

ADDENDUM
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OWNER:	Van Buren Charter Township 46425 Tyler Road Van Buren Township, MI 48111
CONSTRUCTION MANAGER:	Fishbeck 1515 Arboretum Drive, SE Grand Rapids, MI 49546
DRAWING REVISION NO.:	A2
ISSUED HEREWITH:	
OTHER INFORMATION:	Pre-bid Meeting Minutes and Attendance Sheet; Consensus Docs 750 Standard Agreement Between Constructor and Subcontractor
SPECIFICATION SECTIONS	01 11 00, 01 21 13, 07 54 19, 08 71 00, 11 52 13, 26 08 00, 27 41 16
SHEETS:	G201, C102, C201, C301, C304, C305, C307, C401, C501, L101, L201, L301, L501, L601, L602, A001, A101, A102, A131, A132, A140, A151, A152, A201, A202, A203, A204, A301, A302, A321, A323, A324, A340, A341, A501, A502, A503, A521, A522, A523, A524, A525, A526, S101, S102, S104, S105, S201, S202, S301, S401, S402, P302, H101, H102, H202, H401, H701, H702, E003, E010, E101, E102, E201, E501, E502, T002, T003, T100, T101B, T201B, T301B, T701, Y001, Y101B, Y801, AVS02
BIDS DUE:	Wednesday, November 4, 2026, 10:00 a.m.

This Addendum is issued to all Bid Set Holders, is a part of the Contract Documents, and modifies the previously issued Bidding Documents. Acknowledge receipt of this Addendum in the space provided on the Bid form; failure to do so may result in rejection of the Bid.

ITEM NO. 1:

Other: Pre-bid Meeting Minutes and Attendance Sheet (issued)

A. Pre-bid Meeting Minutes and Attendance Sheet, dated October 21, 2026, issued in its entirety.

ITEM NO. 2:

Other: Consensus Docs 750–Standard Agreement Between Constructor and Subcontractor (reissued)

A. Change Article 7.6 end of sentence to read as four percent in lieu of ten percent.

ITEM NO. 3:

Section: 01 11 00 – CM Summary of Work (reissued)

A. Paragraph 1.6 Bid Category – Revise bid categories as indicated.

ITEM NO. 4:

Section: 01 21 13 – CM Cash Allowances (reissued)

A. Add paragraph item 1.3.C.4 as indicated.

ITEM NO. 5:

Section: 07 54 19 – Polyvinyl-Chloride (PVC) Roofing (reissued)

A. Add Versico Roofing Systems as an acceptable manufacturer in paragraph 2.1.

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ITEM NO. 6:

Section: 08 71 00 – Door Hardware (issued)

- A. Issued new Specification Section 08 71 00 – Door Hardware in its entirety.

ITEM NO. 7:

Section: 11 52 13 – Projection Screens (reissued)

- A. Reissue specification. Screens are contractor furnished and installed.

ITEM NO. 8:

Section: 26 08 00 – Commissioning of Electrical Systems (reissued)

- A. Revise control requirements for the Community Living Room and Multi-purpose Room to clarify touch panel functionality in divided, combined, and overflow operating modes.

ITEM NO. 9:

Section: 27 41 16 – Integrated Audiovisual Systems and Equipment (reissued)

- A. Reissue specification as indicated.

ITEM NO. 10:

Sheet: G201 – Life Safety Plan – Area A (reissued)

- A. Revise total occupancy load as indicated.

ITEM NO. 11:

Sheet: C102 – Demolition and Phase 1 SESC Plan (reissued)

- A. Revise note 12 to remove all riprap, not just as needed.

ITEM NO. 12:

Sheet: C201 – Site Plan (reissued)

- A. Add bike racks near the playground.
- B. Revise tread depth of Lake House tiered seating and steps.
- C. Add Key note 6 to call for replacement of riprap along bank to edge of water.

ITEM NO. 13:

Sheet: C301– Enlarged Grading Plan (reissued)

- A. Revise elevations at Lake House tiered seating and steps.

ITEM NO. 14:

Sheet: C304– Enlarged Grading Plan (reissued)

- A. Revise elevations at Lake House tiered seating and steps.

ITEM NO. 15:

Sheet: C305– Enlarged Grading Plan (reissued)

- A. Revise location of trench drain at Lake Hall.

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ITEM NO. 16:

Sheet: C307 – Details (reissued)

- A. Revise Lake House Tiered Seating Section with shortened treads.
- B. Revise Lake House Stair Section with shortened treads.
- C. Revise East Terminus Retaining Wall Section to have 4" curb.
- D. Revise East Terminus Retaining Wall Elevation to have 4" curb.

ITEM NO. 17:

Sheet: C401– Utility Plan (reissued)

- A. Revise location, length, and inverts of trench drain at Lake Hall.

ITEM NO. 18:

Sheet: C501 – Details (issued)

- A. Revise Dumpster Wall Detail to match block retaining walls within site.

ITEM NO. 19:

Sheet: L101 – Pedestrian Paving Plan (reissued)

- A. Add two concrete pad locations for bike racks.
- B. Add concrete pad location for drinking fountain.
- C. Add callout notes 41 and 42 to plan and note key.
- D. Modify location of light column to make room for western bike rack concrete pad.
- E. Modify layout of steps and tiered seating at Lake House to match architectural, civil, and structural plans.
- F. Add playground equipment layout and locations for reference.
- G. Add playable fountain spray nozzle layout and locations for reference.

ITEM NO. 20:

Sheet: L201 – Layout Plan (reissued)

- A. Add two concrete pad locations for bike racks.
- B. Add concrete pad location for drinking fountain.
- C. Modify layout of steps and tiered seating at Lake House to match architectural, civil, and structural plans.
- D. Add playground equipment layout and locations for reference.
- E. Add playable fountain spray nozzle layout and locations for reference.

ITEM NO. 21:

Sheet: L301 – Underdrainage Plan (reissued)

- A. Modify site grading and utilities to match civil plans.
- B. Add playground equipment layout and locations for reference in relationship to underdrainage.
- C. Add playable fountain spray nozzle layout and locations for reference.

ITEM NO. 22:

Sheet: L501 – Landscape Plan (reissued)

- A. Modify extents of sodded lawn hatching according to the addition of bike rack and drinking fountain concrete pads.
- B. Modify location of three Greenspire Lindens between walk and Lake House to make room for eastern bike rack concrete pad.
- C. Substitute Emerald Green Arborvitae for Broadmoor Juniper on plan and in plant list.
- D. Add playground equipment layout and locations for reference.
- E. Add playable fountain spray nozzle layout and locations for reference.

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ITEM NO. 23:

Sheet: L601 – Irrigation Plan (reissued)

- A. Modify irrigation head layout according to the addition of bike rack concrete pads.
- B. Modify irrigation legend.
- C. Add playground equipment layout and locations for reference.
- D. Add playable fountain spray nozzle layout and locations for reference.

ITEM NO. 24:

Sheet: L602 – Irrigation Details (reissued)

- A. Modify Detail 1/Note 12 to state that irrigation booster pump is to be installed by plumbing trades.

ITEM NO. 25:

Sheet: A001 – General Notes / Accessibility (reissued)

- A. Revise detail dimensions as indicated.

ITEM NO. 26:

Sheets: A101 – Floor Plan – Area A (reissued)
A102 – Floor Plan – Area B (reissued)

- A. Revise keynotes as indicated.
- B. Revise dimensions as indicated.

ITEM NO. 27:

Sheet: A131 – Finish Plan – Area A (reissued)

- A. Community Living Room 104 – Add FWP1 to north wall of plan, matching elevation information.
- B. Multi-purpose Room 105 – Add CPT1 tag and revise room finish tags replacing “x” notation with list of finishes.

ITEM NO. 28:

Sheet: A132 – Finish Plan – Area B (reissued)

- A. Key Note 8 – clarify where to refer for information regarding the corner trim that will be covered with wall finish.
- B. Revise room finish tags replacing “x” notation with list of finishes.
- C. Ballroom 169 and 170 north wall:
 - 1. Add WB3 wood base to finish legend tag matching elevation information.
 - 2. Revise wood finish at bar openings to WD2 and WB3 matching elevation information.

ITEM NO. 29:

Sheet: A140 – Furniture Plan – Overall (reissued)

- A. Revise graphical representation of referenced site information.
- B. Revise plan title.
- C. Revise enlarged plan callout.

ITEM NO. 30:

Sheet: A151 – Reflected Ceiling Plan – Area A (reissued)
A152 – Reflected Ceiling Plan – Area B (reissued)

- A. Revise keynotes as indicated.
- B. Revise dimensions as indicated.

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ITEM NO. 31:

Sheet: A201 – Wall Types (reissued)

- A. Revise wall type schedule as indicated.

ITEM NO. 32:

Sheet: A202 – Door Schedule (reissued)

- A. Revise frame type details as indicated.
- B. Revise door schedule as indicated.
- C. Revise notes as indicated.
- D. Revise head and jamb details as indicated.

ITEM NO. 33:

Sheet: A203 – Finish Legend (reissued)

- A. Revise finish legend as indicated.
- B. Revise finish notes as indicated.

ITEM NO. 34:

Sheet: A204 – Window Schedule (reissued)

- A. Revise dimensions as indicated.
- B. Revise notes as indicated.

ITEM NO. 35:

Sheet: A301 – Exterior Elevations – Area A (reissued)

- A. Revise elevation A and E as indicated.

ITEM NO. 36:

Sheet: A302 – Exterior Elevations – Area B (reissued)

- A. Revise elevation A and 1 as indicated.

ITEM NO. 37:

Sheet: A321 – Interior Elevations (reissued)

- A. Revise elevations F and J as indicated.

ITEM NO. 38:

Sheet: A323 – Interior Elevations (reissued)

- A. Revise elevation A as indicated.

ITEM NO. 39:

Sheet: A324 – Interior Elevations (reissued)

- A. Revise elevations A, C, D and K as indicated.

ITEM NO. 40:

Sheet: A340 – Enlarged Plans & Elevations – Restrooms (reissued)

- A. Revise enlarged plan 1 as indicated.
- B. Revise toilet accessory schedule as indicated.

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ITEM NO. 41:

Sheet: A341 – Enlarged Plans & Elevations – Restrooms (reissued)

- A. Revise enlarged plan 1 as indicated.
- B. Revise elevations D and G as indicated.
- C. Revise toilet accessory schedule as indicated.

ITEM NO. 42:

Sheet: A501 – Exterior Details (reissued)

- A. Revise Details 1 through 15 as indicated.
- B. Renumber and revise detail 16 as indicated.
- C. Relocated detail 17 to different sheet.

ITEM NO. 43:

Sheet: A502 – Exterior Details (reissued)

- A. Add Details 10 and 11.
- B. Revise Details 1, 4, 5, 6, 7, 8 and 9 as indicated.

ITEM NO. 44:

Sheet: A503 – Exterior Details (reissued)

- A. Add Details 4, 5, 6, 8, 9, 10, 11 and 12.
- B. Relocated detail 7 (originally on A501) and revised.
- C. Revise detail 1 as indicated.

ITEM NO. 45:

Sheet: A521 – Interior Details (reissued)

- A. Revise Details 1, 3, 4, 6 and 10 as indicated.

ITEM NO. 46:

Sheet: A522 – Interior Details (reissued)

- A. Add detail 18.
- B. Revise Details 1, 2, 4, 5, 6, 7, 10, 15, 16 and 17 as indicated.
- C. Remove detail 12.

ITEM NO. 47:

Sheet: A523 – Interior Details (reissued)

- A. Revise detail 7 as indicated.

ITEM NO. 48:

Sheet: A524 – Interior Details (reissued)

- A. Revise Details 7, 10, 11 and 13 as indicated.

ITEM NO. 49:

Sheet: A525 – Interior Details – Casework (reissued)

- A. Revise Details 1, 2 and 3 as indicated.

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ITEM NO. 50:

Sheet: A526 – Interior Details – Casework (reissued)

- A. Revise Details 1 and 2 as indicated.

ITEM NO. 51:

Sheet: S101 – Foundation Plan – Area A (reissued)

- A. Revise top of foundation wall and pier elevations as indicated.
- B. Revise pier size as indicated.
- C. Revise dimensions as indicated.

ITEM NO. 52:

Sheet: S102 – Foundation Plan – Area B (reissued)

- A. Revise top of foundation wall and pier elevations.
- B. Revise dimensions as indicated.

ITEM NO. 53:

Sheet: S104 – Slab Plan – Area A (reissued)

- A. Revise dimensions as indicated.

ITEM NO. 54:

Sheet: S105 – Slab Plan – Area B (reissued)

- A. Revise dimensions as indicated.

ITEM NO. 55:

Sheet: S201 – Roof Framing Plan – Area A (reissued)
S202 – Roof Framing Plan – Area B (reissued)

- A. Revise steel elevations as indicated.
- B. Add plan note as indicated.

ITEM NO. 56:

Sheet: S301 – Foundation Sections (reissued)

- A. Add reinforcement notes in Details 1 and 2.
- B. Change brick ledge to turndown slab in Details 3 and 4.
- C. Modify slope and elevation in Detail 5 as indicated.
- D. Modify elevation in Detail 6 as indicated.

ITEM NO. 57:

Sheet: S401 – Framing Sections (reissued)

- A. Revise steel elevation and plate size in Detail 8 as indicated.
- B. Revise steel elevation in Details 9 and 10 as indicated.

ITEM NO. 58:

Sheet: S402 – Framing Sections (reissued)

- A. Revise steel elevation in Detail 2 as indicated.

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ITEM NO. 59:

Sheet: P302 – Plumbing Supply Piping Plan – Area B (reissued)

A. Revise the gas meter location to accommodate RTU selection.

ITEM NO. 60:

Sheet: H101 – HVAC Sheet Metal Plan – Area A (reissued)

- A. Revise the RTU-1 selection, update unit size and clearances.
- B. Reroute ductwork for a layout to allow for smoother airflow.
- C. Add note about clearances between flue vent and intake air for fireplace.
- D. Add vertical duct silencer on RTU-1 supply duct.

ITEM NO. 61:

Sheet: H102 – HVAC Sheet Metal Plan – Area B (reissued)

- A. Revise the RTU-2 selection, updated unit size and clearances.
- B. Revise ductwork layout in Ballroom 169 and Ballroom 170.
- C. Include key note about distances from dampers to diffusers.

ITEM NO. 62:

Sheet: H201 – HVAC Piping Plan – Area A (reissued)

- A. Revise the RTU-1 selection, updated unit size and clearances.
- B. Revise controls connections and noted central thermostat to control wall panels and trench heaters.
- C. Add General Note about locating manual high point vents in accessible locations.

ITEM NO. 63:

Sheet: H202 – HVAC Piping Plan – Area B (reissued)

- A. Revise the RTU-2 selection, updated unit size and clearances.
- B. Revise controls connections and noted central thermostat to control wall panels and trench heaters.
- C. Add General Note about locating manual high point vents in accessible locations.

ITEM NO. 64:

Sheet: H401 – Sections (reissued)

- A. Adjust the location of the Duct Silencer to align with the return duct.

ITEM NO. 65:

Sheet: H701 – Schedules (reissued)

- A. Update the RTU schedule to match the revised RTU-1 and RTU-2 selection.

ITEM NO. 66:

Sheet: H702 – Schedules (reissued)

- A. Update the duct silencer schedule.

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ITEM NO. 67:

Sheet: E003 – Schedules (reissued)

- A. Revise the fixture lengths for types C4, C4E, and C4F
- B. Revise the VA and lumens for type C10 .
- C. Add type TCE to the fixture schedule.
- D. Clarified the approved equal types for types U1 and U1E
- E. Add lumens for the R1 and R4 luminaires.
- F. Add the type SK1 luminaire description.
- G. Revise the type Q fixture to a type V for clarity.

ITEM NO. 68:

Sheet: E010 – Electrical Site Plan (reissued)

- A. Add power for the Fire Pit as indicated.

ITEM NO. 69:

Sheet: E101 – Lighting Plan – Area A (reissued)

- A. Revise emergency lighting as indicated.

ITEM NO. 70:

Sheet: E102 – Lighting Plan – Area B (reissued)

- A. Revise emergency lighting as indicated.
- B. Relocated lighting control and shifted the type “F5” fixture in Men’s 153.
- C. Relocated lighting control and shifted the type “F5” in Women’s 154.

ITEM NO. 71:

Sheet: E201 – Power and Systems Plan – Area A (reissued)

- A. Add power for the fireplace as indicated.

ITEM NO. 72:

Sheet: E501 – Lakehouse Panel Schedules (reissued)

- A. Revise the circuit breaker for RTU-1 to match the one-line.

