b. Each building
      c. Each floor and zone controlled

F. Hierarchical Schedules: Utilizing the Navigation Tree displayed in the web browser GUI, an operator (with password access) shall be able to define a Normal, Holiday or Override schedule for an individual piece of equipment or room, or choose to apply a hierarchical schedule to the entire system, site or floor area. For example, Independence Day 'Holiday' for every level in the system would be created by clicking at the top of the geographic hierarchy defined in the Navigation Tree. No further operator intervention would be required and every control module in the system with would be automatically downloaded with the 'Independence Day' Holiday. All schedules that affect the system/area/equipment highlighted in the Navigation Tree shall be shown in a summary schedule table and graph.
   1. Schedules: Schedules shall comply with the BacNet standards, (Schedule Object, Calendar Object, Weekly Schedule property and Exception Schedule property) and shall allow events to be scheduled based on:
      a. Types of schedule shall be Normal, Holiday or Override
      b. A specific date,
      c. A range of dates,
      d. Any combination of Month of Year (1-12, any), Week of Month (1-5, last, any), Day of Week (M-Sun, Any)
      e. Wildcard (example, allow combinations like second Tuesday of every month).
   2. Schedule Categories: The system shall allow operators to define and edit scheduling categories (different types of "things" to be scheduled; for example, lighting, HVAC occupancy, etc.). The categories shall include: name, description, icon (to display in the hierarchy tree when icon option is selected) and type of value to be scheduled.
   3. Schedule Groups: In addition to hierarchical scheduling, operators shall be able to define functional Schedule Groups, comprised of an arbitrary group of areas/rooms/equipment scattered throughout the facility and site. For example, the operator shall be able to define an 'individual tenant' group – who may occupy different areas within a building or buildings. Schedules applied to the 'tenant group' shall automatically be downloaded to control modules affecting spaces occupied by the 'tenant group'
   4. Intelligent Scheduling: The control system shall be intelligent enough to automatically turn on any supporting equipment needed to control the environment in an occupied

space. If the operator schedules an individual room in a VAV system for occupancy, for example, the control logic shall automatically turn on the VAV air handling unit, chiller, boiler, and/or any other equipment required to maintain the specified comfort and environmental conditions within the room.

5. Partial Day Exceptions: Schedule events shall be able to accommodate a time range specified by the operator (ex: board meeting from 6 pm to 9 pm overrides Normal schedule for conference room).
6. Schedule Summary Graph: The schedule summary graph shall clearly show Normal versus Holiday versus Override Schedules, and the net operating schedule that results from all contributing schedules. Note: In case of priority conflict between schedules at the different geographic hierarchy, the schedule for the more detailed geographic level shall apply.

G. Alarms. Take the following actions with alarms: 1) Alarms associated with a specific system, area, or equipment selected in the Navigation Tree, shall be displayed in the Action Pane by selecting an 'Alarms' view. 2) Report alarms and system notifications to .csv file for upload to the Owner's existing system. Alarms, and reporting actions shall have the following capabilities:

1. Alarms View: Each Alarm shall display an Alarms Category (using a different icon for each alarm category), date/time of occurrence, current status, alarm report, and a bold URL link to the associated graphic for the selected system, area or equipment. The URL link shall indicate the system location, address and other pertinent information. An operator shall easily be able to sort events, edit event templates and categories, acknowledge or force a return to normal in the Events View as specified in this section.
2. Alarm Categories: The operator shall be able to create, edit or delete alarm categories such as HVAC, Maintenance, Fire, or Generator. An icon shall be associated with each alarm category, enabling the operator to easily sort through multiple events displayed.
3. Alarm Templates: Alarm template shall define different types of alarms and their associated properties. As a minimum, properties shall include a reference name, verbose description, severity of alarm, acknowledgement requirements, and high/low limit and out of range information.
4. Alarm Areas: Alarm Areas enable an operator to assign specific Alarm Categories to specific Alarm Reporting Actions. For example, it shall be possible for an operator to assign all HVAC Maintenance Alarm on the 1st floor of a building to email the technician responsible for maintenance. The Navigation Tree shall be used to setup Alarm Areas in the Graphic Pane.
5. Alarm Time/Date Stamp: All events shall be generated at the DDC control module level and comprise the Time/Date Stamp using the standalone control module time and date.
6. Alarm Configuration: Operators shall be able to define the type of Alarm generated per object. A 'network' view of the Navigation Tree shall expose all objects and their respective Alarm Configuration. Configuration shall include assignment of Alarm, type of Acknowledgement and notification for return to normal or fault status.
7. Alarm Summary Counter: The view of Alarm in the Graphic Pane shall provide a numeric counter, indicating how many Alarms are active (in alarm), require acknowledgement, and total number of Alarms in the BAS Server database.
8. Alarm Auto-Deletion: Alarms that are acknowledged and closed shall be auto-deleted from the database and archived to a text file after an operator defined period.
9. Alarm Reporting Actions: Alarm Reporting Actions specified shall be automatically launched (under certain conditions) after an Alarm is received by the BAS server software. Operators shall be able to easily define these Reporting Actions using the Navigation Tree and Graphic Pane through the web browser GUI. Reporting Actions shall be as follows:
   a. Print: Alarm information shall be printed to the BAS server's PC or a networked printer.

b. Email: Email shall be sent via any POP3-compatible e-mail server (most Internet Service Providers use POP3). Email messages may be copied to several email accounts. Note: Email reporting action shall also be used to support alphanumeric paging services, where email servers support pagers.
c. File Write: The ASCII File write reporting action shall enable the operator to append operator defined alarm information to any alarm through a text file. The alarm information that is written to the file shall be completely definable by the operator. The operator may enter text or attach other data point information (such as AHU discharge temperature and fan condition upon a high room temperature alarm).
d. Similar to above, see also paragraph 2.8 for Owner software integration, and write alarm file to .csv file and transfer to the existing Building Management software system.
e. Write Property: The write property reporting action updates a property value in a hardware module.
f. SNMP: The Simple Network Management Protocol (SNMP) reporting action sends an SNMP trap to a network in response to receiving an alarm.
g. Run External Program: The Run External Program reporting action launches specified program in response to an event.

H. Trends: Trends shall both be displayed and user configurable through the Web Browser GUI. Trends shall comprise analog, digital or calculated points simultaneously. A trend log's properties shall be editable using the Navigation Tree and Graphic Pane. Refer to Point Schedule for Trended Data.
1. Viewing Trends: The operator shall have the ability to view trends by using the Navigation Tree and selecting a Trends button in the Graphic Pane. The system shall allow y- and x-axis maximum ranges to be specified and shall be able to simultaneously graphically display multiple trends per graph.
2. Similar to above, see also paragraph 2.8 for Owner software integration, and write trended data to file to .csv file and transfer to the existing Building Management software system.
3. Local Trends: Trend data shall be collected locally by Multi-Equipment/Single Equipment general-purpose controllers, and periodically uploaded to the BAS server if historical trending is enabled for the object. Trend data, including run time hours and start time date shall be retained in non-volatile module memory. Systems that rely on a gateway/router to run trends are NOT acceptable.
4. Resolution. Sample intervals shall be as small as one second. Each trended point will have the ability to be trended at a different trend interval. When multiple points are selected for displays that have different trend intervals, the system will automatically scale the axis.
5. Dynamic Update. Trends shall be able to dynamically update at operator-defined intervals.
6. Zoom/Pan. It shall be possible to zoom-in on a particular section of a trend for more detailed examination and 'pan through' historical data by simply scrolling the mouse.
7. Numeric Value Display. It shall be possible to pick any sample on a trend and have the numerical value displayed.
8. Copy/Paste. The operator must have the ability to pan through a historical trend and copy the data viewed to the clipboard using standard keystrokes (i.e. CTRL+C, CTRL+V).