ITEM NO. 73:

Sheet: E502 – Lakehall Panel Schedules (reissued)

- A. Revise the circuit breaker for RTU-2 to match the one-line.

ITEM NO. 74:

Sheet: T002 – Technology Legends (reissued)

- A. Add cable type for pole-mounted cameras.

ITEM NO. 75:

Sheet: T003 – Technology Schedules (reissued)

- A. Revise Room Projection Screen Schedule to clarify room numbers and D1 and D2 values.

ITEM NO. 76:

Sheet: T100 – Telcom Site Plan (reissued)

- A. Add cable type for pole-mounted cameras.

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ITEM NO. 77:

Sheet: T101B – Technology Infrastructure Plan – Floor Area B (reissued)

- A. Added wall-mounted camera outlets in Rooms 169 and 170 (Ballroom).

ITEM NO. 78:

Sheet: T201B – Technology Infrastructure Reflected Ceiling Plan – Floor Area B (reissued)

- A. Revise locations of L11-1 devices to coordinate with the ceiling.
- B. Remove ceiling-mounted camera outlets in Rooms 169 and 170 (Ballroom).
- C. Add ceiling-mounted camera outlet in Room 168.

ITEM NO. 79:

Sheet: T301B – Telcom Plan – Floor Area B (reissued)

- A. Revise added cable delineation to outlets in Rooms 159 and 168.
- B. Add cable delineation to outlets in Rooms 169 and 170.

ITEM NO. 80:

Sheet: T701 – Technology Elevations (reissued)

- A. Revise display height and associated D8 device.

ITEM NO. 81:

Sheet: Y001 – Security Symbols Legend, Notes and Schedules (reissued)

- A. Update Camera Schedule information as indicated.

ITEM NO. 82:

Sheet: Y101B – Security Floor Plan – Floor Area B (reissued)

- A. Replace ceiling-mounted cameras with wall-mounted cameras in Rooms 169 and 170 (Ballroom).

ITEM NO. 83:

Sheet: Y801 – Security Details (reissued)

- A. Add Details 7/Y801 and 8/Y801.

ITEM NO. 84:

Sheet: AVS02 – Audiovisual System Signal Flow Diagrams (reissued)

- A. Remove AVoIP HDBaseT encoder, touch panel, and 2-input HDMI transmitter.

END OF ADDENDUM

Meeting Minutes

PROJECT:	Van Buren Charter Township The Lakeside Park	PROJECT NO.:	2500281
SUBJECT:	Pre-Bid Meeting	MEETING DATE:	October 21, 2026
		START: 10:00 a.m.	ADJOURN: 11:00 a.m.
MEETING SITE:	Van Buren Township Offices – Black Box Theatre	DISTRIBUTION DATE:	October 27, 2026, via Addendum 2
PREPARED BY:	Chad Everts	ATTACHMENTS:	☒ Yes ☐ No
ATTENDING:	See Attached Attendance Sheet		
DISTRIBUTION:	Attendees		

If information contained herein is thought to be inaccurate or incorrect, please contact writer at once for resolution.

1. General Introductions and Sign-In of Attendees
 - a. Project Manager–Chad Everts
 - b. Site Manager–Steve Johnson
 - c. Owner Rep–Elizabeth Renaud
 - d. Architect–Luke Finney, RA, LEED AP BD+C
2. Receipt of Bids
 - a. Bids are due by 10:00 a.m. on Wednesday, November 4, 2026.
 - b. Bids will be delivered to:
Van Buren Township Offices–Lakeside Park Project
ATTENTION: Fishbeck/Chad Everts
46425 Tyler Road
Van Buren Township, MI 48111
 - c. **Email bids will not be accepted.**
3. Bidding Documents
 - a. All bidding contractors have been sent bidding documents (OneDrive link via email).
4. Summary of Work
 - a. See Specification Section 00 11 00 Summary of Work for details on how work is divided.
5. Substitute and “or equal” Items
 - a. If the plans/specs call for a particular product without an “or equal” clause, no substitutions will be accepted.
 - b. If the plan/specs call for a particular product with an “or equal” clause, substitutions will require the Architect’s prior approval.
 - c. If the plans/specs call for a product based on reference standards or by description, submit for Architect’s review and approval.

6. Bid Categories
 - a. Contractors are required to familiarize themselves with ALL specifications and bid categories.
 - b. Bid categories are as follows:
 - Bid Category 03-100–Concrete
 - Bid Category 04-100–Masonry
 - Bid Category 05-100 – Structural Steel and Miscellaneous Metals
 - Bid Category 05-200 – Canopy/Skyring (NOTE: Owner has pre-selected ICON/webuildfun)
 - Bid Category 06-100–General Trades
 - Bid Category 07-100–Roofing
 - Bid Category 08-100–Curtainwall Glass and Glazing
 - Bid Category 09-100–Painting
 - Bid Category 09-300–Flooring and Tile
 - Bid Category 21-100–Fire Suppression
 - Bid Category 23-100–Plumbing, Heating, Ventilating, and Air Conditioning
 - Bid Category 26-100–Electrical, Fire Alarm, and Audio Visual
 - Bid Category 31-100–Earthwork and Site Utilities
 - Bid Category 32-100–Landscaping
 - Bid Category 35-100–Boardwalk, Boat Docks, and Fishing Pier
7. Project Schedule
 - a. The schedule is included in the Summary of Work section.
 - b. Please review the schedule and inform Fishbeck of any potential issues.
8. Bid Form
 - a. One, completely filled out Bid Form is to be submitted.
 - b. ***Bids not submitted on the supplied Bid Form will not be considered.***
9. Alternates
 - a. None at this time
10. Bonds
 - a. No bid bonding requirements for this project
 - b. Payment and Performance bonds are required for all contracts greater than \$100,000.
11. Agreement
 - a. ConsensusDocs 750 – Standard Agreement Between Constructor and Subcontractor.
12. Insurance
 - a. Insurance requirements are as noted in the Agreement, Specification Section 00 52 00, Article 9.
13. Sales Tax
 - a. All necessary sales and use taxes apply to the project.
14. Items Furnished by the Construction Manager
 - a. Full-time site supervision.
 - b. Portable toilets.
 - c. General waste dumpsters.
15. Work by Owner
 - a. Work by Owner is described in Specification Section 01 11 00 Summary of Work and as noted in the drawings.
 - b. Work includes:
 - Playground Equipment
 - Splashpad
 - Site Furnishings

- Central/Plaza Structure
- Interior Furnishings
- Food Service/Warming Kitchen Equipment

16. Addenda

- a. An Addendum will be issued on Tuesday, October 27, 2026. All questions must be received by 12:00 Noon on Monday, October 26, 2026, to be included in the Addendum.

17. Project Site Visits

- a. Bidders are welcome to visit the site immediately following the Prebid meeting today.
 - Additional site visits and walk throughs need prior approval. Please contact Chad Everts (email: ceverts@fishbeck.com, phone: 616-293-8957 to make arrangements.

18. Owner Comments

- a. Township-issued permits will be issued at no charge.

19. Fishbeck Comments

- a. Both Union and Non-Union contractors are welcome and encouraged to bid on the project. It is incorrectly noted in the Advertisement for Bids that the project is for Union-only contractors.

20. Contractor Comments

- a. None

Attendance Sheet



MEETING: Prebid Meeting

DATE: Wednesday, October 21, 2026 TIME: 10:00 a.m.

PROJECT NAME: Van Buren Charter Township
The Lakeside Park

LOCATION: Van Buren Township Offices – Black Box Theatre

PROJECT NO.: 2500281

NAME	COMPANY REPRESENTED	PHONE NO.	EMAIL	BID CATEGORY
Michelle Stinson	Lockwood Construction	810.338.3619	mstinson@lockwoodcompanies.com	06
Sebastian Leon	Eminent Excavating	313.652.4947	sleon@eminentexcavating.com	31
Dove Van Wormer	We Build Fun	989.239.8713	Dvanwormer3@gmail.com	05-2
Mark Davenport	Davenport Brothers	734.697.2994	mark@davenportbrothers.com	06
Brett Tripp	Spurlocks	734.891.5840	brett@spurlocks.com	32
Andrew Henry	Spence Brothers	734.756.3753	andrewhenry@spencebrothers.com	06
Dillon Connor	Waters Edge Docks & Hoist	517.294.7476	dillon@watersdgedockandhoist.com	35



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STANDARD AGREEMENT BETWEEN CONSTRUCTOR AND SUBCONTRACTOR



TABLE OF ARTICLES

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ARTICLE 1 AGREEMENT

Project Number: 2500281

This Agreement is made this _____ Day of _____ in the year [____], by and between the

CONSTRUCTOR,
Fishbeck
1515 Arboretum Drive SE
Grand Rapids, Michigan 49546



and the

SUBCONTRACTOR,

NAME

ADDRESS

ADDRESS

Tax identification number (TIN) _____

Contractor License No., if applicable _____

For services in connection with the Subcontract Work for Bid Category _____ for the following

PROJECT: Van Buren Charter Township Lakeside Park |

Owner is Van Buren Charter Township,

and the Design Professional is Fishbeck.

ARTICLE 2 SCOPE OF WORK

2.1 PARTIES RELATIONSHIP Each Party agrees to act on the basis of mutual trust, good faith, and fair dealing. The Parties shall each endeavor to promote harmony and cooperation, and perform in an economical and timely manner.

2.1.1 ETHICS Each Party shall perform with integrity. Each shall: (a) avoid conflicts of interest; and (b) promptly disclose to the other Party any conflicts that arise. Each Party warrants that it has not and shall not pay nor receive any contingent fees or gratuities to or from the other Party, including its agents, officers, employees, subcontractors or others for whom they may be liable, to secure preferential treatment. |

2.2 SUBCONTRACT WORK Constructor contracts with Subcontractor as an independent contractor to provide all labor, materials, equipment, and services necessary to complete the Subcontract Work in accordance with, and reasonably inferable from, the Subcontract Documents, and consistent with the Progress Schedule, as may change from time to time. Subcontractor shall perform the Subcontract Work under Constructors general direction and in accordance with the Subcontract Documents.

2.3 CONSTRUCTORS WORK Constructors Work is the construction and services required of Constructor to fulfill its obligations pursuant to its agreement with Owner (the Work). The "Subcontract Work" is a portion of Constructors Work. |

2.4 SUBCONTRACT DOCUMENTS The Subcontract Documents include this Agreement, the Prime Agreement, special conditions, general conditions, specifications, drawings, addenda issued and acknowledged before execution of this Agreement, amendments, laboratory testing that are Contract Documents, other documents listed in this Agreement, and modifications issued in accordance with this Agreement. Constructor shall provide to Subcontractor, before the execution of this Agreement, copies of the existing Subcontract Documents. Subcontractor shall provide copies of applicable portions of the Subcontract Documents to its proposed subcontractors and suppliers. Nothing shall prohibit Subcontractor from obtaining copies of the Subcontract Documents from Constructor at any time after the Subcontract Agreement is executed.

2.4.1 ELECTRONIC DOCUMENTS If Owner requires that Owner, Design Professional, Constructor, and Subcontractors exchange documents and data in electronic or digital form, before any such



exchange, Owner, Design Professional, and Constructor shall agree on and follow a written protocol, which at minimum, shall specify: (a) the definition of documents and data to be accepted in electronic or digital form or to be transmitted electronically or digitally; (b) management and coordination responsibilities; (c) necessary equipment, software, and services; (d) acceptable formats, transmission methods, and verification procedures; (e) methods for maintaining version control; (f) privacy and security requirements; and (g) storage and retrieval requirements. Subcontractor shall provide whatever input is needed to assist Constructor in developing the protocol and shall be bound by the requirements of the written protocol. Except as otherwise agreed upon in writing, the Parties shall each bear their own costs as identified in the protocol. In the absence of a written protocol, use of documents and data in electronic or digital form shall be at the sole risk of the recipient.

2.5 CONFLICTS In the event of a conflict between this ConsensusDocs 750 Standard Agreement as modified and the other Subcontract Documents, the ConsensusDocs 750 shall govern.

2.6 DEFINITIONS

2.6.1 "Agreement" means this ConsensusDocs 750 Standard Agreement Between Constructor and Subcontractor, as modified by the Parties, and exhibits and attachments made part of this agreement upon its execution. |

2.6.1.1 The following exhibits are as follows: |

Exhibit A: The Bid dated [____].

Exhibit B: The Drawings, Specifications, General and Other Conditions dated [____], addenda, and other information.

Exhibit C: Progress Schedule.

Exhibit D: Alternates and Unit Prices and Estimated Quantities.

Exhibit E: Insurance Documents.

Exhibit F: Bonds.

Exhibit G: Labor Relations.

2.6.2 "Business Day" means all Days, except weekends and official federal or state holidays where the Project is located.

2.6.3 The term "Day" shall mean calendar day.

2.6.4 Not Used

2.6.5 "Law" means a federal, state, or local law, ordinance, code, rule, or regulation applicable to the Subcontract Work with which a Party must comply that is enacted as of the Agreement date.

2.6.6 The "Parties" are collectively Constructor and Subcontractor.

2.6.7 "Prime Agreement" means the agreement between Constructor and Owner for the construction of the Project.

2.6.8 A "Subcontract Change Order" is a written order signed by The Parties after execution of this Agreement, indicating changes in the scope of the Subcontract Work, the Subcontract Amount, or Subcontract Time, including substitutions proposed by Subcontractor and accepted by Constructor.

2.6.9 "Subcontract Time" means the time period on the Progress Schedule between commencing and completing the Subcontract Work.



2.6.10 "Worksite" means the geographical area of the Project location as identified in the design documents where the Work is to be performed.

2.6.11 The term "Constructor" within this agreement shall mean Construction Manager within the Division 0 and Division 1 specification sections.

ARTICLE 3 SUBCONTRACTOR'S RESPONSIBILITIES

3.1 OBLIGATIONS The Parties are mutually bound by the terms of this Agreement. To the extent the terms of the Prime Agreement apply to the Subcontract Work, then Constructor assumes toward Subcontractor all the obligations, rights, duties, and redress that Owner under the Prime Agreement assumes toward Constructor. In an identical way, Subcontractor hereby assumes toward Constructor all the same obligations, rights, duties, and redress that Constructor assumes toward Owner and Design Professional under the Prime Agreement. In the event of an inconsistency among the documents, the specific terms of this Agreement shall govern.

3.2 RESPONSIBILITIES Subcontractor shall furnish its diligent efforts to perform the Subcontract Work in an expeditious manner and to cooperate with Constructor so that Constructor may fulfill its obligations to Owner. Subcontractor shall furnish all of the labor, materials, equipment, and services, including but not limited to competent supervision, shop drawings, samples, tools, and scaffolding as are necessary for the proper performance of the Subcontract Work, all of which shall be provided in full accord with and reasonably inferable from the Subcontract Documents. Subcontractor shall provide Constructor a list of its proposed subcontractors and suppliers, and be responsible for taking field dimensions, providing tests, obtaining required permits related to the Subcontract Work and affidavits, ordering of materials, and all other actions as required to meet the Progress Schedule.

3.3 INCONSISTENCIES AND OMISSIONS Subcontractor shall examine and compare the drawings, specifications, other Subcontract Documents, and information furnished by Owner relative to the Subcontract Work. Such examination and comparison shall be solely for the purpose of facilitating the Subcontract Work and not for the discovery of errors, inconsistencies, or omissions in the Subcontract Documents nor for ascertaining if the Subcontract Documents are in accordance with Laws. Subcontractor shall not have liability for errors, omissions, or inconsistencies discovered under this subsection unless Subcontractor knowingly fails to report a recognized problem to Constructor. Should Subcontractor discover any errors, inconsistencies, or omissions in the Subcontract Documents, Subcontractor shall promptly report such discoveries to Constructor in writing. Following receipt of written notice, Constructor shall promptly instruct Subcontractor as to the measures to be taken, and Subcontractor shall comply with Constructor's instructions. If Subcontractor performs work knowing it to be contrary to Laws without notice to Constructor and advance approval by appropriate authorities, including Constructor, Subcontractor shall assume responsibility for such work and bear all associated costs, charges, fines, penalties, fees, and expenses necessarily incurred to remedy the violation. Subcontractor may be entitled to additional costs or time because of clarifications or instructions arising out of Subcontractor's reports described in this section. Nothing in this section shall relieve Subcontractor of responsibility for its own errors, inconsistencies, and omissions.

3.4 WORKSITE VISITATION Before commencing the Subcontract Work, Subcontractor shall examine and compare the Subcontract Documents, relevant field measurements made by Subcontractor or shared by Constructor, and any visible conditions at the Worksite affecting the Subcontract Work. If Subcontractor discover any errors, omissions, or inconsistencies in the Subcontract Documents or between its Worksite observations and the Subcontract Documents, such discrepancies shall be promptly reported to Constructor.