I. Security Access: Systems that Security access from the web browser GUI to BAS server shall require a Login Name and Password. Access to different areas of the BAS system shall be defined in terms of Roles, Privileges and geographic area of responsibility as specified:

1. Roles: Roles shall reflect the actual roles of different types of operators. Each role shall comprise a set of 'easily understood English language' privileges. Roles shall be defined in terms of View, Edit and Function Privileges.
   a. View Privileges shall comprise: Navigation, Network, and Configuration Trees, Operators, Roles and Privileges, Alarm/Event Template and Reporting Action.
   b. Edit Privileges shall comprise: Setpoint, Tuning and Logic, Manual Override, and Point Assignment Parameters.
   c. Function Privileges shall comprise: Alarm/Event Acknowledgement, Control Module Memory Download, Upload, Schedules, Schedule Groups, Manual Commands, Print, and Alarm/Event Maintenance.
2. Geographic Assignment of Roles: Roles shall be geographically assigned using a similar expandable/collapsible navigation tree. For example, it shall be possible to assign two HVAC Technicians with similar competencies (and the same operator defined HVAC Role) to different areas of the system.

2.10 GRAPHICAL PROGRAMMING

A. The system software shall include a Graphic Programming Language (GPL) for all DDC control algorithms resident in all control modules. Any system that does not use a drag and drop method of graphical icon programming shall not be accepted. All systems shall use a GPL is a method used to create a sequence of operations by assembling graphic microblocks that represent each of the commands or functions necessary to complete a control sequence. Microblocks represent common logical control devices used in conventional control systems, such as relays, switches, high signal selectors, etc., in addition to the more complex DDC and energy management strategies such as PID loops and optimum start. Each microblock shall be interactive and contain the programming necessary to execute the function of the device it represents. Finished GUI graphic images should be consistent with existing system images as much as possible.

B. Graphic programming shall be performed while on screen and using a mouse; each microblock shall be selected from a microblock library and assembled with other microblocks necessary to complete the specified sequence. Microblocks are then interconnected on screen using graphic "wires," each forming a logical connection. Once assembled, each logical grouping of microblocks and their interconnecting wires then forms a graphic function block which may be used to control any piece of equipment with a similar point configuration and sequence of operation.

C. Graphic Sequence: The clarity of the graphic sequence must be such that the operator has the ability to verify that system programming meets the specifications, without having to learn or interpret a manufacturer's unique programming language. The graphic programming must be self-documenting and provide the operator with an understandable and exact representation of each sequence of operation.

D. GPL Capabilities: The following is a minimum definition of the capabilities of the Graphic Programming software:
   1. Function Block (FB): Shall be a collection of points, microblocks and wires which have been connected together for the specific purpose of controlling a piece of HVAC equipment or a single mechanical system.
   2. Logical I/O: Input/Output points shall interface with the control modules in order to read various signals and/or values or to transmit signal or values to controlled devices.
   3. Microblocks: Shall be software devices that are represented graphically and may be connected together to perform a specified sequence. A library of microblocks shall be submitted with the control contractors bid.
   4. Wires: Shall be Graphical elements used to form logical connections between microblocks and between logical I/O.
   5. Reference Labels: Labels shall be similar to wires in that they are used to form logical connections between two points. Labels shall form a connection by reference instead

of a visual connection, i.e. two points labeled 'A' on a drawing are logically connected even though there is no wire between them.

6. Parameter: A parameter shall be a value that may be tied to the input of a microblock.
7. Properties: Dialog boxes shall appear after a microblock has been inserted which has editable parameters associated with it. Default parameter dialog boxes shall contain various editable and non-editable fields, and shall contain 'push buttons' for the purpose of selecting default parameter settings.
8. Icon: An icon shall be graphic representation of a software program. Each graphic microblock has an icon associated with it that graphically describes its function.
9. Menu-bar Icon: Shall be an icon that is displayed on the menu bar on the GPL screen, which represents its associated graphic microblock.
10. Live Graphical Programs: The Graphic Programming software must support a 'live' mode, where all input/output data, calculated data, and setpoints shall be displayed in a 'live' real-time mode.

2.11 NETWORK MANAGEMENT

A. Systems requiring the use of third party network management tools shall not be accepted.
B. Network management shall include the following services: device identification, device installation, device configuration, device diagnostics, device maintenance and network variable binding.
C. The Network configuration tool shall also provide diagnostics to identify devices on the network, to reset devices, and to view health and status counters within devices.
D. These tools shall provide the ability to "learn" an existing network, regardless of what network management tool(s) were used to install the existing network, so that existing BACnet or Niagara 4 devices and newly added devices are part of a single network management database.
E. The network management database shall be resident in the Network Area Controller (NAC), ensuring that anyone with proper authorization has access to the network management database at all times. Systems employing network management databases that are not resident, at all times, within the control system shall not be accepted.

2.12 PORTABLE OPERATOR'S TOOL (LAPTOP COMPUTER)

A. Contractor is responsible for providing suitable device with all necessary drives, connectors and cables for communication with the provided control system.

PART 3 INSTALLATION

3.1 GENERAL

A. Install system and materials in accordance with manufacturer's instructions, and as detailed on the project drawing set.
B. Line and low voltage electrical connections to control equipment shown specified or shown on the control diagrams shall be furnished and installed by the Control System Contractor in accordance with these specifications.
C. Equipment furnished by the Mechanical Contractor that is normally wired before installation shall be furnished completely wired. Control wiring normally performed in the field will be furnished and installed by the Control System Contractor.
D. All control devices mounted on the face of control panels shall be clearly identified as to function and system served with permanently engraved phenolic labels.

3.2 WIRING

A. All electrical control wiring to the control panels shall be the responsibility of the Control System Contractor.

B. All wiring shall be in accordance with the Project Electrical Specifications (Division 26), the National Electrical Code and any applicable local codes. All control wiring shall be installed in raceways.

3.3 ACCEPTANCE TESTING

A. Upon completion of the installation, the Control System Contractor shall load all system software and start-up the system. The Control System Contractor shall perform all necessary calibration, testing and de-bugging and perform all required operational checks to insure that the system is functioning in full accordance with these specifications.

B. The Control System Contractor shall perform tests to verify proper performance of components, routines, and points. Repeat tests until proper performance results. This testing shall include a point-by-point log to validate 100% of the input and output points of the DDC system operation.