3.5 INCREASED COSTS OR TIME Subcontractor may assert a claim if Constructor's clarifications or instructions in response to requests for information are believed to require additional time or cost. If



Subcontractor fails to perform the reviews and comparisons required in §3.3 and §3.4, to the extent Constructor is held liable to Owner because of Subcontractor's failure, Subcontractor shall pay the costs and damages to Constructor that would have been avoided if Subcontractor had performed those obligations.

3.6 COMMUNICATIONS Except as otherwise provided in the Subcontract Documents or for emergencies, Subcontractor shall direct Project-related communications to Constructor.

3.7 SUBMITTALS

3.7.1 Subcontractor promptly shall submit for approval to Constructor all shop drawings, samples, product data, manufacturers' literature, and similar submittals required by the Subcontract Documents. Submittals shall be submitted in electronic form if required. Subcontractor shall be responsible to Constructor for the accuracy and conformity of its submittals to the Subcontract Documents. Subcontractor shall prepare and deliver its submittals to Constructor in a manner consistent with the Progress Schedule and in such time and sequence so as not to delay Constructor or others in the performance of the Work, but not later than thirty (30) days after notice to proceed has been issued, unless a revised submittal schedule has been approved by the Constructor. Subcontractor's submittals shall identify in writing for each submittal all changes, deviations, or substitutions from the requirements of the Subcontract Documents. The approval of any Subcontractor submittal shall not be deemed to authorize changes, deviations, or substitutions in the requirements of the Subcontract Documents unless express written approval is obtained from Constructor and Owner authorizing such change, deviation, or substitution. Such approval shall be promptly memorialized in a Subcontract Change Order within seven (7) Days following approval by Constructor and, if applicable, provide for an adjustment in the Subcontract Amount or Subcontract Time. If the Subcontract Documents do not contain submittal requirements pertaining to the Subcontract Work, Subcontractor agrees upon request to submit in a timely fashion to Constructor for approval any shop drawings, samples, product data, manufacturers' literature, or similar submittals as may reasonably be required by Constructor, Owner, or Design Professional.

3.7.2 Constructor, Owner, and Design Professional are entitled to rely on the adequacy, accuracy, and completeness of any professional certifications required by the Subcontract Documents concerning the performance criteria of systems, equipment, or materials, including all relevant calculations and any governing performance requirements.

3.8 DESIGN DELEGATION

3.8.1 If the Subcontract Documents specify that Subcontractor is responsible for the design of a particular system or component for Project incorporation, then all design and performance criteria shall be specified. Subcontractor shall not be responsible for the adequacy of such performance and design criteria. Subcontractor shall be responsible for conformance of its design with the information given and the design concept expressed in the Subcontract Documents. As required by the Law, Subcontractor shall procure design services and necessary certifications from licensed design professionals. The signature and seal of Subcontractor's design professional shall appear on all drawings, calculations, specifications, certifications, shop drawings, and other submittals related to the Subcontract Work designed or certified by Subcontractor's design professional. Constructor shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by Subcontractor's design professional.

3.8.2 Subcontractor's design professional(s) is _____. If Subcontractor's design professional is an independent professional, the design services shall be procured pursuant to a separate agreement between Subcontractor and the design professional. The agreement between Subcontractor and Subcontractor's design professional shall not include any



limitation of liability, except to the extent that consequential damages are waived pursuant to §5.4.1, or exclusion from participation in the multiparty proceedings requirement of §11.4. Subcontractor shall notify Constructor in writing if it intends to change its procured design professional.

3.9 COORDINATION Subcontractor shall: (a) cooperate with Constructor and others whose work may interface with the Subcontract Work, (b) specifically note and immediately advise Constructor of any such interface with the Subcontract Work, and (c) participate in preparing coordination drawings and work schedules in congested areas.

3.10 SUBCONTRACTOR'S REPRESENTATIVE Subcontractor's authorized representative is _____. This person shall possess full authority to receive and act upon instructions, orders, or directions. If Subcontractor changes its representative, or the representative's authority, Subcontractor shall immediately notify Constructor in writing.

3.11 TESTS AND INSPECTIONS Subcontractor shall schedule all required tests, approvals, and inspections of the Subcontract Work at appropriate times so as not to delay the progress of the Work or other work related to the Project. Subcontractor shall give proper written notice to all required Parties of such tests, approvals, and inspections. Except as otherwise provided in the Subcontract Documents, Subcontractor shall bear all expenses associated with tests, inspections, and approvals required of Subcontractor by the Subcontract Documents, which shall be conducted by an independent testing laboratory or entity approved by Constructor and Owner. Required certificates of testing, approval, or inspection shall, unless otherwise required by the Subcontract Documents, be secured by Subcontractor and promptly delivered to Constructor.

3.12 WARRANTIES Subcontractor warrants that all materials and equipment shall be new unless otherwise specified, of good quality, in conformance with the Subcontract Documents, and free from defective workmanship and materials. Upon request by Constructor, Subcontractor shall furnish satisfactory evidence of the quality and type of materials and equipment furnished. Subcontractor further warrants that the Subcontract Work shall be free from material defects not intrinsic in the design or materials required in the Subcontract Documents. Subcontractor's warranty does not include remedies for defects or damages caused by normal wear and tear during normal usage, use for a purpose for which the Project was not intended, improper or insufficient maintenance, modifications performed by others, or abuse. Subcontractor's warranties shall commence on the date of Substantial Completion of the Work or a designated portion.

3.13 CLEANUP

3.13.1 Subcontractor shall at all times during its performance of the Subcontract Work keep the Worksite clean and free from debris resulting from the Subcontract Work. Before discontinuing the Subcontract Work in an area, Subcontractor shall clean the area and remove all its rubbish and its construction equipment, tools, machinery, waste, and surplus materials. Subcontractor shall make provisions to minimize and confine dust and debris resulting from its construction activities. Subcontractor shall not be held responsible for unclean conditions caused by others.

3.13.2 If Subcontractor fails to commence compliance with cleanup duties within two (2) Business Days after written notification from Constructor of non-compliance, Constructor may implement appropriate cleanup measures without further notice and shall deduct the reasonable costs from any amounts due or to become due Subcontractor in the next payment period.

3.14 SAFETY PROGRAMS Subcontractor is required to perform the Subcontract Work in a safe and reasonable manner. Subcontractor shall prevent against injury, loss, or damage to persons or property by taking reasonable steps to protect: (a) employees and other persons at the Worksite; (b) materials and



equipment stored on or off the Worksite for performing the Subcontract Work; and (c) all property and structures located at the Worksite and adjacent.

3.14.1 Subcontractor shall give all required notices and comply with all applicable rules, regulations, orders, and other lawful requirements established to prevent injury, loss, or damage to persons or property.

3.14.2 Subcontractor shall implement appropriate safety programs pertaining to the Subcontract Work and the Project, including establishing safety rules, posting appropriate warnings and notices, erecting safety barriers, and establishing proper notice procedures to protect persons and property at the Worksite and adjacent to the Worksite from injury, loss, or damage.

3.14.3 Subcontractor shall exercise extreme care in carrying out any of the Subcontract Work which involves explosive or other dangerous methods of construction or hazardous procedures, materials, or equipment. Subcontractor shall use properly qualified individuals or entities to carry out the Subcontract Work in a safe and reasonable manner so as to reduce the risk of bodily injury or property damage.

3.14.4 Damage or loss not insured under property insurance and to the extent caused by the negligent or intentionally wrongful acts or omissions of Subcontractor, or anyone for whose acts Subcontractor may be liable, shall be promptly remedied by Subcontractor. Damage or loss to the extent caused by the negligent or intentionally wrongful acts or omissions of Constructor, or anyone for whose acts Constructor may be liable, shall be promptly remedied by Constructor.

3.14.5 Subcontractor is required to designate an individual at the Worksite in the employ of Subcontractor who shall act as Subcontractor's designated safety representative with a duty to prevent accidents. Unless otherwise identified by Subcontractor in writing to Constructor, the designated safety representative shall be Subcontractor's project superintendent. Such safety representative shall attend Worksite safety meetings as requested by Constructor.

3.14.6 Subcontractor has an affirmative duty not to overload the structures or conditions at the Worksite and shall take reasonable steps not to load any part of the structures or Worksite so as to give rise to an unsafe condition or create an unreasonable risk of bodily injury or property damage. Subcontractor shall have the right to request, in writing, from Constructor loading information concerning the structures at the Worksite.

3.14.7 Subcontractor shall give prompt written notice to Constructor of any accident involving bodily injury requiring a physician's care, any property damage exceeding five hundred dollars (\$500.00) in value, or any failure that could have resulted in serious bodily injury, whether or not such an injury was sustained.

3.14.8 Prevention of accidents at the Worksite is the responsibility of Constructor, Subcontractor, and all other subcontractors, persons, and entities at the Worksite. Establishment of a safety program by Constructor shall not relieve Subcontractor or other parties of their safety responsibilities. Subcontractor shall establish its own safety program implementing safety measures, policies, and standards conforming to those required or recommended by governmental and quasi-governmental authorities having jurisdiction and by Constructor and Owner, including, but not limited to, requirements imposed by the Subcontract Documents. Subcontractor shall comply with the reasonable recommendations of insurance companies having an interest in the Project, and shall stop any part of the Subcontract Work which Constructor deems unsafe until corrective measures satisfactory to Constructor shall have been taken. Constructor's failure to stop Subcontractor's unsafe practices does not relieve Subcontractor of its responsibility. Subcontractor shall notify Constructor immediately following a reportable incident under applicable rules, regulations, orders,



and other lawful requirements, and promptly confirm the notice in writing. A detailed written report shall be furnished if requested by Constructor. To the fullest extent permitted by Law, each Party to this Agreement shall indemnify the other Party from and against fines or penalties imposed as a result of safety violations, but only to the extent that such fines or penalties are caused by its failure to comply with applicable safety requirements. This indemnification obligation does not extend to additional or increased fines that result from repeated or willful violations not caused by Subcontractor's failure to comply with applicable rules, regulations, orders, and other lawful requirements.

3.14.9 Prior to the start of any work on the jobsite, Subcontractor shall furnish Constructor with an electronic copy of their Safety Manual and Silica Exposure Control Plan.

3.15 PROTECTION OF THE WORK Subcontractor shall take necessary precautions to properly protect the Subcontract Work and the work of others from damage caused by Subcontractor's operations. Should Subcontractor cause damage to the Subcontract Work or property of Owner, Constructor, or others, Subcontractor shall promptly remedy such damage to the satisfaction of Constructor, or Constructor may, after forty-eight (48) hours' written notice to Subcontractor, remedy the damage and deduct its cost from any amounts due or to become due Subcontractor, unless such costs are recovered under applicable property insurance.

3.16 EMERGENCIES In an emergency affecting the safety of persons or property, Subcontractor shall act to prevent threatened damage, injury, or loss. Any change in the Subcontract Amount or the Progress Schedule from actions of Subcontractor in an emergency situation shall be determined as provided in ARTICLE 7.

3.17 PERMITS AND TAXES Subcontractor shall give timely notices required by Law pertaining to the Subcontract Work, and is responsible for all permits, fees, licenses, assessments, inspections, testing, and taxes necessary to complete the Subcontract Work in accordance with the Subcontract Documents.

3.18 HAZARDOUS MATERIALS Subcontractor shall have the same rights and obligations as Constructor does under the Prime Agreement or Law regarding hazardous materials, provided that the hazardous materials affect the Subcontract Work's area or originate with Subcontractor.

3.19 SAFETY DATA SHEETS (SDS) Subcontractor shall submit to Constructor printed copies of all SDS required by law for materials or substances necessary for the performance of the Subcontract Work. SDS sheets obtained by Constructor from other subcontractors or sources shall be made available to Subcontractor by Constructor.

3.20 LAYOUT RESPONSIBILITY AND LEVELS Constructor shall establish principal axis lines of the building and Worksite, and benchmarks. Subcontractor shall lay out and be strictly responsible for the accuracy of the Subcontract Work and for any loss or damage to Constructor or others by reason of Subcontractor's failure to lay out or perform Subcontract Work correctly. Subcontractor shall exercise prudence so that the actual final conditions and details shall result in alignment of finish surfaces.

3.21 CORRECTION OF COVERED SUBCONTRACT WORK

3.21.1 UNCOVERING OF SUBCONTRACT WORK

3.21.1.1 If required in writing by Constructor, Subcontractor must uncover any portion of the Subcontract Work which has been covered by Subcontractor in violation of the Subcontract Documents or contrary to a directive issued to Subcontractor by Constructor. Upon receipt of a written directive from Constructor, Subcontractor shall uncover such work for Constructor's



or Owner's inspection and restore the uncovered Subcontract Work to its original condition at Subcontractor's time and expense.

3.21.1.2 Constructor may direct Subcontractor to uncover portions of the Subcontract Work for inspection by Owner or Constructor at any time. Subcontractor is required to uncover such work whether or not Constructor or Owner had requested to inspect the Subcontract Work before such work was covered. Except as provided by the subsection immediately above, this Agreement shall be adjusted by Subcontract Change Order for the cost and time of uncovering and restoring any work which is uncovered for inspection and proves to be installed in accordance with the Subcontract Documents, provided Constructor had not previously instructed Subcontractor in writing to leave the work uncovered. If Subcontractor uncovers work pursuant to a directive issued by Constructor, and such work upon inspection does not comply with the Subcontract Documents, Subcontractor shall be responsible for all costs and time of uncovering, correcting, and restoring the work so as to make it conform to the Subcontract Documents. If Constructor or some other entity for which Subcontractor is not responsible caused the nonconforming condition, Constructor shall be required to adjust this Agreement by Subcontract Change Order for all such costs and time.

3.21.2 CORRECTION OF WORK

3.21.2.1 If the Design Professional or Constructor rejects the Subcontract Work or the Subcontract Work is not in conformance with the Subcontract Documents, Subcontractor shall promptly correct the Subcontract Work whether it had been fabricated, installed, or completed. Subcontractor shall be responsible for the costs of correcting such Subcontract Work, any additional testing, inspections, and compensation for services and expenses of Design Professional and Constructor made necessary by the defective Subcontract Work.

3.21.2.2 In addition to Subcontractor's obligations under this §3.21, Subcontractor agrees to promptly correct, after receipt of a written notice from Constructor, all Subcontract Work which proves to be defective in workmanship or materials within a period of one year from the date of substantial completion of the Subcontract Work or for a longer period of time as may be required by specific warranties in the Subcontract Documents. Substantial completion of the Subcontract Work, or of a designated portion, occurs on the date when construction is sufficiently complete in accordance with the Subcontract Documents so that Owner can occupy or utilize the Project, or a designated portion, for the use for which it is intended, without unapproved disruption. If, during the one-year period, Constructor fails to provide Subcontractor with prompt written notice of the discovery of defective or nonconforming Subcontract Work, Constructor shall neither have the right to require Subcontractor to correct such Subcontract Work nor the right to make a claim for breach of warranty. If Subcontractor fails to correct defective or nonconforming Subcontract Work within a reasonable time after receipt of notice from Constructor, Constructor may correct such Subcontract Work pursuant to §10.1.1.

3.21.3 Subcontractor's correction of Subcontract Work pursuant to this section shall not extend the one-year period for the correction of Subcontract Work, but if Subcontract Work is first performed after Substantial Completion, the one-year period for corrections shall commence when that Subcontract Work portion is substantially complete. Subcontractor's obligation to correct Subcontract Work within one year does not limit the enforcement of Subcontractor's other obligations with regard to the Agreement and the Subcontract Documents.

3.21.4 If Subcontractor's correction or removal of Subcontract Work destroys or damages other completed or partially completed work or existing buildings, Subcontractor shall be responsible for destroyed or damaged work correction costs.



3.21.5 If portions of Subcontract Work which do not conform with the requirements of the Subcontract Documents are neither corrected by Subcontractor nor accepted by Constructor, Subcontractor shall remove such Subcontract Work from the Project Worksite if so directed by Constructor.

3.22 MATERIALS OR EQUIPMENT FURNISHED BY OTHERS If the scope of the Subcontract Work includes installation of materials or equipment furnished by others, Subcontractor is responsible for exercising proper care in receiving, handling, storing, and installing such items, unless otherwise provided in the Subcontract Documents. Subcontractor shall examine the items provided and report to Constructor in writing any items it may discover that do not conform to requirements of the Subcontract Documents. Subcontractor shall not proceed to install nonconforming items without further instructions from Constructor. Loss or damage due to acts or omissions of Subcontractor shall, upon two (2) Business Days' written notice to Subcontractor, be deducted from any amounts due or to become due Subcontractor.