C. System Acceptance: Satisfactory completion is when the Control System Contractor has performed successfully all the required testing to show performance compliance with the requirements of the Contract Documents to the satisfaction of the Owner's Representative. System acceptance shall be contingent upon completion and review of all corrected deficiencies.

3.4 OPERATOR TRAINING

A. During system commissioning and at such time acceptable performance of the Control System hardware and software has been established, the Control System Contractor shall provide on-site operator instruction to the owner's operating personnel. Operator instruction shall be done during normal working hours and shall be performed by a competent representative familiar with the system hardware, software and accessories.

B. The Control System Contractor shall provide 40 hours of comprehensive training in two separate sessions (80 hours total) for system orientation, product maintenance and troubleshooting, programming and engineering, if not provided under a previous contract at the site using the same brand and type of controllers within the previous 3 years.

C. The Control System Contractor shall provide 16 hours (total) of instruction to the owner's designated personnel on the operation of the BMS and describe its intended use with respect to the programmed functions specified. Operator orientation of the BMS shall include, but not be limited to; the overall operation program, equipment functions (both individually and as part of the total integrated system), commands, systems generation, advisories, and appropriate operator intervention required in responding to the System's operation

3.5 WARRANTY PERIOD SERVICES

A. Equipment, materials and workmanship incorporated into the work shall be warranted for a period of one year from the time of system acceptance.

B. Within this period, upon notice by the Owner, any defects in the BMS due to faulty materials, methods of installation or workmanship shall be promptly repaired or replaced by the Control System Contractor at no expense to the Owner

C. Maintenance of Computer Software Programs: The Control System Contractor shall maintain all software during the warranty period. In addition, all factory or sub-vendor upgrades to software shall be added to the systems, when they become available, at no additional cost. New products are not considered upgrades in this context.

D. Maintenance of Control Hardware: The Control System Contractor shall inspect, repair, replace, adjust, and calibrate, as required, the controllers, control devices and associated peripheral units during the warranty period. The Control System Contractor shall then furnish a report describing the status of the equipment, problem areas (if any) noticed during service work, and description of the corrective actions taken. The report shall clearly certify that all software is functioning correctly.

E. Service Period: Calls for service by the Owner shall be honored within 24 hours and are not to be considered as part of routine maintenance.
F. Service Documentation: A copy of the service report associated with each owner-initiated service call shall be provided to the owner.

3.6 WARRANTY ACCESS

A. The Owner shall grant to the Control System Contractor reasonable access to the BMS during the warranty period. Remote access to the BMS (for the purpose of diagnostics and troubleshooting, via the Internet, during the warranty period) will be allowed.

3.7 OPERATION & MAINTENANCE MANUALS

A. See Division 1 for requirements. O&M manuals shall include the following elements, as a minimum:
   1. As-built control drawings for all equipment.
   2. As-built Network Communications Diagram.
   3. General description and specifications for all components.
   4. Completed Performance Verification sheets.

PART 4 SEQUENCE OF OPERATIONS

4.1 SEQUENCE OF OPERATIONS

A. GENERAL
   1. All control points, setpoints, limits, etc. shall be accessible through the central CPU or the laptop computer connected to the system through the GUI.
   2. Control points as may be available for the VRF system shall be able to be observed from the central CPU or laptop through the GUI and adjustable.
   3. Control points for the equipment controlled by the DDC BMS system shall be able to be observed and adjusted through the central CPU or laptop.

ADD-05

B. DEDICATED OUTSIDE AIR SYSTEM
   1. GENERAL:
      a. THE UNIT SHALL OPERATE BASED ON LIBRARY HOUR SCHEDULE TO PROVIDE TEMPERED VENTILATION AIR.
      b. THE UNIT IS SUPPLIED WITH SIMPLE TERMINAL STRIP CONTROL, PACKAGED VFDS AND AIRFLOW MONITORING. THE DDC SHALL INTERFACE WITH THE TERMINAL STRIP CONTROL FOR ON/OFF AND BYPASS CONTROL AS WELL AS MONITORING OF POINTS. THE DDC SHAL ALSO CONNECT DIRECTLY TO THE FACTORY VFDS FOR CONTROL AND MONITORING.
   2. UNOCCUPIED/OFF MODE/MAINTENANCE MODE (NOT SCHEDULED BUT AVAILABLE FOR OPERATOR COMMAND):
      a. NORMAL OPERATION
         1) UNIT IS DISABLED
         2) FANS ARE OFF
         3) DAMPERS ARE CLOSED
   3. OCCUPIED MODE:
      a. NORMAL OPERATION: DISCHARGE AIR TEMPERATURE IS WITHIN HEAT DEADBAND.
         1) UNIT IS ENABLED
         2) DAMPERS OPEN
         3) SUPPLY FANS START AND RUNS CONTINUOUSLY ONCE DAMPER PROVES OPEN
         4) EXHAUST FANS START AND RUNS CONTINUOUSLY ONCE DAMPER PROVES OPEN

ADD-05

5) HEAT RECOVERY BYPASS DAMPER POSITIONED AS DESCRIBED IN HEAT RECOVER BYPASS SEQUENCE.

b. HEAT RECOVERY BYPASS

1) THE HEAT RECOVERY BYPASS DAMPER SHALL OPEN/CLOSE TO DIVERT AIR FLOW PAST THE HEAT EXCHANGER DURING THE FOLLOWING CONDITIONS.

(a) 68 DEGREES F < OSAT < 72 DEGREES F AND;

(b) EAT > 72 DEGREES F OR;

(c) EAT < 68 DEGREES F

2) 55 DEGREES F < OSAT < EAT AND;

(a) CALL FOR COOLING IS PRESENT IN MORE THAN 70% (ADJUSTABLE) OF ASSOCIATED ZONES. UNDER THIS CONDITION ELECTRIC HEATER IS LOCKED OUT. THIS SEQUENCE IS TO BE ACCOMPLISHED BY POLLING THE COOLING DEMAND AT THE VRF UNITS.

c. AIRFLOW MONITORING

1) THE DDC SHALL CONNECT TO THE FACTORY PROVIDED AIR FLOW MONITORING STATION AND DISPLAY MEASURED VALUE AT GUI.

d. FAN SPEED CONTROL

1) THE DDC SHALL HAVE CAPABILITY TO MONITOR AND CONTROL FAN SPEED. SPEED TO BE SET AS DETERMINED DURING BALANCING (ADJUSTABLE)

e. SAFETIES/ALARMS: SAFETIES DEVICE SHUTDOWN SHALL BE HARDWIRED AND INDEPENDENT OF DDC SYSTEM CONTROLS (EXCEPT FOR MONITORING). ALL SAFETIES SHALL BE AUTOMATIC RESETTING UNLESS SPECIFICALLY NOTED OTHERWISE.

1) FAN FAIL: IF UNIT IS ENABLED AND SUPPLY OR EXHAUST FAN STATUS IS NOT PROVEN, ALARM IS GENERATED.

2) HIGH FILTER PRESSURE: IF FILTER DIFFERENTIAL PRESSURE EXCEEDS 0.5” WC AN ALARM IS GENERATED.

3) FIRE ALARM INTERFACE: UNIT SHUTS DOWN UPON ACTIVATION OF FIRE ALARM SYSTEM.

4) DAMPER FAIL: IF DAMPER IS COMMANDED OPEN AND NO PROOF IS REGISTERED AND ALARM IS GENERATED.

C. ELECTRIC HEATER

1. GENERAL:

a. OPERATION OF ELECTRIC HEATER IS BY PACKAGED CONTROL NATIVE TO THE HEATER.

2. UNOCCUPIED/OFF MODE/MAINTENANCE MODE:

a. NORMAL OPERATION

1) UNIT IS DISABLED

3. OCCUPIED MODE:

a. HEATING

1) OPERATES TO MEET SET POINT.

D. VRF HEAT PUMPS

1. GENERAL:

a. OPERATION OF THE VARIABLE REFRIGERANT FLOW (VRF) SYSTEM SHALL BE REGULATED BY PACKAGED CONTROLS NATIVE TO THE SYSTEM.

ADD-05

b. DDC SHALL COMMUNICATE WITH THE VRF CENTRALCONTROLLER VIA BACNET PROTOCOL FOR VARIOUS MONITORING POINTS AS WELL AS CONTROL OF ENABLING/DISABLING THE UNITS AND SETPOINT ADJUSTMENT.

2. MAINTENANCE MODE (NOT SCHEDULED BUT AVAILABLE FOR OPERATOR COMMAND):
   a. ALL UNITS ARE DISABLED.
3. UNOCCUPIED MODE (NOT SCHEDULED BUT AVAILABLE FOR OPERATOR COMMAND):
   a. SYSTEM FOLLOWS SAME SEQUENCE OF OPERATIONS FOR OCCUPIED MODE WITH THE FOLLOWING SETPOINTS.
      1) HEATING: 60 DEGREES F
      2) COOLING: 85 DEGREES F
4. OCCUPIED MODE:
   a. GENERAL:
      1) VRF SYSTEM SHALL BE ENABLED AND COMMANDED TO OPERATE. COMMAND SIGNAL FROM DDC TO VRF CONTROLLER SHALL BE CYCLED EVERY 12 HOURS (ADJUSTABLE).
   b. HEATING
      1) WHEN SPACE TEMPERATURE IS BELOW OCCUPIED HEATING SETPOINT, 70 DEGREES F (ADJUSTABLE); UNIT IS ENABLED AND CONTROLLED BY PACKAGED CONTROLLER TO MAINTAIN SETPOINT.
      2) WHEN SPACE TEMPERATURE IS ABOVE OCCUPIED HEATING SETPOINT (ADJUSTABLE); UNIT SHUTS OFF.
   c. COOLING
      1) WHEN SPACE TEMPERATURE IS ABOVE OCCUPIED COOLING SETPOINT, 75 DEGREES F (ADJUSTABLE); UNIT IS ENABLED AND CONTROLLED BY PACKAGED CONTROLLER TO MAINTAIN SETPOINT.
      2) WHEN SPACE TEMPERATURE IS BELOW OCCUPIED COOLING SETPOINT (ADJUSTABLE); UNIT SHUTS OFF.
5. SAFETIES/ALARMS
   a. FAULT: IF UNIT IS IN FAULT AT THE VRF CENTRAL CONTROLLER, ALARM IS GENERATED.
   b. COMMUNICATION FAILURE: IF COMMUNICATION WITH THE CENTRAL CONTROLLER OR INDIVIDUAL UNIT IS LOST, ALARM IS GENERATED.
   c. HIGH SPACE TEMPERATURE: IF SPACE TEMPERATURE EXCEEDS SETPOINT BY 5 DEGREES F (ADJUSTABLE) FOR 5 MINUTES, ALARM IS GENERATED.
   d. LOW SPACE TEMPERATURE: IF SPACE TEMPERATURE IS BELOW SETPOINT BY 5 DEGREES F (ADJUSTABLE) FOR 5 MINUTES, ALARM IS GENERATED.
6. SERVER ROOM EXHAUST FAN
   a. GENERAL:
   b. THE UNIT SHALL OPERATE BASED UPON ROOM TEMPERATURE SET POINT.
   c. UNOCCUPIED/OFF/MAINTENANCE MODE (NOT SCHEDULED BUT AVAILABLE FOR OPERATOR COMMAND):
      1) UNIT IS DISABLED
         (a) FAN IS OFF
         (b) EXHAUST MOTOR DAMPER IS CLOSED
   d. OCCUPIED MODE (24/7/365):
      1) UNIT IS ENABLED

ADD-05

2) UNIT RUNS TO MAINTAIN ROOM SET POINT (ADJUSTABLE).

7. DOMESTIC HOT WATER CIRCULATION PUMP
   a. MAINTENANCE (NOT SCHEDULED BUT AVAILABLE FOR OPERATOR COMMAND):
      1) tHE HOT WATER CIRCULATION PUMP SHALL BE DISABLED.
   b. OCCUPIED:
      1) THE HOT WATER CIRCULATION PUMP IS ENABLED AND OPERATES TO MAINTAIN RECIRCULATING WATER TEMPERATURE SETPOINT, 100 DEGREES F (ADJUSTABLE). TEMPERATURE SENSOR SHALL BE LOCATED IN HOT WATER RECIRCULATION, RETURN LINE.
8. HEAT PUMP DOMESTIC HOT WATER HEATER
   a. MAINTENANCE MODE (NOT SCHEDULED BUT AVAILABLE FOR OPERATOR COMMAND):
      1) THE HOT WATER HEATER SHALL BE DISABLED.
   b. OCCUPIED MODE:
      ~~3.~~1) THE HOT WATER HEATER IS ENABLED AND OPERATES TO MAINTAIN WATER TEMPERATURE SETPOINT, 140 DEGREES F (ADJUSTABLE).

~~4. Refer to drawing sheet M-003 for detailed sequence of operation for each equipment~~.

~~PART 5 POINTS SCHEDULE~~

5.1 POINTS

A. GENERAL

1. All setpoints, limits, etc. shall be accessible through the central CPU or the laptop computer connected to the system.