3.23 SUBSTITUTIONS No substitutions shall be made in the Subcontract Work unless permitted in the Subcontract Documents, and only upon Subcontractor first receiving all approvals required under the Subcontract Documents for substitutions.

3.24 USE OF CONSTRUCTOR'S EQUIPMENT Subcontractor, its agents, employees, subcontractors, or suppliers shall use Constructor's equipment only with the express written permission of Constructor's designated representative and in accordance with Constructor's terms and conditions for such use. If Subcontractor or any of its agents, employees, subcontractors, or suppliers utilize any of Constructor's equipment, including machinery, tools, scaffolding, hoists, lifts, or similar items owned, leased, or under the control of Constructor, Subcontractor shall indemnify and be liable to Constructor as provided in ARTICLE 9 for any loss or damage (including bodily injury or death) which may arise from such use, except to the extent that such loss or damage is caused by the negligence of Constructor's employees operating Constructor's equipment.

3.25 WORK FOR OTHERS Until final completion of the Subcontract Work, Subcontractor agrees not to perform any work directly for Owner or any tenants, or deal directly with Owner's representatives in connection with the Subcontract Work, unless otherwise approved in writing by Constructor.

3.26 SYSTEMS AND EQUIPMENT STARTUP With the assistance of Owner's maintenance personnel and Constructor, Subcontractor shall direct the check-out and operation of systems and equipment for readiness, and assist in their initial startup and the testing of the Subcontract Work.

3.27 COMPLIANCE WITH LAWS Subcontractor agrees to comply with the Law at its own cost. Subcontractor shall be liable to Constructor and Owner for all loss, cost, and expense attributable to any acts or omissions by Subcontractor, its employees, subcontractors, suppliers, and agents resulting from the failure to comply with the Law, including any fines, penalties, or corrective measures, except as provided in §3.14.8. However, liability under this section shall not apply if prior approval by appropriate authorities and Constructor is received.

3.27.1 To the extent Constructor receives reimbursement or additional time from Owner under the Prime Agreement, the Subcontract Amount or Progress Schedule shall be equitably adjusted for changes in the Law enacted after the date of this Agreement, including taxes, affecting the performance of the Work.

3.28 CONFIDENTIALITY To the extent the Prime Agreement provides for the confidentiality of any of Owner's proprietary or otherwise confidential information disclosed in connection with the performance of this Agreement, Subcontractor is equally bound by Owner's confidentiality requirements.



3.29 ROYALTIES, PATENTS, AND COPYRIGHTS Subcontractor shall pay all royalties and license fees which may be due on the inclusion of any patented or copyrighted materials, methods, or systems selected by Subcontractor and incorporated in the Subcontract Work. Subcontractor shall defend, indemnify, and hold Constructor and Owner harmless from all suits or claims for infringement of any patent rights or copyrights arising out of such selection. Subcontractor shall be liable for all loss, including all costs, expenses, and attorneys' fees, but shall not be responsible for such defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Subcontract Documents. However, if Subcontractor has reason to believe a particular design, process, or product required by Subcontract Documents is an infringement of a patent, Subcontractor shall promptly furnish such information to Constructor or be responsible to Constructor and Owner for any loss as a result.

ARTICLE 4 CONSTRUCTOR'S RESPONSIBILITIES

4.1 CONSTRUCTOR'S REPRESENTATIVE Constructor's authorized representative is Chad Everts. Constructor's representative shall be the only person Subcontractor shall look to for instructions, orders, or directions, except in an emergency. If Constructor changes its representative, Constructor shall promptly notify Subcontractor in writing.

4.2 OWNER'S ABILITY TO PAY

4.2.1 Unless expressly prohibited by the Prime Agreement, Constructor shall promptly provide to Subcontractor the following information received from Owner: (a) upon Subcontractor's request, information regarding Owner's financial ability to pay for the Work, and (b) notice of any material variation in Owner's financial ability to pay. Constructor, however, does not warrant the accuracy or completeness of the information provided.

4.2.2 If Subcontractor does not receive the information referenced in the subsection immediately above with regard to Owner's ability to pay for the Work as required by the Contract Documents, Subcontractor may request the information from Owner or Owner's lender.

4.3 CONSTRUCTOR APPLICATION FOR PAYMENT Upon request, Constructor shall give Subcontractor a copy of the most current Constructor application for payment reflecting the amounts approved or paid by Owner for the Subcontract Work performed to date.

4.4 INFORMATION OR SERVICES Subcontractor is entitled to request through Constructor any information or services required for Subcontractor's performance of the Subcontract Work which is under Owner's control. Subcontractor also is entitled to request through Constructor any information necessary to give notice of or enforce mechanic's lien rights and, where applicable, stop notices. This information shall include Owner's interest in the real property on which the Project is located and the recorded legal title. To the extent Constructor receives such information or services, Constructor shall provide them to Subcontractor in a timely manner. Constructor, however, does not warrant the accuracy or completeness of the information provided by Owner. To the extent Owner provides any warranty of Owner provided information, Constructor agrees to permit Subcontractor to prosecute a claim in the name of Constructor for the use and benefit of Subcontractor, pursuant to §5.3.2.

4.5 STORAGE AREAS Constructor shall allocate adequate storage areas, if available, for Subcontractor's materials and equipment during the course of the Subcontract Work. Unless otherwise agreed upon, Constructor shall reimburse Subcontractor for the additional costs of having to relocate such storage areas at the direction of Constructor.



4.6 TIMELY COMMUNICATIONS Constructor shall transmit to Subcontractor, with reasonable promptness, all submittals, transmittals, and written approvals relative to the Subcontract Work. Unless otherwise specified in the Subcontract Documents, if communications are not through Subcontractor, Constructor shall inform Subcontractor of the communications Constructor has with Subcontractor's subcontractors and suppliers.

4.7 USE OF SUBCONTRACTOR'S EQUIPMENT Constructor, its agents, employees, other subcontractors, or suppliers shall use Subcontractor's equipment only with the express written permission of Subcontractor's designated representative and in accordance with Subcontractor's terms and conditions for such use. If Constructor or any of its agents, employees, or suppliers utilize any of Subcontractor's equipment, including machinery, tools, scaffolding, hoists, lifts, or similar items owned, leased, or under the control of Subcontractor, Constructor shall indemnify and hold harmless Subcontractor as provided in ARTICLE 9 for any loss or damage which may arise from such use, except to the extent that such loss or damage is caused by the negligence of Subcontractor's employees operating Subcontractor's equipment.

ARTICLE 5 PROGRESS SCHEDULE

5.1 TIME IS OF THE ESSENCE Time is of the essence with regard to the obligations of the Subcontract Documents.

5.2 SCHEDULE Subcontractor shall provide Constructor with any scheduling information proposed by Subcontractor for the Subcontract Work. In consultation with Subcontractor, Constructor shall prepare the schedule for performance of the Work ("Progress Schedule") and shall revise and update such schedule, as necessary, as the Work progresses. The Progress Schedule binds each Party and all subsequent changes and additional details shall be submitted to Subcontractor promptly and reasonably in advance of the required performance. Constructor shall have the right to determine and, if necessary, make reasonable changes to the time, order, and priority in which the various portions of the Work shall be performed and all other matters relative to the Subcontract Work. To the extent such changes increase Subcontractor's time and costs, Subcontractor may seek equitable adjustment in the Subcontract Amount or Subcontract Time in accordance with the Subcontract Documents.

5.3 DELAYS AND EXTENSIONS OF TIME

5.3.1 OWNER CAUSED DELAY Subject to §5.3.2, if the commencement or progress of the Subcontract Work is delayed without the fault or responsibility of Subcontractor, the Subcontract Time shall be extended by Subcontract Change Order and the Subcontract Amount equitably adjusted to the extent obtained by Constructor under the Subcontract Documents, and the Progress Schedule shall be revised accordingly.

5.3.2 CLAIMS RELATING TO OWNER Subcontractor agrees to initiate all claims for which Owner is or may be liable in the manner and within the time limits provided in the Subcontract Documents for like claims by Constructor upon Owner and in sufficient time for Constructor to initiate such claims against Owner in accordance with the Subcontract Documents. At Subcontractor's request and expense to the extent agreed upon in writing, Constructor agrees to permit Subcontractor to prosecute a claim in the name of Constructor for the use and benefit of Subcontractor in the manner provided in the Subcontract Documents for like claims by Constructor upon Owner.

5.3.3 CONSTRUCTOR CAUSED DELAY Nothing in this article precludes Subcontractor's recovery of delay damages caused by Constructor.

5.3.4 CLAIMS RELATING TO CONSTRUCTOR Subcontractor shall give Constructor written notice of all claims not included in §5.3.2 within fourteen (14) Days of Subcontractor's knowledge of the facts



giving rise to the claim. Thereafter, Subcontractor shall submit written documentation of its claim, including appropriate supporting documentation, within twenty-one (21) Days after giving notice, unless the Parties agree upon a longer period of time. Constructor shall respond in writing denying or approving, in whole or in part, Subcontractor's claim no later than fourteen (14) Days after receipt of Subcontractor's documentation of claim. Constructor's failure to respond shall be deemed a denial of Subcontractor's claim. All unresolved claims, disputes, and other matters in question between the Parties not relating to claims included in §5.3.2 shall be resolved as provided for in ARTICLE 11.

5.4 LIMITED MUTUAL WAIVER OF CONSEQUENTIAL DAMAGES

5.4.1 Except for any (a) liquidated, consequential, or other damages that Owner is entitled to recover against Constructor under the Prime Agreement, and (b) losses covered by insurance required by the Subcontract Documents, the Parties mutually waive all claims against each other for consequential damages, including but not limited to, damages for loss of business, loss of financing, loss of profits not related to this Project, loss of bonding capacity, loss of reputation, or insolvency. Similarly, Subcontractor shall obtain in contracts with its subcontractors mutual waivers of consequential damages that correspond to Subcontractor's waiver of consequential damages. The provisions of this subsection shall also apply to and survive this Agreement.

5.5 Not Used

ARTICLE 6 SUBCONTRACT AMOUNT

6.1 As full compensation for performance of this Agreement, Constructor agrees to pay Subcontractor in current funds for the satisfactory performance of the Subcontract Work subject to all applicable provisions of this Agreement:

6.1.1 the fixed-price of [] dollars (\$[]) subject to additions and deductions as provided for in the Subcontract Documents; or

6.1.2 alternates and unit prices in accordance with the attached schedule of alternates and unit prices and estimated quantities, which is incorporated by reference and identified as Exhibit D; or

6.1.3 time and material rates and prices in accordance with the attached Schedule of Labor and Material Costs which is incorporated by reference and identified as Exhibit [].

The fixed-price, unit prices, or time and material rates and prices are referred to as the Subcontract Amount.

ARTICLE 7 CHANGES

7.1 Subcontractor may request or Constructor may order changes in the Subcontract Work or the timing or sequencing of the Subcontract Work that impacts the Subcontract Amount or Subcontract Time. A change in the Subcontract Work that affects the Subcontract Amount or the Subcontract Time shall be formalized in a Subcontract Change Order and processed in accordance with this article.

7.1.1 For changes in the Subcontract Work, the Parties shall negotiate in good faith an appropriate adjustment to the Subcontract Amount or the Subcontract Time and shall conclude these negotiations as expeditiously as possible. Acceptance of the Subcontract Change Order and any adjustment in the Subcontract Amount or Subcontract Time shall not be unreasonably withheld.

7.2 Not Used



7.3 CONCEALED OR UNKNOWN SITE CONDITIONS If a condition encountered at the Worksite is (a) a subsurface or other physical condition materially different from those indicated in the Subcontract Documents, or (b) an unusual and unknown physical condition materially different from conditions ordinarily encountered and generally recognized as inherent in the Subcontract Work provided for in the Subcontract Documents, Subcontractor shall stop affected Work after the condition is first observed and give prompt written notice of the condition to Constructor. Subcontractor shall not be required to perform any Work relating to the condition without the written mutual agreement of the Parties. Any change in the Contract Price or the Contract Time as a result of the condition, including a dispute about its existence or nature, shall be determined as provided in ARTICLE 7.

7.4 ADJUSTMENTS IN SUBCONTRACT AMOUNT An adjustment in the Subcontract Amount resulting from a Subcontract Change Order shall be determined by one of the following methods:

7.4.1 mutual acceptance of an itemized lump sum;

7.4.2 unit prices as indicated in the Subcontract Documents or as subsequently agreed to by the Parties; or

7.4.3 costs as determined in the Subcontract Documents or in a manner otherwise acceptable to the Parties, and a mutually acceptable fixed or percentage fee.

7.5 SUBSTANTIATION OF ADJUSTMENT If Subcontractor does not respond promptly or disputes the method of adjustment, the method and the adjustment shall be determined by Constructor on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in the case of an increase in the Subcontract Amount, an allowance for overhead and profit of the percentage provided in §7.6, or if none is provided, as mutually agreed upon by the Parties. Subcontractor may contest the reasonableness of any adjustment determined by Constructor. Subcontractor shall maintain for Constructor's review and approval an appropriately itemized and substantiated accounting of the following items attributable to the Subcontract Change Order:

7.5.1 labor costs, including Social Security, health, welfare, retirement, and other fringe benefits as normally required, and state workers' compensation insurance;

7.5.2 costs of materials, supplies, and equipment, whether incorporated in the Subcontract Work or consumed, including transportation costs;

7.5.3 costs of renting machinery and equipment other than hand tools;

7.5.4 costs of bond and insurance premiums, permit fees, and taxes attributable to the change; and

7.5.5 costs of additional supervision and field office personnel services necessitated by the change.

7.6 Adjustments shall be based on net change in Subcontractor's reasonable cost of performing the changed Subcontract Work plus, in case of a net increase in cost, an agreed upon sum for overhead and profit not to exceed **four** percent (4%).

7.7 NO OBLIGATION TO PERFORM Subcontractor shall not be obligated to perform changes in the Subcontract Work until a Subcontract Change Order has been executed or written instructions have been issued in accordance with §7.8.

7.8 INCIDENTAL CHANGES Constructor may direct Subcontractor to perform incidental changes in the Subcontract Work which do not involve adjustments in the Subcontract Amount or the Subcontract Time. Incidental changes shall be consistent with the scope and intent of the Subcontract Documents.



ARTICLE 8 PAYMENT

8.1 SCHEDULE OF VALUES As a condition precedent to payment, Subcontractor shall provide a schedule of values satisfactory to Constructor not more than fifteen (15) Days from the date of execution of this Agreement.

8.2 PROGRESS PAYMENTS

8.2.1 APPLICATIONS Subcontractor's applications for payment shall be itemized and supported by substantiating data as required by the Subcontract Documents. If Subcontractor is obligated to provide design services pursuant to §3.8, Subcontractor's applications for payment shall show its design professional's fee and expenses as a separate cost item. Subcontractor's application for payment shall be notarized. Subcontractor's application for payment for the Subcontract Work performed in the preceding payment period shall be submitted for approval by Constructor in accordance with the schedule of values if required in §8.2.2 through §8.2.4. Constructor shall incorporate the approved amount of Subcontractor's application for payment into Constructor's application for payment to Owner for the same period and submit it to Owner in a timely fashion. Constructor shall promptly notify Subcontractor of any changes in the amount requested on behalf of Subcontractor. |

8.2.2 RETAINAGE The rate of retainage shall be ten percent (10%). |

8.2.3 TIME OF APPLICATION Subcontractor shall submit progress payment applications to Constructor no later than the 24th Day of each payment period for the Subcontract Work performed up to and including the 20th Day of the payment period indicating work completed and, to the extent allowed under the subsection below, materials suitably stored during the preceding payment period.

8.2.4 STORED MATERIALS Unless otherwise provided in the Subcontract Documents, applications for payment may include materials and equipment not yet incorporated in the Subcontract Work but delivered to and suitably stored on or off the Worksite including applicable insurance, storage, and costs incurred transporting the materials to an off-site storage facility. Approval of payment applications for such stored items on or off the Worksite shall be conditioned upon submission by Subcontractor of bills of sale and required insurance or such other procedures satisfactory to Owner and Constructor to establish Owner's title to such materials and equipment, or otherwise to protect Owner's and Constructor's interest including transportation to the Worksite. |

8.2.5 TIME OF PAYMENT Progress payments to Subcontractor for satisfactory performance of the Subcontract Work shall be made no later than seven (7) Days after receipt by Constructor of payment from Owner for the Subcontract Work. If payment from Owner for such Subcontract Work is not received by Constructor, through no fault of Subcontractor, Constructor will make payment to Subcontractor within a reasonable time for the Subcontract Work satisfactorily performed.

8.2.6 PAYMENT DELAY If Constructor has received payment from Owner and if for any reason not the fault of Subcontractor, Subcontractor does not receive a progress payment from Constructor within seven (7) Days after the date such payment is due, as defined in the subsection immediately above, or, if Constructor has failed to pay Subcontractor within a reasonable time for the Subcontract Work satisfactorily performed, Subcontractor, upon giving seven (7) Days' written notice to Constructor, and without prejudice to and in addition to any other legal remedies, may stop work until payment of the full amount owing to Subcontractor has been received. The Subcontract Amount and Time shall be adjusted by the amount of Subcontractor's reasonable and verified cost of shutdown, delay, and startup, which shall be effected by an appropriate Subcontractor Change Order.



8.2.7 PAYMENTS WITHHELD Constructor may reject a Subcontractor application for payment in whole or in part or withhold amounts from a previously approved Subcontractor application for payment, as may reasonably be necessary to protect Constructor from loss or damage for which Constructor may be liable and without incurring an obligation for late payment interest based upon:

8.2.7.1 Subcontractor's repeated failure to perform the Subcontract Work as required by this Agreement;

8.2.7.2 except as accepted by the insurer providing Builder's Risk or other property insurance covering the Project, loss or damage arising out of or relating to this Agreement and caused by Subcontractor to Owner, Constructor, or others to whom Constructor may be liable;

8.2.7.3 Subcontractor's failure to properly pay for either labor, materials, equipment, or supplies furnished in connection with the Subcontract Work, provided that Constructor is making payments to Subcontractor for that portion of the Subcontract Work in accordance with this Agreement;

8.2.7.4 rejected or defective Subcontract Work which has not been corrected in a timely fashion;

8.2.7.5 reasonable evidence of delay in performance of the Subcontract Work such that the Work will not be completed within the Subcontract Time, and that the unpaid balance of the Subcontract Amount is not sufficient to offset the liquidated damages or actual damages that may be sustained by Constructor as a result of the anticipated delay caused by Subcontractor;

8.2.7.6 reasonable evidence demonstrating that the unpaid balance of the Subcontract Amount is insufficient to cover the cost to complete the Subcontract Work; and

8.2.7.7 uninsured third-party claims involving Subcontractor or reasonable evidence demonstrating that third-party claims are likely to be filed unless and until Subcontractor furnishes Constructor with adequate security in the form of a surety bond, letter of credit, or other collateral or commitment sufficient to discharge such claims if established.

No later than seven (7) Days after receipt of an application for payment, Constructor shall give written notice to Subcontractor, at the time of disapproving or nullifying all or part of an application for payment, stating its specific reasons for such disapproval or nullification, and the remedial actions to be taken by Subcontractor in order to receive payment. When the above reasons for disapproving or nullifying an application for payment are removed, payment will be promptly made for the amount previously withheld.

8.2.8 SUBSTANTIAL COMPLETION

8.2.8.1 Upon substantial completion of the Subcontract Work or a designated portion thereof, Constructor shall assume responsibility for security and protection of the Subcontract Work pending the achievement of Substantial Completion of the Project. However, acceptance of the Subcontract Work for the purpose of allowing succeeding Work to proceed shall not result in the commencement of the warranty period for the Subcontract Work unless otherwise provided in the Prime Agreement.

8.2.8.2 Unless otherwise provided for in the Prime Agreement, partial Owner occupancy or use of completed portions of the Subcontract Work shall constitute Substantial Completion of that portion of the Subcontract Work and the warranty period applicable to the Subcontract



Work shall commence upon the achievement of Substantial Completion of the Project and acceptance by Owner under the terms of the Prime Agreement.

8.3 FINAL PAYMENT

8.3.1 APPLICATION Upon acceptance of the Subcontract Work by Owner and Constructor and receipt from Subcontractor of evidence of fulfillment of Subcontractor's obligations in accordance with the Subcontract Documents and the subsection below, Constructor shall incorporate Subcontractor's application for final payment into Constructor's next application for payment to Owner without delay, or notify Subcontractor if there is a delay and the reasons for the delay.

8.3.2 REQUIREMENTS Before Constructor shall be required to incorporate Subcontractor's application for final payment into Constructor's next application for payment, Subcontractor shall submit to Constructor:

- (a) An affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Subcontract Work have been paid, satisfied, or are to be paid with the proceeds of final payment, so as not to encumber Owner's property, Constructor, or Constructor's surety;
- (b) As-built drawings, manuals, copies of warranties, startup and testing required in §3.26, and all close-out documents and satisfaction of close-out procedures if required by the Subcontract Documents.
- (c) Release of any liens, conditioned on final payment being received, and in such form as may be required by the Subcontract Documents;
- (d) Consent of surety to final payment, if required;
- (e) A report of any outstanding known and unreported accidents or injuries experienced by Subcontractor at the Worksite;
- (f) Other data, if required, such as receipts and releases.

8.3.3 TIME OF PAYMENT Final payment of the balance due of the Subcontract Amount shall be made to Subcontractor within seven (7) Days after receipt by Constructor of final payment from Owner for such Subcontract Work.

8.3.4 FINAL PAYMENT DELAY If Owner or its designated agent does not issue a certificate for final payment or Constructor does not receive such payment for any cause which is not the fault of Subcontractor, Constructor shall promptly inform Subcontractor in writing. If final payment from Owner for such Subcontract Work is not received by Constructor, through no fault of Subcontractor, Constructor will make payment to Subcontractor within a reasonable time.

8.3.5 WAIVER OF CLAIMS Final payment shall constitute a waiver of all claims by Subcontractor relating to the Subcontract Work, but shall in no way relieve Subcontractor of liability for the obligations assumed under §3.20 and §3.21, or for faulty or defective work or services discovered after final payment, nor relieve Constructor for claims made in writing by Subcontractor as required by the Subcontract Documents before its application for final payment as unsettled at the time of such payment.

8.4 LATE PAYMENT INTEREST Progress payments or final payment due and unpaid under this Agreement shall bear interest from the date payment is due at the prevailing statutory rate at the place of



the Project. However, if Owner fails to timely pay Constructor through no fault or neglect of Constructor, and Constructor fails to timely pay Subcontractor as a result of such nonpayment, Constructor's obligation to pay Subcontractor interest on corresponding payments due and unpaid under this Agreement shall be extinguished by Constructor promptly paying to Subcontractor Subcontractor's proportionate share of the interest, if any, received by Constructor from Owner on such late payments.

8.5 CONTINUING OBLIGATIONS Provided Constructor is making payments in accordance with this Agreement, Subcontractor shall reimburse Constructor for costs and expenses for any claim, obligation, or lien asserted before or after final payment is made that arises from the performance of the Subcontract Work. Subcontractor shall reimburse Constructor for costs and expenses including attorneys' fees and costs and expenses incurred by Constructor in satisfying, discharging, or defending against any such claims, obligation, or lien, including any action brought or judgment recovered. If any Law or bond requires Subcontractor to take any action before the expiration of the reasonable time for payment referenced in §8.2.5 in order to preserve or protect Subcontractor's rights with respect to mechanic's lien or bond claims, then Subcontractor may take that action before the expiration of the reasonable time for payment and such action will not: (a) create the reimbursement obligation recited above, (b) be in violation of this Agreement, or (c) be considered premature for purposes of preserving and protecting Subcontractor's rights.

8.6 PAYMENT USE RESTRICTION Payments received by Subcontractor shall be used to satisfy the indebtedness owed by Subcontractor to any person furnishing labor or materials, or both, for use in performing the Subcontract Work through the most current period applicable to progress payments received from Constructor before it is used for any other purpose. In the same manner, payments received by Constructor for the Subcontract Work shall be dedicated to payment to Subcontractor. This applies to this Agreement only, and is not for the benefit of third parties. Moreover, this section does not restrict commingling funds nor require separate accounts for deposits. Nothing in this section creates a fiduciary duty on the Parties, nor creates any tort cause of action or liability for breach of trust, punitive damages, or other equitable remedy or liability for alleged breach.

8.7 PAYMENT VERIFICATION If Constructor has reason to believe that Subcontractor is not complying with payment terms in this Agreement, Constructor may contact Subcontractor's subcontractors and suppliers to ascertain whether they are being paid by Subcontractor in accordance with this Agreement.

8.8 PARTIAL LIEN WAIVERS AND AFFIDAVITS As a prerequisite for payments, Subcontractor shall provide, in a form satisfactory to Owner and Constructor, partial lien and claim waivers in the amount of the application for payment and affidavits (sworn statement) covering its subcontractors and suppliers for completed Subcontract Work. Such waivers shall be conditional upon payment. In no event shall Subcontractor be required to provide an unconditional waiver of lien or claim, before receiving payment or in an amount in excess of what it has been paid.

8.9 SUBCONTRACTOR PAYMENT FAILURE Upon payment by Constructor, Subcontractor shall promptly pay its subcontractors and suppliers the amounts to which they are entitled. If Constructor has reason to believe that labor, material, or other obligations incurred in the performance of the Subcontract Work are not being paid, Constructor may give written notice of a potential claim or lien to Subcontractor and may take any steps deemed necessary to assure that progress payments are utilized to pay such obligations, including but not limited to the issuance of joint checks. If upon receipt of notice, Subcontractor does not (a) supply evidence to the satisfaction of Constructor that payment owed has been paid; or (b) post a bond indemnifying Owner, Constructor, Constructor's surety, if any, and the premises from a claim or lien, Constructor shall have the right to withhold from any payments due or to become due to Subcontractor a reasonable amount to protect Constructor from any and all loss, damage, or expense including attorneys' fees that may arise out of or relate to any such claim or lien.



8.10 SUBCONTRACTOR ASSIGNMENT OF PAYMENTS Subcontractor shall not assign any payment due or to become due under this Agreement, without the written consent of Constructor, unless the assignment is intended to create a new security interest within the scope of Article 9 of the Uniform Commercial Code. Should Subcontractor assign all or any part of any payment due or to become due under this Agreement to create a new security interest or for any other purpose, the instrument of assignment shall contain a clause to the effect that the assignee's right in and to any money due or to become due to Subcontractor shall be subject to the claims of all persons, firms, and corporations for services rendered or materials supplied for Subcontract Work.

8.11 PAYMENT NOT ACCEPTANCE Payment to Subcontractor does not constitute or imply acceptance of any portion of the Subcontract Work.

ARTICLE 9 INDEMNITY, INSURANCE, AND BONDS

9.1 INDEMNITY

9.1.1 INDEMNITY To the fullest extent permitted by law, Subcontractor shall indemnify and hold harmless Constructor, Design Professional, Owner, and their agents, consultants, and employees (the "Indemnitees") from all claims for bodily injury and property damage other than to the Work itself that may arise from the performance of the Subcontract Work, including reasonable attorneys' fees, costs, and expenses, that arise from the performance of the Work, but only to the extent caused by the negligent or intentionally wrongful acts or omissions of Subcontractor, Subcontractor's subcontractors, or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable.

9.1.2 NO LIMITATION ON LIABILITY In any claim against the Indemnitees by any employee of Subcontractor, anyone directly or indirectly employed by Subcontractor, or anyone for whose acts Subcontractor may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

9.2 INSURANCE

9.2.1 SUBCONTRACTOR'S INSURANCE Before commencing the Subcontract Work, and as a condition precedent to payment, Subcontractor shall purchase and maintain insurance that will protect it from the claims arising out of its operations under this Agreement, whether the operations are by Subcontractor, or any of its consultants or subcontractors or anyone directly or indirectly employed by any of them for whose acts Subcontractor may be liable.

9.2.2 MINIMUM LIMITS OF LIABILITY Subcontractor shall procure and maintain in force Workers' Compensation Insurance, Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL) with insurance companies licensed in the jurisdiction in which the Project is located and acceptable to Constructor, which acceptance shall not be unreasonably withheld, at least the limits of liability as set forth below.

9.2.2.1 Worker's Compensation and Employers Liability Insurance in accordance with the laws of the State of Michigan.

9.2.2.2 Commercial General Liability Insurance
a. Each Occurrence Limit \$1,000,000
b. General Aggregate \$2,000,000



- c. Products/Completed Operations Aggregate \$2,000,000
- d. Personal and Advertising Injury Limit \$1,000,000

9.2.2.3 Comprehensive Automobile Liability Insurance
Combined Single Limit Bodily Injury and Property Damage \$1,000,000 Each
Occurrence

9.2.2.4 ADDITIONAL INSUREDS Policies under 9.2.2.2 and 9.2.2.3 shall list
Fishbeck and the Owner as additional insureds, as well as other parties if required
by the Contract Documents.

9.2.3 PROFESSIONAL LIABILITY INSURANCE

9.2.3.1 If required by §3.8, Subcontractor shall require its design professional(s) to maintain professional liability insurance with a company reasonably satisfactory to Constructor, including contractual liability insurance against the liability assumed, and including coverage for any professional liability caused by consultants of its design professional. Said insurance shall have specific minimum limits as set forth below:

Limit of Two Million dollars (\$2,000,000) per claim.

General Aggregate of Two Million dollars (\$2,000,000) for the subcontract services rendered.

The professional liability insurance shall contain prior acts coverage sufficient to cover all subcontract services rendered by the design professional. Said insurance shall be continued in effect with an extended period of Two years following final payment to the design professional. Such insurance shall have a maximum self-insured retention and/or deductible in the amount of One Hundred Fifty Thousand dollars (\$150,000) per claim. The self-insured retention and/or deductible shall be paid by the Subcontractor or its design professional.

9.2.3.2 Subcontractor shall require its design professional to furnish to Subcontractor and Constructor, before the design professional commences its services, a copy of its professional liability policy evidencing the coverages required in this subsection. No policy shall be canceled or modified, with the exception of non-payment, without thirty (30) Days' prior written notice to Subcontractor and Constructor.

9.2.4 NUMBER OF POLICIES Commercial General Liability Insurance (CGL) and other liability insurance may be arranged under a single policy for the full limits required or by a combination of underlying policies with the balance provided by an Excess or Umbrella Liability Policy.

9.2.5 CANCELLATION, RENEWAL, AND MODIFICATION To the extent commercially available to Subcontractor from its current insurance company, insurance policies required under §9.2.1 shall contain a provision that the insurance company or its designee must give Constructor written notice transmitted in paper or electronic format: (a) 30 Days before coverage is nonrenewed by the insurance company and (b) within 10 Business Days after cancellation, for reasons other than non-payment, of coverage by the insurance company. Before commencing the Work and upon renewal or replacement of the insurance policies, Subcontractor shall furnish Constructor with certificates of insurance until one year after Substantial Completion or longer if required by the Contract Documents. In addition, if any insurance policy required under §9.2.1 is not to be immediately replaced without lapse in coverage when it expires, exhausts its limits, or is to be canceled, Subcontractor shall give Constructor prompt written notice upon actual or constructive knowledge of such condition. Subcontractor will be in breach of contract if the Constructor does not receive prior notification of any cancellation, non-renewal, or modification of the required policy coverage or limits.



9.2.6 CONTINUATION OF COVERAGE Subcontractor shall continue to carry Completed Operations Liability Insurance for at least one year after final payment to Constructor. Before commencing the Work, Subcontractor shall furnish Constructor with certificates evidencing the required coverages.

9.2.7 BUILDER'S RISK POLICY INSURANCE Upon Subcontractor's written request, Constructor shall provide Subcontractor with a copy of the Builder's Risk policy of insurance or any other property or equipment insurance in force for the Project and procured by Owner or Constructor. Constructor shall advise Subcontractor if a Builder's Risk policy of insurance is not in force.

9.2.8 WAIVER OF SUBROGATION The Parties waive all rights against each other, Owner, and Design Professional, and any of their respective consultants, subcontractors, subsubcontractors, suppliers, agents, and employees, for damages caused by perils to the extent covered by the proceeds of the insurance provided in §9.2.7, except such rights as they may have to the insurance proceeds and such rights as they may have for the failure to obtain and maintain any Project Builders Risk Coverage that they may have been obligated to provide in the Prime Agreement. Subcontractor shall require similar waivers from its subcontractors. The policies under clauses 9.2.2, 9.2.3, and 9.2.7 shall also be endorsed to state that the carrier waives any right against the Owner, Constructor, Design Professional, Subcontractors, material Suppliers, or Subsubcontractors.

9.2.9 ENDORSEMENT If the policies of insurance referred to in this article require an endorsement to provide for continued coverage where there is a waiver of subrogation, the owners of such policies will cause them to be so endorsed.