ADD-05

B. POINTS LIST~~Refer to drawing sheet M-003 for points list.~~

BUILDING CONTROL SYSTEM POINT SUMMARY							
DESCRIPTION	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
DEDICATED OUTSIDE AIR SYSTEM	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
START/STOP				X		DI	
OSAT TEMPERATURE	X					TS	MOUNT IN UNIT, FIELD INSTALLED
HR EXHAUST TEMPERATURE	X					TS	MOUNT IN UNIT, FIELD INSTALLED
HR SUPPLY TEMPERATURE	X					TS	MOUNT IN UNIT, FIELD INSTALLED
HR RETURN TEMPERATURE	X					TS	MOUNT IN UNIT, FIELD INSTALLED
AIR FLOW RATE	X					AI	PROVIDED BY UNIT VENDOR
SUPPLY AIR DAMPER			X	X	X	CR/AUX	PROVIDE ENDSWITCH FOR PROOF
EXHAUST AIR DAMPER			X	X	X	CR/AUX	PROVIDE ENDSWITCH FOR PROOF

ADD-05

FAN STATUS (2)			X		X	CT	ONE FOR EACH FAN
FAN SPEED (2)		X				AO	ONE FOR EACH FAN
FROST STATUS			X			DI	
BYPASS DAMPER				X		CR	HRV UNIT ENABLES BYPASS OPERATION
FILTER PRESSURE DROP			X		X	DPH	
CO2 LEVEL	X					CO2	DUCT MOUNTED, FIELD INSTALLED
ELECTRIC HEATER	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
ENABLE/DISABLE				X		DO	
STATUS			X			DI	
VRF SYSTEMS AND SINGLE ZONE HEAT PUMP SYSTEMS	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
ENABLE/DISABLE				X		CR	
STATUS			X			DI	
ROOM/ZONE TEMPERATURE	X	X			X	T	MONITOR ZONE TEMPERATURE AND CONTROL ZONE SETPOINT
FAN SPEED		X				AO	
OPERATING MODE	X					DO	ALL MONITORING OF VRF SYSTEM BY DDC
							VIA BACNET PROTOCOL
EXHAUST FANS	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
ENABLE/DISABLE			X	X		OS	START/ STOP BASED ON MOTION/OCCUPANCY SENSOR
EXHAUST DAMPERS/ RELIEF DAMPERS				X	X	DO	OPEN/CLOSE WITH ENABLE/DISABLE SIGNALS. MONITOR DAMPER STATUS WITH END SWITCHES
FAN STATUS			X			CT	
HEAT PUMP WATER HEATER	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
ENABLE/DISABLE				X		CR	
STATUS			X			DI	
ENTERING WATER TEMPERATURE	X					TS	
LEAVING WATER TEMPERATURE	X					TS	
STORAGE TANK TEMPERATURE	X				X	TS	

ADD-05

FAULT			X		X	DI	
DOMESTIC WATER CIRCULATION PUMP	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL INPUTS	DIGITAL OUTPUTS	ALARMS	DEVICE TYPE	REMARKS
ON/OFF				X		CR	
HOT WATER RETURN TEMPERATURE	X				X	TS	
STATUS			X				

~~2.~~

END OF SECTION

SECTION 23 31 13 - METAL DUCTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Single-wall rectangular ducts and fittings.
   2. Single-wall round ducts and fittings.
   3. Sheet metal materials.
   4. Duct liner.
   5. Sealants and gaskets.
   6. Hangers and supports.
   7. Seismic-restraint devices.

B. Related Sections:
   1. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
   2. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products:
   1. Liners and adhesives.
   2. Sealants and gaskets.
   3. Seismic-restraint devices.

B. Sustainable Design Submittals:
   1. Ventilation: Product Data for ventilation equipment, indicating compliance with ASHRAE 62.1, Section 5 - "Systems and Equipment."
   2. Product Data: For adhesives, indicating VOC content.
   3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
   4. Product Data: For sealants, indicating VOC content.
   5. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
   6. Laboratory Test Reports: For antimicrobial coatings, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings:
   1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   2. Factory- and shop-fabricated ducts and fittings.
   3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
   4. Elevation of top and bottom of ducts.
   5. Dimensions of all duct runs from building grid lines.
   6. Fittings.
   7. Reinforcement and spacing.
   8. Seam and joint construction.
   9. Penetrations through fire-rated and other partitions.
   10. Equipment installation based on equipment being used on Project.
   11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.

12. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 QUALITY ASSURANCE

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Duct hangers, supports and seismic restraints shall withstand the effects of gravity and seismic loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7
   1. Refer to Structural plans for project specific seismic data.
B. Airstream Surfaces: Surfaces in contact with airstream shall comply with requirements in ASHRAE 62.1.
C. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."
D. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
E. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
   1. Construct ducts of galvanized sheet steel unless otherwise indicated.
   2. For ducts exposed to weather, construct of Type 304 stainless steel indicated by manufacturer to be suitable for outdoor installation.
B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
   1. For ducts with longest side less than 36 inches, select joint types in accordance with Figure 2-1.
C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
   1. Construct ducts of galvanized sheet steel unless otherwise indicated.

2. For ducts exposed to weather, construct of Type 304 stainless steel indicated by manufacturer to be suitable for outdoor installation.

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
1. Galvanized Coating Designation: G60.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

D. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

E. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

F. Tie Rods: Galvanized steel, 1/4-inch- minimum diameter for lengths 36 inches or less; 3/8-inch- minimum diameter for lengths longer than 36 inches.

2.5 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. Knauf Insulation.
   c. Owens Corning.
2. Maximum Thermal Conductivity:
   a. Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg Fat 75 deg F mean temperature.
   b. Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg Fat 75 deg F mean temperature.
3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
4. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

a. Verify adhesive has a VOC content of 80 g/L or less.
b. Verify adhesive complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized or stainless steel (to match associated duct material)]; with beveled edge sized as required to hold insulation securely in place, but not less than 1-1/2 inches in diameter.

2.6 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:
1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.
10. Verify sealant has a VOC content of 420 g/L or less.
11. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
12. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
13. Service: Indoor or outdoor.
14. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Flanged Joint Sealant: Comply with ASTM C 920.
1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. Verify sealant has a VOC content of 420 g/L or less.
7. Verify sealant complies with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.7 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.
E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.
F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
H. Trapeze and Riser Supports:
    1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
    2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
    3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.8 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    1. Kinetics Noise Control, Inc.
    2. Mason Industries, Inc.
    3. Unistrut; Atkore International.
B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
    1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
C. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
D. Restraint Cables: ASTM A 603, galvanized or ASTM A 492, stainless-steel cables with end connections made of galvanized-steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.
F. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested in accordance with ASTM E 488/E 488M.

PART 3 EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.
B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
C. Install ducts in maximum practical lengths with fewest possible joints.
D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
G. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.
H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.
J. Install fire dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.
K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.
L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."
M. Elbows: Use long-radius elbows wherever they fit.
    1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
    2. Fabricate 90-degree round elbows with a minimum of three segments for 12 inches and smaller and a minimum of five segments for 14 inches and larger.
N. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 DUCTWORK EXPOSED TO WEATHER

A. All external joints are to have secure watertight mechanical connections. Seal all openings to provide weatherproof construction.
B. Construct ductwork to resist external loads of wind, snow, ice, and other effects of weather. Provide necessary supporting structures.
C. Single Wall:
    1. Ductwork shall be Type 304stainless steel.
    2. Where ducts have external insulation, provide weatherproof aluminum jacket. See Section 230713 "Duct Insulation."