9.2.10 ADDITIONAL GENERAL LIABILITY COVERAGE Constructor shall require Subcontractor to purchase and maintain additional liability coverage, primary to Constructor's coverage pursuant to the subsection immediately above. If required, the additional liability coverage required of Subcontractor shall be:

9.2.10.1 ADDITIONAL INSURED. Constructor and Owner shall be named as an additional insured on Subcontractor's CGL specified, for on-going operations and completed operations, excess/umbrella liability, commercial automobile liability, and any required pollution liability, but only with respect to liability for bodily injury, property damage, or personal and advertising injury to the extent caused by the negligent acts or omissions of Subcontractor, or those acting on Subcontractor's behalf, in the performance of Subcontract Work for Constructor at the Worksite. The insurance of the Subcontractor shall be primary and non-contributory to any insurance available to the Additional Insureds.

9.3 BONDS

9.3.1 Performance and Payment Bonds are required of Subcontractor for any contract over \$100,000. Such bonds shall be issued by a surety admitted in the state in which the Project is located and must be acceptable to Constructor. Constructor's acceptance shall not be withheld without reasonable cause. The penal sum of the Payment Bond and Performance Bond shall each be in the original full Subcontract Amount.

9.3.2 Subcontractor shall be reimbursed, without retainage, for the cost of any required performance or payment bonds simultaneously with the first progress payment. The reimbursement amount for Subcontractor bonds shall be one hundred percent (100%) of the Subcontract Amount, which sum is included in the Subcontract Amount. If acceptable to Constructor, Subcontractor may, in lieu of retainage, furnish a retention bond or other security interest, acceptable to Constructor, to be held by Constructor.



9.3.3 If Subcontractor shall fail to promptly provide any required bonds, Constructor may terminate this Agreement and enter into a subcontract for the balance of the Subcontract Work with another subcontractor. All Constructor costs and expenses incurred by Constructor as a result of said termination shall be paid by Subcontractor.

9.3.4 PAYMENT BOND REVIEW Constructor ☐ has/ ☐ has not provided Owner a payment bond.

ARTICLE 10 SUSPENSION, NOTICE TO CURE, AND TERMINATION

10.1 FAILURE OF PERFORMANCE AND TERMINATION

10.1.1 NOTICE TO CURE A DEFAULT If Subcontractor persistently fails to supply enough qualified workers, proper materials, or equipment to maintain the Progress Schedule, or fails to make prompt payment to its workers, subsubcontractors, or suppliers, or disregards a Law or orders of any public authority having jurisdiction, or otherwise is guilty of a material breach of a provision of this Agreement, Subcontractor shall be deemed in default of this Agreement. If Subcontractor fails within three (3) Business Days after written notification to commence and continue satisfactory correction of the default with diligence and promptness, then Constructor shall give a second notice to Subcontractor and surety, if any, to correct the default within a two (2) Business Day period. If Subcontractor fails to promptly commence and continue satisfactory correction of the default following receipt of such second notice, Constructor without prejudice to any other rights or remedies, shall have the right to any or all of the following remedies:

10.1.1.1 supply workers, materials, equipment, and facilities as Constructor deems necessary for the completion of the Subcontract Work or any part which Subcontractor has failed to complete or perform after written notification, and charge Subcontractor costs and expenses, including reasonable overhead, profit, and attorneys' fees that are due or to become due. Subcontractor shall be liable for the payment of any amount by which such expense may exceed the unpaid balance of the Subcontract Amount. At Subcontractor's request, Constructor shall provide a detailed accounting of the costs to finish the Subcontract Work;

10.1.1.2 contract with one or more additional contractors to perform such part of the Subcontract Work as Constructor determines will provide the most expeditious completion of the Work, and charge the cost to Subcontractor as provided under the subsection above;

10.1.1.3 withhold any payments due or to become due Subcontractor pending corrective action in amounts sufficient to cover losses and compel performance to the extent required by and to the satisfaction of Constructor. In the event of an emergency affecting the safety of persons or property, Constructor may proceed as above without notice, but Constructor shall give Subcontractor notice promptly after the fact as a precondition of cost recovery; or

10.1.1.4 terminate the Agreement by written notice.

10.1.2 USE OF SUBCONTRACTOR'S EQUIPMENT If Constructor performs work under this article, either directly or through other subcontractors, Constructor or other subcontractors shall have the right to take and use any materials or supplies for which Constructor or other subcontractors have paid and located at the Worksite for the purpose of completing any remaining Subcontract Work. Constructor shall also have the right to use construction tools and equipment located on the Worksite and belonging to the Subcontractor and its subcontractors for the purpose of completing the remaining Work, which shall not be unreasonably withheld. If Constructor uses the tools and equipment in accordance with this subsection, Constructor shall indemnify and hold harmless Subcontractor in connection with Constructor's use of such tools and equipment. Immediately upon completion of the Subcontract Work, any remaining materials, implements, equipment, appliances,



or tools not consumed or incorporated in performance of the Subcontract Work, and furnished by, belonging to, or delivered to the Project by or on behalf of Subcontractor, shall be returned to Subcontractor in substantially the same condition as when they were taken, normal wear and tear excepted.

10.2 BANKRUPTCY

10.2.1 TERMINATION ABSENT CURE If Subcontractor files a petition under the Bankruptcy Code, this Agreement shall terminate if: (a) Subcontractor or Subcontractor's trustee rejects the Agreement; (b) a default has occurred, and Subcontractor is unable to give adequate assurance of required performance; or (c) Subcontractor is otherwise unable to comply with the requirements for assuming this Agreement under the applicable provisions of the Bankruptcy Code.

10.2.2 INTERIM REMEDIES If Subcontractor is not performing in accordance with the Progress Schedule at the time a petition in bankruptcy is filed, or at any subsequent time, Constructor, while awaiting the decision of Subcontractor or its trustee to reject or to assume this Agreement and provide adequate assurance of its ability to perform, may avail itself of such remedies under this article as are reasonably necessary to maintain the Progress Schedule. Constructor may offset against any sums due or to become due Subcontractor all costs incurred in pursuing any of the remedies provided including, but not limited to, reasonable overhead, profit, and attorneys' fees. Subcontractor shall be liable for the payment of any amount by which costs incurred may exceed the unpaid balance of the Subcontract Amount.

10.3 SUSPENSION BY OWNER FOR CONVENIENCE Should Owner suspend the Work or any part which includes the Subcontract Work for the convenience of Owner and such suspension is not due to any act or omission of Constructor, or any other person or entity for whose acts or omissions Constructor may be liable, Constructor shall notify Subcontractor in writing and, upon receiving notification, Subcontractor shall immediately suspend the Subcontract Work. To the extent provided for under the Prime Agreement and to the extent Constructor recovers such on Subcontractor's behalf, the Subcontract Amount and the Subcontract Time shall be equitably adjusted by Subcontract Change Order for the cost and delay resulting from any such suspension. Constructor agrees to cooperate with Subcontractor, at Subcontractor's expense, in the prosecution of any Subcontractor claim arising out of an Owner suspension and to permit Subcontractor to prosecute the claim, in the name of Constructor, for the use and benefit of Subcontractor.

10.4 TERMINATION BY OWNER Should Owner terminate its contract with Constructor or any part which includes the Subcontract Work, Constructor shall notify Subcontractor in writing within three (3) Business Days of the termination and, upon written notification, this Agreement shall be terminated and Subcontractor shall immediately stop the Subcontract Work, follow all of Constructor's instructions, and mitigate all costs. In the event of Owner termination, Constructor's liability to Subcontractor shall be limited to the extent of Constructor's recovery on Subcontractor's behalf under the Subcontract Documents, except as otherwise provided in this Agreement. Constructor agrees to cooperate with Subcontractor, at Subcontractor's expense, in the prosecution of any Subcontractor claim arising out of Owner termination and to permit Subcontractor to prosecute the claim, in the name of Constructor, for the use and benefit of Subcontractor, or assign the claim to Subcontractor. If Owner terminates Constructor for cause, through no fault of Subcontractor, Subcontractor shall be entitled to recover from Constructor its reasonable costs arising from the termination of this Agreement, including reasonable overhead and profit on Work not performed.

10.5 CONTINGENT ASSIGNMENT OF THIS AGREEMENT Constructor's contingent assignment of this Agreement to Owner, as provided in the Prime Agreement, is effective when Owner has terminated the Prime Agreement for cause and has accepted the assignment by notifying Subcontractor in writing. This contingent assignment is subject to the prior rights of a surety that may be obligated under Constructor's



bond, if any. Subcontractor consents to such assignment and agrees to be bound to the assignee by the terms of this Agreement, provided that the assignee fulfills the obligations of Constructor.

10.6 SUSPENSION BY CONSTRUCTOR Constructor may order Subcontractor in writing to suspend all or any part of the Subcontract Work for such period of time as may be determined to be appropriate for the convenience of Constructor. Phased Work or interruptions of the Subcontract Work for short periods of time shall not be considered a suspension. Subcontractor, after receipt of Constructor's order, shall notify Constructor in writing in sufficient time to permit Constructor to provide timely notice to Owner in accordance with the Prime Agreement of the effect of such order upon the Subcontract Work. The Subcontract Amount or Subcontract Time shall be adjusted by Subcontract Change Order for any increase in the time or cost of performance of this Agreement caused by such suspension. No claim under this section shall be allowed for any costs incurred more than fourteen (14) Days before Subcontractor's notice to Constructor. Neither the Subcontract Amount nor the Progress Schedule shall be adjusted for any suspension, to the extent that performance would have been suspended, due in whole or in part to the fault or negligence of Subcontractor or by a cause for which Subcontractor would have been responsible. The Subcontract Amount shall not be adjusted for any suspension to the extent that performance would have been suspended by a cause for which Subcontractor would have been entitled only to a time extension under this Agreement.

10.7 WRONGFUL EXERCISE If Constructor wrongfully exercises any option under this article, Constructor shall be liable to Subcontractor solely for the reasonable value of Subcontract Work performed by Subcontractor before Constructor's wrongful action, including reasonable overhead and profit on the Subcontract Work performed, less prior payments made, together with reasonable overhead and profit on the Subcontract Work not executed, and other reasonable costs incurred by such action, including reasonable attorneys' fees.

10.8 TERMINATION BY SUBCONTRACTOR If the Subcontract Work has been stopped for thirty (30) Days because Subcontractor has not received progress payments or has been abandoned or suspended for an unreasonable period of time not due to the fault or neglect of Subcontractor, then Subcontractor may terminate this Agreement upon giving Constructor seven (7) Days' written notice. Upon such termination, Subcontractor shall be entitled to recover from Constructor payment for all Subcontract Work satisfactorily performed but not yet paid for, including reasonable overhead, profit, and attorneys' fees related to termination, costs, and expenses. However, if Owner has not paid Constructor for the satisfactory performance of the Subcontract Work through no fault or neglect of Constructor, and Subcontractor terminates this Agreement under this article because it has not received corresponding progress payments, Subcontractor shall be entitled to recover from Constructor, within a reasonable period of time following termination, payment for all Subcontract Work executed and for any proven loss, cost, or expense in connection with the Work, including all demobilization costs plus reasonable overhead and profit on Subcontract Work not performed. Constructor's liability for any other damages claimed by Subcontractor under such circumstances shall be extinguished by Constructor pursuing said damages and claims against Owner on Subcontractor's behalf as provided for in §10.3 and §10.4.

ARTICLE 11 DISPUTE RESOLUTION

11.1 WORK CONTINUATION AND PAYMENT Subcontractor shall continue the Subcontract Work and maintain the Progress Schedule during any dispute resolution procedure. If Subcontractor continues to perform, Constructor shall continue to make payments in accordance with this Agreement.

11.2 DISPUTES BETWEEN THE PARTIES If the dispute resolution provisions between Constructor and Owner in the Subcontract Documents do not permit consolidation or joinder with disputes of third parties, such as Subcontractor, or if such dispute is only between the Parties, then the Parties shall submit the dispute to the dispute resolution procedures set forth in the section below.



11.3 CONSTRUCTOR-SUBCONTRACTOR DISPUTE RESOLUTION

11.3.1 DIRECT DISCUSSIONS If the Parties cannot reach resolution on a matter relating to or arising out of the Agreement, the Parties shall endeavor to reach resolution through good faith direct discussions between the Parties' representatives, who shall possess the necessary authority to resolve such matter and who shall record the date of first discussions. If the Parties' representatives are not able to resolve such matter within five (5) Business Days, the Parties' representatives shall immediately inform senior executives of the Parties in writing that a resolution could not be reached. Upon receipt of such notice, the senior executives of the Parties shall meet within five (5) Business Days to endeavor to reach resolution. If the matter remains unresolved after fifteen (15) Days from the date of first discussion, the Parties may pursue their available legal remedies and opinion, including litigation as set forth in this ARTICLE 11.

11.3.2 Not Used

11.3.3 LITIGATION If the matter is unresolved after Direct Discussions, the Parties shall resolve the matter by litigation in either the state or federal court located in Michigan.

11.3.4 NONBINDING DISPUTE RESOLUTION The Parties shall engage in such pretrial dispute resolution proceedings as may be required by the court having jurisdiction over such litigation.

11.3.5 COSTS The costs of litigation and any dispute resolution procedure and reasonable attorneys' fees shall be borne by the non-prevailing Party, as determined by the adjudicator of the dispute.

11.3.6 VENUE Kent County, Michigan shall serve as the venue for resolution of all disputes.

11.4 MULTIPARTY PROCEEDING All parties necessary to resolve a matter agree to be parties to the same dispute resolution proceeding, if possible. To the extent disputes between the Parties involve in whole or in part disputes between Constructor and Owner, disputes between Subcontractor and Constructor shall be decided by the same tribunal and in the same forum as disputes between Constructor and Owner.

11.5 NO LIMITATION OF RIGHTS OR REMEDIES Except as expressly waived, this article does not limit any rights or remedies which Subcontractor may possess under lien laws or payment bonds.

ARTICLE 12 MISCELLANEOUS

12.1 EXTENT OF AGREEMENT Except as specifically provided, this Agreement is for the exclusive benefit of the Parties, and not for the benefit of any third party. This Agreement represents the entire and integrated agreement between the Parties, and supersedes all prior negotiations, representations, or agreements, either written or oral.

12.2 ASSIGNMENT OF SUBCONTRACT WORK Except as provided in §8.10, Subcontractor shall neither assign the whole nor any part of the Subcontract Work without prior written approval of Constructor.

12.3 GOVERNING LAW The Law in effect at the location of the Project shall govern this Agreement.

12.4 SEVERABILITY The partial or complete invalidity of any one or more provisions of this Agreement shall not affect the validity or continuing force and effect of any other provision.



12.5 NOTICE Unless changed in writing, a Party's address indicated in Article 1 shall be used when delivering notice to a physical address. Except for Agreement termination and as otherwise specified in the Contract Documents, notice is effective upon transmission by any effective means, including overnight delivery service.

12.6 NO WAIVER OF PERFORMANCE Either Party's failure to insist upon any performance of any term, covenant, or condition of this Agreement, or to exercise any of its rights, shall not be construed as a waiver or relinquishment of such term, covenant, condition, or right.

12.7 TITLES Titles given to articles and sections of this Agreement are for ease of reference only and shall not be relied upon or cited for any other purpose.

12.8 JOINT DRAFTING The Parties expressly agree that this Agreement was jointly drafted, and that they both had opportunity to negotiate its terms and to obtain the assistance of counsel in reviewing its terms before execution. Therefore, this Agreement shall be construed neither against nor in favor of either Party, but shall be construed in a neutral manner.

ARTICLE 13 SUBCONTRACT DOCUMENTS

13.1 INTERPRETATION OF SUBCONTRACT DOCUMENTS

13.1.1 The drawings and specifications are complementary. If Work is shown only on one but not on the other, Subcontractor shall perform the Subcontract Work as though fully described on both consistent with the Subcontract Documents and reasonably inferable from them.

13.1.2 In case of conflicts between drawings and specifications, the specifications shall govern. In any case of omissions or errors in figures, drawings, or specifications, Subcontractor shall immediately submit the matter to Constructor for clarification by Owner. Subject to an equitable adjustment in Subcontract Time or Subcontract Amount pursuant to ARTICLE 7 or ARTICLE 11, Owner's clarifications are final and binding.

13.1.3 Where figures are given, they shall be preferred to scaled dimensions.

13.1.4 Unless otherwise specifically defined in this Agreement, any terms that have well-known technical or trade meanings shall be interpreted in accordance with their well-known meanings.

13.1.5 ORDER OF PRECEDENCE In case of any inconsistency, conflict, or ambiguity among the Subcontract Documents, the documents shall govern in the following order: (a) Subcontract Change Orders and written amendments to this Agreement; (b) this Agreement; (c) subject to §13.1.2, the drawings (large scale governing over small scale), specifications, and addenda issued before the execution of this Agreement; (d) information furnished by Owner that is identified as a Subcontract Document; (e) other documents listed in this Agreement. Among categories of documents having the same order of precedence, the term or provision that includes the latest date shall control.



CONSTRUCTOR
Fishbeck

BY: _____

PRINT NAME: _____

PRINT TITLE: _____

WITNESS: _____

NAME: _____

TITLE: _____

SUBCONTRACTOR:

BY: _____

PRINT NAME: _____

PRINT TITLE: _____

WITNESS: _____

NAME: _____

TITLE: _____

END OF DOCUMENT. |



SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement and Division 01 Specification Sections apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work covered by the Contract Documents comprises construction the new Lake House, Lake Hall, and all associated sitework and landscaping of The Lakeside Park located at Belleville Road, Van Buren Township, Michigan for Van Buren Charter Township, Owner.

1.3 TYPE OF CONTRACT

- A. Construct the Work of this Contract under a single lump sum Contract.

1.4 GENERAL

- A. Imperative Language: These Specifications (Divisions 01 through 49) are written in the imperative and abbreviated form. This imperative language of the technical specifications is directed at Subcontractor unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall", "shall be" and similar mandatory phrases by inference in the same manner as they are applied to notes on Drawings. The words "shall", "shall be" and similar mandatory phrases shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated in the imperative or otherwise.
- B. Related Sections: Some Sections of these Specifications (Divisions 01 through 49) may include a paragraph titled "Related Sections". This paragraph is an aid to the Project Manual user and is not intended to include all Sections which may be related. It is Subcontractor's obligation to coordinate all Sections whether indicated under "Related Sections" or not.
- C. Reference to General Conditions: In Divisions 0 through 49, all references to General Conditions and Supplemental Conditions throughout the Contract Document shall mean the Agreement.

1.5 WORK BY OWNER

- A. The following items will be furnished and installed by Owner:
 - 1. Playground equipment.
 - 2. Splashpad.
 - 3. Site furnishings.
 - 4. Central/Plaza Sculpture.
 - 5. Interior furnishings.
 - 6. Food Service/ Warming Kitchen equipment.
- B. Coordinate the schedule of work by Owner with Owner and Construction Manager.

1.6 BID CATEGORY DESCRIPTIONS

- A. Bid Category 03-100 – Concrete: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:

03 11 00 - Concrete Forming
03 15 00 - Concrete Accessories
03 15 16 - Post-Installed Anchors
03 21 00 - Reinforcing Steel
03 31 00 - Structural Concrete
07 21 00 – Thermal Insulation
[32 12 13.40 – Concrete Planter Curbs and Paving](#)
32 13 13 – Concrete Paving
32 13 14 – Concrete Walks

32 16 13 - Concrete Curbs and Gutters

1. Clarifications:

- a. Includes fine grade and final compaction, including the supplying of additional or removal of excess materials as needed prior to placing concrete slabs, notify construction manager of major grade discrepancies.
- b. Provide all interior and exterior concrete equipment foundations, housekeeping pads and generator pads. Coordinate size, embeds and location requirements with the respective trade contractors.
- c. Coordinate excavation and backfill for all concrete foundations, retaining walls and grade beams with bid category 31-100 Earthwork and Site Utilities.
- d. Provide and apply all required concrete cure and seal as specified. Do not apply where a conflict with other finishes is apparent or present. Coordinate with construction manager and other appropriate trades.
- e. Schedule all required soils or concrete testing and inspection through the construction manager to prevent project delays.
- f. Concrete truck clean out to be in designated area as directed by the construction manager. Concrete Subcontractor to clean designated area and remove off-site and dispose of in a legal manner at the end of concrete work.
- g. Includes all footings, foundation walls, slab on grade and supported slabs.
- h. Includes all exterior concrete pavement, reinforced concrete pavement, sidewalks, curb and gutter, sidewalk keyways into curbs, concrete stairs, steps, ramps, landings, screen walls, cheek walls, concrete planters, and playable fountain concrete.
- i. Include concrete ballast at sanitary sewer grinder pump station.
- j. Additives must be approved prior to use.
- k. Provide and install all detectable warning strips.
- l. Install all pipe bollards, gate posts, and other embedded items furnished by others.
- m. Install all embedded items furnished by other trades.
- n. Furnish and install all mesh and reinforcing steel.
- o. Furnish and install all waterstops and waterproofing.
- p. Furnish and install all required expansion and control joints.
- q. Provide all necessary heat, including fuel, and weather protection for completion of your work.
- r. Provide all perimeter foundation insulation and protection board.
- s. Furnish and install all drilling, reinforcing and doweling for foundation tie-in.
- t. Install all anchor bolts furnished by others.
- u. Grout base plates.
- v. Furnish and install vapor barrier beneath slab.
- w. Fine grade and proof roll gravel base prior to placing paving, notify Construction Manager of any grade or compaction discrepancies.
- x. Maintain streets during trucking operations. Provide all traffic control, flagmen etc. as required.
- y. Include dampproofing of concrete foundation walls.

2. Excludes:
 - a. Concrete testing by Construction Manager
 - b. Survey and Staking by Construction Manager.
 - c. Concrete foundation for Sky Ring Structure by bid category 05-200 Canopy/Sky Ring.
 - d. Grouting of pipe supports by bid category 23-100 Plumbing and HVAC.
 - e. Site light pole bases by bid category 26-100 Electrical, Security, and Audio Visual.
 - f. Precast structures by bid category 31-100 Earthwork and Site Utilities.
 - g. Gravel base and rough grading by bid category 31-100 Earthwork and Site Utilities.
 - h. Handicap parking signs and posts by bid category 31-100 Earthwork and Site Utilities.
 - i. Site demolition for to remove existing concrete paving and sidewalk by bid category 31-100 Earthwork and Site Utilities.
 - j. Concrete piers for Boardwalk, Boat Docks, and Fishing Pier by bid category 35-100 Boardwalk, Boat Dock, and Fishing Pier,
 - k. Concrete footings/foundations for ornamental fence by bid category 05-100 Structural Steel and Miscellaneous Metals.
- B. Bid Category 04-100 – Masonry: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
 - 04 20 00 – Masonry Accessories
 - 04 42 00 – Exterior and Interior Stone Cladding
 - 07 21 00 – Thermal Insulation
1. Clarifications:
 - a. Furnish and install all horizontal and vertical reinforcing steel and anchors embedded in masonry.
 - b. Furnish and install all required flashings, weeps, vents and other accessories embedded in masonry work.
 - c. Coordinate all wall openings for louvers, fans, doors and windows.
 - d. Receive, unload and install all lintels, anchors, bearing plates, angles, pipe sleeves and embedded items supplied by others to be installed in masonry.
 - e. Furnish and install all bond beams, including concrete, reinforcing steel and related anchor bolts.
 - f. Furnish dumpsters and legally dispose of construction debris of this trade.
 - g. Provide all necessary heat, including fuel, and weather protection for completion of your work.
 - h. Furnish and install all masonry cavity wall insulation.
 - i. Construction of mock-up panels.
 - j. Grout masonry under new steel beam ends, etc. in masonry walls as required.
 - k. Grout beam pockets after installation of beams as shown or specified.
 - l. Fire safing and fire caulking as it relates to this trades work.
 - m. Furnish and install dampproofing and air/vapor barriers in masonry cavity walls, etc. on all exterior walls.
 - n. Clean and wash all masonry as specified and in accordance with approved sample. Protect any adjacent surfaces.
 - o. Provide all required shoring for your work.
 - p. Includes building signage etched into stone masonry as shown in project documents.
 - ~~q.~~ ~~Include masonry and stone cap for dumpster enclosure.~~
 - ~~r.~~ ~~Coordinate loose lock flashing embedded into coping with bid category 07-100 Roofing.~~
 - ~~s.~~ ~~Coordinate with bid category 04-100 to install sealant at weather barrier penetrations for limestone split tie anchors.~~
 - ~~t.~~ ~~Include insulation over exterior metal stud frame walls behind limestone veneer.~~
2. Excludes:
 - a. Caulking and sealants for control joints.
 - b. Masonry testing.
 - ~~b.~~c. Excludes precast concrete block and wall cap for dumpster enclosure. This will be provided by bid category 32-100 Landscaping.

- C. Bid Category 05-100 – Structural Steel and Miscellaneous Metals: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
- 05 12 00 – Structural Steel Framing
 - 05 30 00 – Metal Decking
 - 05 50 00 – Metal Fabrications
 - 05 51 33 – Metal Ladders
 - 05 52 00 – Handrails
 - 05 52 13 – Pipe and Tube Railings
 - 10 75 00 – Site Furnishings
1. Clarifications:
- a. Furnish and install all structural steel as shown, specified or as necessary to complete the work.
 - b. Furnish and install all miscellaneous steel as shown, specified or as necessary to complete the work.
 - c. Furnish all steel embedded in concrete or masonry – to be installed by others- including but not limited to:
 - 1) Bollards
 - 2) Dumpster gate posts
 - d. Includes interior guardrail with swinggate.
 - e. Includes gates for dumpster enclosure.
 - f. Includes exterior handrails (including concrete coring as needed).
 - g. Includes exterior aluminum handrails and guardrails (including Sleeve-Its as shown).
 - h. Includes ornamental fencing and gates (including concrete fence post footings).
 - i. Includes screen fence enclosures.
 - j. Includes roof access ladders.
 - ~~k. Includes handrails on fishing pier.~~
 - ~~k. Coordinate boardwalk railing with low voltage handrail lighting system by bid category 26-100~~
Electrical, Fire Alarm, and Audio Visual.
 - l. Include AGS Stainless Steel Railing system on Fishing Pier.
 - m. Include AGS Stainless Steel Railing system on Boardwalk.
 - ~~n. Coordinate boardwalk railing with low voltage handrail lighting system by bid category 26-100.~~
2. Excludes:
- a. Light gauge metal stud framing.
 - b. Installation of miscellaneous steel embedded in concrete or masonry.
 - c. Installation of lintels which are not mechanically fastened to other steel.
 - d. Concrete and masonry reinforcing steel.
- D. Bid Category 05-200 – Sky Ring: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
1. Clarifications:
- a. Includes design and construction of complete Sky Ring structure.
2. Excludes:
- E. Bid Category 06-100 – General Trades: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
- 05 40 00 – Cold-Formed Metal Framing
 - 06 10 00 – Rough Carpentry
 - 06 15 33 – Boardwalk Decking and Railings
 - 06 20 00 – Finish Carpentry
 - 06 41 00 – Architectural Wood Casework

06 64 00 – Plastic Paneling
06 83 16 – Fiberglass Reinforce Paneling
07 21 00 – Thermal Insulation
07 27 00 – Air and Vapor Barriers
07 92 00 – Joint Sealants
07 92 00.01 – Joint Sealants
08 11 13 - Hollow Metal Doors and Frames
08 14 05 – Architectural Wood Doors
08 31 00 - Access Doors and Panels
08 39 00 – Attic Access Doors
08 71 00 - Door Hardware
08 80 00 – Glazing
09 21 16 – Gypsum Board Assemblies
09 51 00 – Acoustical Ceilings
09 54 23 – Linear Metal Ceilings
09 84 00 – Acoustic Room Components
09 84 30 – Sound-Absorbing Wall Units
10 21 13.16 – Plastic-Laminate-Clad Toilet Compartments
10 22 39 – Folding Panel Partitions
10 28 00 - Toilet, Bath, and Laundry Accessories
10 44 00 – Fire Protection Specialties
11 30 13 - Appliances
12 22 16 – Drapery Track and Accessories
12 24 00 – Window Shades
12 36 00 – Countertop and Window Sills

1. Clarifications:
 - a. Set all hollow metal frames including doors set in masonry walls.
 - b. Furnish and install all wood blocking required for toilet accessories, cabinets, millwork, trim, windows, curtainwall, etc.
 - c. Wood furring, backing, blocking, etc. to support built-in items, fixtures, millwork, and other wall supported items. Coordinate with other trades Electrical, Technology, A/V to include all necessary backing and block.
 - d. Furnish and install all hollow metal frames and doors, wood doors, and finish hardware as shown and/or specified.
 - e. Furnish and install glazing in architectural wood doors.
 - f. Furnish all control wiring as required for fully functioning doors including control wiring for security, card readers and overhead door safety devices as specified by hardware schedule.
 - g. Includes cash allowances as shown in specification section 01 21 00 Cash Allowances
 - h. Include composite deckboard and underlayment at tiered seating, stairs, and ramps.
 - i. Furnish and install cedar board installation on dumpster gates.
 - j. Coordinate with bid category 09-300 Flooring and Tile and 26-100 Electrical, Fire Alarm, and Audio Visual to integrate recesses within stone with acrylic panel accents and lighting. Provide mockup sample of detail.
 - k. Furnish and install Acoustic Room Components – Mobile.
 - l. Furnish and install all corner guards/wall protection.
 - m. Furnish and install kitchenette island.
 - n. Furnish and install all coat shelves/rods.
 - o. Furnish and install kitchen appliances as shown in schedule.
 - p. Furnish and install drywall aluminum reveal molding as shown.
 - q. Coordinate with bid category 04-100 to install sealant at weather barrier penetrations for limestone split tie anchors.
 - r. Includes all interior and exterior joint sealants except as noted in exclusions below.
 - s. Include all batt and sound insulation as shown and/or specified.
 - t. Include insulation in stud cavity of exterior metal stud framed walls.
 - u. Include insulation in interior metal framed partitions.
 - v. Include foamed in place air barrier sealant.
 - w. Coordinate vapor barrier installation with bid category 09-100 Roofing to construct building envelope as a complete system.

- x. Includes mounting of plumbing fixture accessories for Janitor Receptor such as hose bracket, bumper guard plate, wall guard, mop hanger, and strainer.
- 2. Excludes:
 - a. Conduit for control wiring.
 - b. Door hardware for doors provided by bid category 08-100 Storefronts and Glazing.
 - c. Excludes joint sealants for all penetrations installed as part of bid categories 08-100 Storefronts and Glazing, 21-100 Fire Suppression, 23-100 Plumbing, Heating, Ventilation, and Air Conditioning, 26-100 Electrical, Fire Alarm, and Audio Visual.
 - d. Exclude insulation at perimeter of foundation – by bid category 03-100 Concrete.
 - e. Exclude insulation over exterior metal stud frame walls – by bid category 04-100 Masonry.
 - f. Excludes rough carpentry beams and framing of boardwalk, boat docks and fishing pier – by bid category 35-100 Boardwalk, Boat Dock, and Fishing Pier.
 - g. Excludes composite decking of boardwalk, boat docks and fishing pier – by bid category 35-100 Boardwalk, Boat Dock, and Fishing Pier.
- F. Bid Category 07-100 – Roofing: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
 - 07 21 00 – Thermal Insulation
 - 07 27 00 – Air and Vapor Barriers
 - 07 54 19 – Polyvinyl-Chloride (PVC) Roofing
 - 07 62 00 – Sheet Metal Flashing and Trim
 - 07 72 00 – Roof Accessories
 - 07 92 00 – Joint Sealants
- 1. Clarifications:
 - a. Furnish and install all required caulking, flashing, trim and edging related to roofing work.
 - b. Coordinate roof openings with other trades.
 - c. Includes roof hatch and safety railing system.
 - d. Coordinate loose lock flashing embedded into coping with bid category 04-100 Masonry
 - e. Include vapor barrier and cover boards.
 - f. Coordinate vapor barrier installation with bid category 06-100 General Trades to construct building envelope as a complete system.
- 2. Excludes:
 - a. Furnishing of mechanical roof curbs.
- G. Bid Category 08-100 – Storefronts and Glazing: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
 - 07 92 00 – Joint Sealants
 - 08 32 23 – Sliding and Folding Glazed Walls and Doors
 - 08 41 13 – Aluminum-Framed Entrances
 - 08 43 13 – Aluminum Framed Storefronts
 - 08 44 13 – Glazed Aluminum Curtain Walls
 - 08 71 00 – Door Hardware
 - 08 80 00 – Glazing
 - 08 87 23 – Safety and Security Films
- 1. Clarifications:
 - a. Include all caulking of window systems inherit to the warranty of same.
 - b. Clean all glass and frames when and as directed by Construction Manager.
 - c. Provide protection of all work until final acceptance by the Owner.
 - d. Includes water/leak testing of curtainwall system.
 - e. Coordinate automatic door opening controls/wiring with installation of doors and curtainwall.
 - f. Include glass films. Also include mockup of FLM1 for Architect/Owner Approval as shown.