3.4 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":
    1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
    2. Outdoor, Supply-Air Ducts: Seal Class A.
    3. Outdoor, Exhaust Ducts: Seal Class C.
    4. Outdoor, Return-Air Ducts: Seal Class C.
    5. Unconditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class B.
    6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class A.
    7. Unconditioned Space, Exhaust Ducts: Seal Class C.
    8. Unconditioned Space, Return-Air Ducts: Seal Class B.
    9. Conditioned Space, Supply-Air Ducts in Pressure Classes 2-Inch wg and Lower: Seal Class C.
    10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than 2-Inch wg: Seal Class B.
    11. Conditioned Space, Exhaust Ducts: Seal Class B.
    12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
    1. Where practical, install concrete inserts before placing concrete.
    2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
    3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
    4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
    5. Do not use powder-actuated concrete fasteners for seismic restraints.
C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.
D. Hangers Exposed to View: Threaded rod and angle or channel supports.
E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.
F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.6 SEISMIC-RESTRAINT-DEVICE INSTALLATION

A. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes.
B. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Install cable restraints on ducts that are suspended with vibration isolators.
E. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.
F. Drilling for and Setting Anchors:
   1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
   2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
   3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
   4. Set anchors to manufacturer's recommended torque, using a torque wrench.
   5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.7 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.
B. Leakage Tests:
   1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
   2. Test the following systems:
      a. Outdoor-Air Ducts with a Pressure Class of 2 Inch wg or Higher: Test representative duct sections totaling no less than 100 percent of total installed duct area for each designated pressure class.
   3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
   4. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
   5. Test for leaks before applying external insulation.
   6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
   7. Give seven days' advance notice for testing.
C. Duct system will be considered defective if it does not pass tests and inspections.
D. Prepare test and inspection reports.

ADD-05

~~3.10 DUCT CLEANING~~

~~A. Clean new duct system(s) before testing, adjusting, and balancing.~~
~~B. Use duct cleaning methodology as indicated in NADCA ACR.~~
~~C. Use service openings for entry and inspection.~~
~~1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.~~
~~2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.~~
~~3. Remove and reinstall ceiling to gain access during the cleaning process.~~
~~D. Particulate Collection and Odor Control:~~
~~1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.~~
~~2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.~~
~~E. Clean the following components by removing surface contaminants and deposits:~~
~~1. Air outlets and inlets (registers, grilles, and diffusers).~~
~~2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.~~
~~3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.~~
~~4. Coils and related components.~~
~~5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.~~
~~6. Supply-air ducts, dampers, actuators, and turning vanes.~~
~~7. Dedicated exhaust and ventilation components and makeup air systems.~~
~~F. Mechanical Cleaning Methodology:~~
~~1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.~~
~~2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.~~
~~3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.~~
~~4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.~~
~~5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.~~
~~6. Provide drainage and cleanup for wash-down procedures.~~
~~7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.~~

~~3.11~~3.10 ~~STARTUP~~

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

END OF SECTION 233113

SECTION 28 31 11 – FIRE ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION:

A. Fully addressable fire alarm system. Provide all equipment, programming, devices, cabling, raceways and so forth for a complete and fully functional system. Existing fire alarm control panel (FACP) shall remain. Add devices as indicated on plans.

B. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring as shown on the drawings and specified herein.

C. The fire alarm system shall comply with requirements of NFPA Standard No. 72 for Remote Station Protected Premises Signaling Systems except as modified and supplemented by this specification. The system field wiring shall be supervised either electrically or by software-directed polling of field devices.
   1. The Secondary Power Source of the fire alarm control panel will be capable of providing at least 60 hours of backup power with the ability to sustain 5 minutes in alarm at the end of the backup period.

D. The fire alarm system shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

E. The FACP and peripheral devices shall be manufactured 100% by a single U.S. manufacturer (or division thereof).

F. Underwriters Laboratories Inc. (UL) - USA:
   1. No. 38 Manually Actuated Signaling Boxes
   2. No. 50 Cabinets and Boxes
   3. No. 864 Control Units for Fire Protective Signaling Systems
   4. No. 268 Smoke Detectors for Fire Protective Signaling Systems
   5. No. 268A Smoke Detectors for Duct Applications
   6. No. 346 Waterflow Indicators for Fire Protective Signaling Systems
   7. No. 464 Audible Signaling Appliances
   8. No. 521 Heat Detectors for Fire Protective Signaling Systems
   9. No. 1971 Visual Notification Appliances

G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

1.2 SCOPE:

A. An intelligent, microprocessor-controlled, fire alarm detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:
   1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
   2. Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
   3. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.
   4. All circuits shall be power-limited, per 1995 UL864 requirements.
   5. A single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
   6. Alarm signals arriving at the main FACP shall not be lost following a primary power failure or outage of any kind until the alarm signal is processed and recorded.

C. Basic System Functional Operation:
   1. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
   2. The system alarm LED on the FACP shall flash.
   3. A local piezo electric signal in the control panel shall sound.
   4. A backlit 80-character LCD display on the FACP shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
   5. Printing from the control panel and history recording shall log the information associated each new fire alarm, along with time and date of occurrence.
   6. In response to a fire alarm condition, the system will process all control programming and activate all system outputs (alarm notification appliances and/or relays) associated with the point(s) in alarm

1.3 SUBMITTALS

A. General:
   1. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.
   2. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

B. Shop Drawings:
   1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   2. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts.
   3. Show annunciator layout, configurations, and terminations.

C. Manuals:
   1. Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.
   2. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.
   3. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

D. Software Modifications
   1. Provide the services of a qualified technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.
   2. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.
   3. Provide electronic copy of all programming to the owner to allow for reprogramming of system.

1.4 GUARANTY:

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance. The full cost of maintenance, labor and materials required to correct any defect during this one year period shall be included in the submittal bid.

1.5 MAINTENANCE:

A. Maintenance and testing shall be on a semi-annual schedule or as required by the local AHJ. A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The schedule shall include:
   1. Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, waterflow switches and all accessories of the fire alarm system.
   2. Each circuit in the fire alarm system shall be tested semiannually.
   3. Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 7.

1.6 APPLICABLE STANDARDS AND SPECIFICATIONS:

A. The specifications and standards listed below form a part of this specification.

B. The system shall fully comply with the latest issue of these standards, if applicable.

C. National Fire Protection Association (NFPA) - USA:
   1. No. 13 Sprinkler Systems
   2. No. 70 National Electric Code (NEC)
   3. No. 72 National Fire Alarm Code
   4. No. 101 Life Safety Code

D. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

E. Local and State Building Codes.

F. All requirements of the Authority Having Jurisdiction (AHJ).

1.7 APPROVALS:

A. The system shall have proper listing and/or approval from the following nationally recognized agencies:
   1. UL Underwriters Laboratories Inc
   2. FM Factory Mutual

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIAL, GENERAL:

A. All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a fire protective signaling system, meeting the National Fire Alarm Code.

B. All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

C. All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

D. All equipment must be available "over the counter" through the Security Equipment Distributor (SED) market and can be installed by dealerships independent of the manufacturer.

2.2 CONDUIT AND WIRE:

A. Conduit:

Add 05

1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements. All fire alarm wire will be installed in EMT conduit where in walls, exposed or above non-accessible ceilings. Open cabling allowed above accessible ceilings.
2. All wiring shall be installed in conduit or metallic raceway unless routed open above an accessible ceiling. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
3. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.
4. Wiring for 24-volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
5. Shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.
6. Conduit shall be 3/4-inch (19.1 mm) minimum.
7. All fire alarm system wiring shall be new. Except where connecting to existing fire alarm loops.
8. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.
9. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.
10. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).
11. Wiring used for the multiplex communication circuit (SLC) shall be twisted and support a minimum wiring distance of 10,000 feet when sized at 12 AWG. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit. For new systems, shielded wire shall not be required.
12. All field wiring shall be electrically supervised for open circuit and ground fault.
13. The fire alarm control panel shall be capable of T-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions in, for example, the amount of T-taps, length of T-taps etc., are not acceptable.

B. Terminal Boxes, Junction Boxes and Cabinets:

C. All boxes and cabinets shall be UL listed for their use and purpose.

D. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to building ground through the equipment ground conductor. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

2.3 MAIN FIRE ALARM CONTROL PANEL:

A. Existing FACP: Hochiki FireNet Plus. Provide modules and programming as required to support added fire alarm system devices indicated on plans.

2.4 SYSTEM COMPONENTS:

A. Programmable Electronic Sounders:
1. Electronic sounders shall operate on 24 VDC nominal.
2. Electronic sounders shall be field programmable without the use of special tools, to provide slow whoop, continuous, or interrupted tones with an output sound level of at least 90 dBA measured at 10 feet from the device.
3. Shall be flush or surface mounted as show on plans.

B. Strobe lights shall meet the requirements of the ADA, UL Standard 1971 and shall meet the following criteria:

1. The maximum pulse duration shall be 2/10 of one second.
2. Strobe intensity shall meet the requirements of UL 1971.
3. The flash rate shall meet the requirements of UL 1971.

C. Audible/Visual Combination Devices:
   1. Shall meet the applicable requirements of Section A listed above for audibility.
   2. Shall meet the requirements of Section B listed above for visibility.

D. Manual Fire Alarm Stations
   1. Manual fire alarm stations shall be non-code, non-breakglass type, equipped with key lock so that they may be tested without operating the handle.
   2. Stations must be designed such that after an actual activation, they cannot be restored to normal except by key reset.
   3. An operated station shall automatically condition itself so as to be visually detected, as operated, at a minimum distance of 100 feet (30.5 m) front or side.
   4. Manual stations shall be constructed of sturdy metal construction, with operating instructions provided on the cover. The word FIRE shall appear on the manual station in letters one half inch (12.7 mm) in size or larger.

E. Waterflow Indicator:
   1. Waterflow Switches shall be an integral, mechanical, non-coded, non-accumulative retard type.
   2. Waterflow Switches shall have an alarm transmission delay time which is conveniently adjustable from 0 to 60 seconds. Initial settings shall be 30-45 seconds.
   3. All waterflow switches shall come from a single manufacturer and series.
   4. Waterflow switches shall be provided and connected under this section but installed by the mechanical contractor.
   5. Where possible, locate waterflow switches a minimum of one (1) foot from a fitting which changes the direction of the flow and a minimum of three (3) feet from a valve.

F. Sprinkler and Standpipe Valve Supervisory Switches:
   1. Each sprinkler system water supply control valve riser, zone control valve, and standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
   2. PIV (post indicator valve) or main gate valves shall be equipped with a supervisory switch.
   3. The switch shall be mounted so as not to interfere with the normal operation of the valve and adjusted to operate within two revolutions toward the closed position of the valve control, or when the stem has moved no more than one-fifth of the distance from its normal position.
   4. The supervisory switch shall be contained in a weatherproof aluminum housing, which shall provide a 3/4-inch (19 mm) conduit entrance and incorporate the necessary facilities for attachment to the valves.
   5. The switch housing shall be finished in red baked enamel.
   6. The entire installed assembly shall be tamper proof and arranged to cause a switch operation if the housing cover is removed, or if the unit is removed from its mounting.
   7. Valve supervisory switches shall be provided and connected under this section and installed by mechanical contractor.

G. The control panel will have the capability of Reverse Polarity Transmission or connection to a Municipal Box for compliance with applicable NFPA standards.

H. Digital Alarm Communicator Transmitter (DACT). The DACT is an interface for communicating digital information between a fire alarm control panel and a UL-Listed Central Station.
   1. The DACT shall be compact in size, and shall plug into the fire alarm control printed circuit board within the control cabinet. Systems that utilize relay contact closures are not acceptable.
   2. The DACT shall include connections for dual telephone lines (with voltage detect), per
   3. UL/NFPA/FCC requirements. It shall include the ability for split reporting of panel events up to three different telephone numbers.
   4. The DACT shall be completely field programmable via the fire alarm control panel keypad or via downloaded programming information via a PC.
   5. The DACT shall be capable of transmitting events in at least 15 different formats. This ensures compatibility with existing and future transmission formats.
   6. Communication shall include vital system status such as:

a. Independent Zone (Alarm, trouble, non-alarm, supervisory)
b. Independent Addressable Device Status
c. AC (Mains) Power Loss
d. Low Battery and Earth Fault
e. System Off Normal
f. 12 and 24-Hour Test Signal
g. Abnormal Test Signal (per UL requirements)
h. EIA-485 Communications Failure
i. Phone Line Failure

7. The DACT shall support independent zone/point reporting when used in the Contact ID format. In this format the UDACT shall support transmission of up to 640 points. This enables the central station to have exact details concerning the origin of the fire or response emergency.

I. Field Wiring Terminal Blocks
1. For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks which are permanently fixed are not acceptable.

J. Addressable Devices - General
1. Addressable devices shall employ the simple-to-set decade addressing scheme. Addressable devices which use a binary-coded address setting method, such as a DIP switch, are not an allowable substitute.
2. Detectors shall be addressable and intelligent, and shall connect with two wires to the fire alarm
3. control panel signaling line circuits.
4. Addressable smoke and thermal (heat) detectors shall provide dual alarm and power/polling LEDs. Both LEDs shall flash under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady illumination by the control panel, indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED.
5. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
6. Detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a base with a built-in (local) sounder rated for a minimum of 85 DBA, a relay base and an isolator base designed for Style 7 applications.
7. Detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel.
8. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
9. Detectors shall provide address-setting means using decimal switches.

K. Addressable Pull Box (manual station)
1. Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual pull stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

L. Intelligent Multi-Sensing Detector (Smoke detector)
1. The intelligent detector shall be an addressable device which is capable of detecting multiple threats by employing photoelectric and thermal technologies in a single unit. This detector shall utilize advanced electronics which react to slow smoldering fires (photoelectric) and heat (thermal) all within a single sensing device.
2. The multi-detector shall include two bicolor LEDs for 360-degree viewing.
3. Automatically adjusts sensitivity levels without the need for operator intervention or programming. Sensitivity increases with heat.

M. Intelligent Thermal Detectors (Heat detector)
   1. Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

N. Intelligent Duct Smoke Detector
   1. The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel.
   2. When sufficient smoke is sensed, an alarm signal shall be initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

O. Addressable Monitor Module for Dry Contact Devices
   1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any normally open dry contact device) to one of the fire alarm control panel SLCs.
   2. The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.
   3. The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
   4. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

P. Two-Wire Detector Monitoring
   1. Means shall be provided for the monitoring of conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally open contact alarm initiating devices (pull stations, heat detectors, etc).
   2. Each IDC of conventional devices will be monitored as a distinct address on the polling circuit by an addressable module. The module will supervise the IDC for alarms and circuit integrity (opens).
   3. The monitoring module will be compatible, and listed as such, with all devices on the supervised circuit.
   4. The IDC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
   5. The monitoring module shall be capable of mounting in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or in a surface mount backbox.

Q. Addressable Control Relay Module
   1. Addressable control relay modules shall be provided to control the operation of fan shutdown and other auxiliary control functions.
   2. The control module shall mount in a standard 4-inch square, 2-1/8 inch deep electrical box, or to a surface mounted backbox.
   3. The control relay module will provide a dry contact, Form-C relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relays may be energized at the same time on the same pair of wires.
   4. The control relay module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

R. 6 Output Addressable Control Relay Module
   1. Up to 6 Addressable intelligent control relay modules combined on one circuit board shall be provided to control the operation of fan shutdown and other auxiliary control functions.
   2. Using rotary address switches, the first module shall be addressed from 01 to 154 while the remaining modules shall be automatically assigned to the next five higher addresses. Note: binary dipswitches for setting address are not acceptable.
   3. Provision shall be included for disabling a maximum of three unused modules

4. A single isolated set of dry relay form C contacts shall be provided for each of the 6 module addresses, which shall be capable of being wired for either a normally open or normally closed operation.
5. The module shall allow an addressable control panel to switch these contacts on command.
6. The module shall contain removable plug in terminal blocks capable of supporting 12 AWG to 18 AWG wire.
7. The control relays mounted on the module shall be suitable for pilot duty applications and rated for a maximum of 3.0 amps at 30 VDC, resistive, non-coded and 2.0 amps at 30 VDC maximum, resistive, coded.

S. Six-Zone Interface Module
1. A six-zone interface module shall be provided as an interface between the addressable panel and two-wire conventional detection zones.
2. A common SLC input shall be used for all modules, and the initiating device circuits shall share a common external supervisory supply and ground.
3. The first address on the interface module shall be addressed from 01 to 154 while the remaining modules are automatically assigned to the next five higher addresses.
4. Address shall be set using decimal encoded rotary address switches. Binary address switches are not acceptable.
5. Provision shall be included for disabling a maximum of two unused addresses of the six available.
6. All two-wire detectors being monitored shall be two-wire compatibility listed with the six zone input module.
7. The six zone input module shall transmit the status of a zone of two-wire detectors to the fire alarm control panel. Status shall be reported as normal, open or alarm.
8. Removable plug-in terminals shall be provided capable of accepting from 18 AWG up to 12 AWG wire.

T. Multiple Two-Wire Detector Monitoring
1. A single multi input module shall be provided for the monitoring of up to 10 conventional Initiating Device Circuits populated with 2-wire smoke detectors as well as normally-open contact alarm initiating devices (pull stations, heat detectors, etc).
2. Each IDC of conventional devices will be monitored as a distinct address on the polling circuit by an addressable point. The module will supervise the IDC for alarms and circuit integrity (opens).
3. The first address on the 10 input boards shall be set from 01 to 150 and the remaining module addresses shall be automatically assigned to the next nine higher addresses.
4. Provision shall be included for disabling a maximum of two unused addresses.
5. The supervised state (normal, open, or short) of the monitored device shall be sent back to the panel. A common SLC input shall be used for all modules, and the initiating device loops shall share a common supervisory supply and ground.
6. The IDC zone may be wired for Class A or B (Style D or Style B) operation. A green LED for each circuit shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel. LEDs shall latch on when a circuit is in alarm.

U. Isolator Module
1. Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Style 6 (Class A) or Style 4 (Class B branch). The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.
2. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
3. The isolator module shall not require any address setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
4. The isolator module shall mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted backbox. It shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

2.5 BATTERIES:

A. Upon loss of Primary (AC) power to the control panel, the batteries shall have sufficient capacity to power the fire alarm system for required standby time 60 hours followed by 5 minutes of alarm.

B. batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

C. If necessary to meet standby requirements, external battery/charger systems may be used.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual pull stations shall be suitable for surface mounting or semi flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2 TEST:

A. The service of a competent, NICET level II technician shall be provided to technically supervise and participate during all the adjustments and tests for the system. All testing shall be in accordance with NFPA 72, Chapter 7.

B. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

C. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

D. Verify activation of all waterflow switches.

E. Open initiating device circuits and verify that the trouble signal actuates.

F. Open and short signaling line circuits and verify that the trouble signal actuates.

G. Open and short notification appliance circuits and verify that trouble signal actuates.

H. Ground all circuits and verify response of trouble signals.

I. Check presence and audibility of tone at all alarm notification devices.

J. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

K. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

L. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.3 FINAL INSPECTION:

A. At the final inspection, at a minimum a NICET level II technician shall demonstrate that the system functions properly in every respect.

3.4 INSTRUCTION:

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor or installing dealer shall provide a user manual indicating "Sequence of Operation."

END OF SECTION 28 31 11

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

PROJECT: South King Fire Admin Building Improvements

SUBSTITUTION REQUEST NUMBER:

FROM: Merit Construction

TO: Weinstein A+U

DATE: 5/28/2025

A/E PROJECT NUMBER:

RE: Mecho Shade sub. Springs Window Fashions

CONTRACT FOR:

SPECIFICATION TITLE: Roller Window Shades

DESCRIPTION: MechoShade Mecho /5 System

SECTION: 122413

PAGE: 1

ARTICLE/PARAGRAPH: 2.2.A

PROPOSED SUBSTITUTUION: Springs Window Fashions SL20

MANUFACTURER: Springs Window Fashions

ADDRESS: 7549 Graber Rd, Middleton, WI 53562

PHONE: 877-792-0002

TRADE NAME: Roller Window Shades

MODEL NO.: SL20

Attached data includes product description, specifications, drawings, photographs, and performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The Undersigned certifies:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY: Thomas Evans

SIGNED BY:

FIRM: Merit Construction

ADDRESS: 3020 S 96th S, Lakewood, WA 98499

TELEPHONE: 253-588-9100

A/E's REVIEW AND RECOMMENDATION:

- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☒ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use specified materials.

SWF Contract SL20 product is approved. Contractor to submit full submittal package including samples demonstrating that substituted product meets specified criteria in 12 24 13.

SIGNED BY: [signature]

DATE: 6/3/25

SUPPORTING DATA ATTACHED: ☐ Drawings ■ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

CSI Form 1.5C (August 2020 version)

© 2020 The Construction Specifications Institute (CSI)