- g. Includes joint sealants for all penetration installed as part of this bid category.
 - 2. Excludes:
 - a. Glazing in architectural wood doors by bid category 06-100 General Trades.
 - b. Door hardware for doors provided by bid category 06-100 General Trades.
- H. Bid Category 09-100 – Painting: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
 - 09 25 23 – Lime Base Plastering
 - 09 82 00 – Wall Coverings
 - 09 91 13 – Exterior Painting
 - 09 91 23 - Interior Painting
 - 09 93 00 - Staining and Transparent Finishing
- 1. Clarifications:
 - a. Prepare all surfaces per manufacturers recommendations.
 - b. Includes touch-up of all areas prior to final Owner acceptance.
 - c. Supply and install custom graphic vinyl – to be supplied and installed by IMAGE 360.
 - d. Includes concrete floor sealer where specified in room finish schedule.
 - e. Includes exterior painting of exposed structural lintels.
 - 2. Excludes:
 - a. Masonry cleaning.
 - b. Pavement markings as shown on civil Drawings.
- I. Bid Category 09-300 – Flooring and Tile: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
 - 09 05 61 – Common Work Results for Flooring Preparation
 - 09 30 00 – Tiling
 - 09 65 00 – Resilient Flooring
 - 09 65 13 – Resilient Base and Accessories
 - 09 68 13 - Tile Carpeting
 - 09 68 16 – Sheet Carpeting
 - 32 14 50 – Porcelain Unit Paving
- 1. Clarifications:
 - a. Includes all floor preparation.
 - b. Furnish and install all vinyl/rubber base in all areas specified.
 - c. Final cleaning of finished product as recommended by the manufacturer.
 - d. Include all required reducer strips, thresholds and bases.
 - e. Test concrete floors for moisture levels and do not apply flooring until acceptable moisture levels are reached.
 - f. Include Porcelain Unit Paving-tiles and pedestal system at exterior locations adjacent to building.
 - g. Coordinate with bid category 06-100 General Trades and 26-100 Electrical, Fire Alarm, and Audio Visual to integrate recesses within stone with acrylic panel accents and lighting. Provide mockup sample of detail.
 - 2. ~~Excludes concrete floor sealers.~~ Excludes:
 - a. Excludes concrete floor sealers.
 - b. Excludes mortar set porcelain pavers – to be installed by bid category 32-100 Landscaping.

- J. Bid Category 21-100 – Fire Suppression: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
- 07 92 00 – Joint Sealants
 - 21 05 00 - General Fire Suppression Provisions
 - 21 05 03 - Steel Pipe and Fittings for Fire Suppression
 - 21 05 29 - Hangers and Supports for Fire Suppression Piping and Equipment
 - 21 05 31 - Penetrations for Fire Suppression
 - 21 10 00 - Water Based Fire Suppression Systems
1. Clarifications:
- a. Bid Category 31-100 – Earthwork and Site Utilities will install the fire protection water service to into the building to the riser location. Fire Protection scope of work begins at this riser. Coordinate with Construction Manager and Bid Category 31-100 to ensure proper location, elevation, etc.
 - b. Includes joint sealants for all penetration installed as part of this bid category
 - c. Includes wall mounted fire department connections
 - d. Furnish Post Indicator Valves – Coordinate with bid category 31-100 Earthwork and Site Utilities to install as needed.
 - e. Coordinate with other trades to allow space for all above ceiling work
 - f. Includes custom color concealed head covers in areas shown.
2. Excludes:
- a. Painting of piping valves, fittings, hangers and other supports.
- K. Bid Category 23-100 – Plumbing, Heating, Ventilation, and Air Conditioning: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
- 07 92 00 – Joint Sealants
 - 10 31 00 – Manufactured Fireplaces
 - 22 05 00 – General Plumbing Provisions
 - 22 05 03 – Steel Pipe and Fittings for Plumbing
 - 22 05 06 – Cast Iron Pipe and Fittings for Plumbing
 - 22 05 07 – Plastic Pipe and Fittings for Plumbing
 - 22 05 09 – Copper Pipe and Fittings for Plumbing
 - 22 05 13 – Common Motor Requirements for Plumbing Equipment
 - 22 05 19 – Meters and Gages for Plumbing Piping
 - 22 05 23 – General Duty Valves for Plumbing
 - 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment
 - 22 05 31 – Penetrations for Plumbing
 - 22 05 46 – Sound and Vibration Control for Plumbing
 - 22 05 73 – Testing and Cleaning of Plumbing Systems
 - 22 07 19 – Plumbing Piping Insulation
 - 22 10 00 – Plumbing Piping and Specialties
 - 22 10 23 – Natural Gas Piping System
 - 22 10 29 – Plumbing Pumps
 - 22 36 00 – Domestic Water Heaters
 - 22 40 00 – Plumbing Fixtures
 - 23 01 00 – Operation and Maintenance of HVAC Systems
 - 23 05 00 – General HVAC Provisions
 - 23 05 03 – Steel Pipe and Fittings for HVAC
 - 23 05 13 – Common Motor Requirements for HVAC Equipment
 - 23 05 19 – Meters and Gages for HVAC Piping
 - 23 05 23 – General Duty Valves for HVAC
 - 23 05 29 – Hangers and Supports for HVAC Piping and Equipment
 - 23 05 31 – Penetrations for HVAC
 - 23 05 46 – Sound and Vibration Control for HVAC
 - 23 05 73 – Testing and Cleaning of HVAC Systems

23 05 93 – Testing, Adjusting and Balancing for HVAC
23 07 13 – Duct Insulation
23 07 19 – HVAC Piping Insulation
23 08 00 – Commissioning of HVAC
23 09 00 – Instrumentation and Control for HVAC
23 20 13 - Piping Specialties for HVAC
23 21 13 – Hydronic Piping
23 21 23 – Hydronic Pumps
23 23 00 – Refrigerant Piping
23 25 00 - HVAC Water Treatment
23 31 13 – Metal Ducts
23 33 13 – Dampers
23 34 23 – HVAC Power Ventilators
23 36 00 – Air Terminal Units
23 37 00 - Air Outlets and Inlets
23 52 16 – Condensing Boilers
23 74 43 – Packaged, Outdoor Heating and Cooling Units
23 81 13 – Package Terminal Air Conditioners
23 82 19 – Fan Coil Units
23 83 19 – Radiant Convective Heating Wall Panels

1. Clarifications:
 - a. Include all fees and permits as required for your trade.
 - b. Include temporary filters at air handling equipment. Temporary filters are to be removed and replaced immediately prior to owner occupancy.
 - c. Coordinate concrete equipment pad sizes with bid category 3-1 – Concrete.
 - d. Install all underground utilities from five (5) feet from the exterior of the building.
 - e. Furnish sleeves to be installed in concrete foundations.
 - f. Provide low voltage controls for toilets, faucets, soap dispensers, etc. to be installed by bid category 26-100 Electrical.
 - g. Include temporary protective cover for the trench heaters for use during construction and the finish covers.
 - h. Include Fireplace and Outdoor Firepit.
 - i. Includes cash allowances as shown in specification section 01 21 00 Cash Allowances.
 - j. Includes joint sealants for all penetration installed as part of this bid category.
 - k. Coordinate outdoor drinking fountain water supply and sanitary sewer lines - to be installed by bid category 31-100 Earthwork and Site Utilities.
 - l. Includes plumbing connection of all food service equipment.
 - m. Includes water meter/remote readout.
2. Excludes:
 - a. Concrete equipment pads by bid category 03-100 – Concrete.
 - b. Painting of piping valves, fittings, hangers and other supports.

- L. Bid Category 26-100 – Electrical, Fire Alarm, and Audio Visual: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:

07 92 00 – Joint Sealants
11 52 13 – Projection Screens
11 52 26 – Projector Lifts
26 05 00 – Common Work Results for Electrical
26 05 20 – Conductors and Cables - 600V and Below
26 05 27 – Grounding and Bonding
26 05 29 – Hangers and Supports for Electrical Systems
26 05 34 – Raceways for Electrical Systems
26 05 35 – Boxes for Electrical Systems
26 05 36 – Cable Trays for Electrical Systems
26 05 43 – Underground Ducts and Raceways for Electrical Systems
26 05 53 – Identification for Electrical Systems

26 05 73 – Overcurrent Protective Device Coordination Study and Arc Flash Risk Assessment
26 08 00 – Commissioning of Electrical Systems
26 08 13 – Electrical Acceptance Testing
26 09 23 – Lighting Control Devices
26 09 30 – Lighting Control Systems
26 24 16 – Panelboards
26 27 26 – Wiring Devices
26 28 00 – Low Voltage Circuit Protective Devices
26 28 20 – Enclosed Switches
26 29 13 – Enclosed Controllers
26 29 23 – Variable Frequency Motor Controllers
26 32 13 – Engine Generators
26 36 23 – Transfer Switches
26 43 05 – Surge Protective Devices
26 50 00 – Lighting
27 01 00 – Operation and Maintenance of Communications Systems
27 05 00 – Common Work Results for Communications Systems
27 05 26 – Grounding and Bonding for Communications Systems
27 05 29 – Hangers and Supports for Communications Systems
27 05 36 – Cable Trays for Communications Systems
27 05 53 – Identification for Communications Systems
27 08 00 – Commissioning Communications Systems
27 11 00 – Communications Equipment Room Fittings
27 13 00 – Communications Backbone Cabling
27 15 00 – Communications Horizontal Cabling
27 16 00 – Communications Connecting Cords, Devices, and Adapters
27 40 00 – Audiovisual Systems Bidding and General Requirements
27 41 16 – Integrated Audiovisual Systems and Equipment
27 41 16.02 – Audiovisual Systems Appendices
28 00 00 – Common Work Results for Electronic Safety and Security
28 01 00 – Operation and Maintenance of Electronic Safety and Security
28 05 26 – Grounding and Bonding for Electronic Safety and Security
28 05 29 – Hangers and Supports for Electronic Safety and Security
28 05 53 – Identification for Electronic Safety and Security
28 13 00 – Access Control
28 23 00 – Video Surveillance System
28 31 00 – Fire Detection and Alarm

1. Clarifications:
 - a. Provide temporary jobsite lighting as required.
 - b. Provide temporary power service for construction, 200 amp minimum.
 - c. Furnish, install, remove and pay for all temporary wiring, equipment switches, panels, connections, and transformers, including Construction Manager's trailer.
 - d. Includes all fees and permits as required for your trade.
 - e. Includes all testing, start-up and training work to insure proper performance of electrical systems.
 - f. Assist Commissioning Agent by providing access to all equipment as necessary and with required paperwork.
 - g. Furnish sleeves to be installed in concrete foundations.
 - h. Includes site lighting, including excavation, backfill and concrete for light pole bases for the entire site.
 - i. Includes concrete fill/protection as required over underground electrical lines.
 - j. Includes fire-resistant joint sealants for all electrically associated penetrations.
 - k. Provide all access doors required but not shown for access to electrical systems. These must be thoroughly coordinated in areas with linear ceiling panels.
 - l. Includes electrical connection to Owner provided food service/warming kitchen equipment.
 - m. Coordinate power/controls for window shades to Audio/Visual system.
 - n. Coordinate concrete equipment pad sizes with Bid Category 3-1 – Concrete.
 - o. Install conduit for control wiring installed by other trades.
 - p. Install low voltage controls for toilets, faucets, soap dispensers, etc. - provided by bid category 23-1 Plumbing and HVAC.

- q. Coordinate with bid category 06-100 General Trades and 09-300 Flooring and Tile to integrate recesses within stone with acrylic panel accents and lighting. Provide mockup sample of detail.
 - r. Coordinate installation of low voltage door hardware/card access controls provide by bid category 06-100 General Trades to provide complete working system.
 - s. Includes cash allowances as shown in specification section 01 21 00 Cash Allowances.
 - ~~t.~~ Includes joint sealants for all penetrations installed as part of this bid category.
 - ~~u.~~ Includes cost to supply SK1 light fixture as per Luminaire Schedule and Keynote 9/E010. Installation of SK1 fixture to be included in cash allowance as shown in Specification Section 01 21 00 - Cash Allowances.
2. Excludes:
- a. Concrete pads required for electrical equipment, transformers and housekeeping.
- M. Bid Category 31-100 – Earthwork and Site Utilities: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:
- 31 10 13 – Site Preparation
 - 31 22 00 – Grading
 - 31 22 16 – Fine Grading
 - 31 23 03 – Excavation and Fill for Utilities
 - 31 23 06 – Excavation and Fill for Structures
 - 31 25 00 – Erosion and Sedimentation Controls
 - 31 37 00 – Riprap
 - 32 11 23 – Aggregate Base Courses
 - 32 12 16 – Asphalt Paving
 - 32 17 23 – Pavement Markings
 - 33 05 30 – Utility Horizontal Directional Drilling
 - 33 10 00 – Water Utilities
 - 33 30 00 – Sanitary Sewerage Utilities
 - 33 32 26 – Submersible Grinder Pump Station
 - 33 34 00 – Sanitary Utility Sewerage Force Mains
 - 33 40 00 – Storm Drainage Utilities
 - 33 46 16 – Subdrainage Piping (Underdrains)
 - 33 46 00 – Underdrainage System
 - 40 05 13 – Process Piping Systems
 - 40 05 23 – Process Valves
 - 46 07 15 – Packaged Submersible Sanitary Pump Station
1. Clarifications:
- a. Call "Miss Dig" prior to any digging operations or starting any work.
 - b. Obtain SESC permit and implement and maintain soil erosion, sedimentation and stabilization control as directed within the permit.
 - c. Obtain all necessary permits required to complete this scope of work (water taps, sanitary taps, curb cuts, etc.)
 - d. Protect existing storm sewer inlets from construction site run-off as required by permit.
 - e. Protect all trees, landscaping and existing structures as shown on project documents utilizing tree protection detail.
 - f. Remove and Salvage Bench, Trash Bin, Statue, and Light Post as noted on Demolition Plan. Set aside in safe location for Owner.
 - g. Strip and stockpile topsoil on site as directed by Construction Manager for reuse as necessary
 - h. Provide all tree removal, clearing/grubbing of site as shown on plans and as necessary for performance of your work.
 - i. Include roll off mat at project entrance.
 - j. Clean roads of any dirt or debris during the course of this contract, on as needed basis or as directed by the Construction Manager.
 - k. Provide barricades and warning signs at all open excavations.
 - l. Provide all traffic barricades as necessary for work in, under, or adjacent to roadway.
 - m. Maintain streets during trucking operations. Provide all traffic control, flagmen etc. as required.

- n. Provide dust control as needed or as directed by the Construction Manager throughout the duration of this contract.
 - o. Domestic water service and sanitary sewer utilities to be installed within 5 feet of the exterior of the building. Cap piping and mark above grade.
 - p. Coordinate installation of outdoor drinking fountain water supply and sanitary sewer lines for bid category 23-100 Plumbing, Heating, Ventilation, and Air Conditioning.
 - q. Include a 2" water service/RPZ Backflow preventor from Mechanical/Plumbing room inside Lake Hall, through the floor and footing to the exterior for the Landscape Irrigation supply piping.
 - r. Fire Protection water service to be brought inside the building to the riser. Cap piping above finish floor elevation. Coordinate with Construction Manager and bid category 21-100 Fire Protection.
 - s. Install Fire Protection Post Indicator Valves – supplied by bid category 21-100 Fire Protection.
 - t. Provide dewatering as necessary to complete work.
 - u. Supply and install sleeves under roads, walks, etc. for lawn irrigation system or electrical work. Coordinate with Construction Manager and other trades as required.
 - v. All earthwork and fine grading required to balance the site to elevations indicated on the drawings and to blend into adjacent areas. Additional fill is the responsibility of this bid category.
 - w. Provide excavation and backfill for all foundations.
 - x. Furnish and install underdrains and foundation drains as shown on civil, landscaping, and structural drawings.
 - y. Prepare sub-base to +/- 1 inch for all concrete slabs; interior and exterior.
 - z. Prepare all landscaped green areas to be +/- 1 inch of elevations to be ready for topsoil as shown on project documents. Areas must be fully ready to receive topsoil and plantings by Bid Category 32-100 Landscaping.
 - aa. Prepare all synthetic turf areas to be +/- 1 inch of elevations to be ready for synthetic turf as shown on project documents. Areas must be fully ready to receive synthetic turf by Bid Category 32-100 Landscaping.
 - bb. Coordinate locations for power, water, and miscellaneous equipment with Owner provided Vortex Splashpad.
 - cc. Coordinate locations for Owner provided playground equipment.
 - dd. Furnish and install all site precast structures.
 - ee. Ensure that work is installed to standards shown on Van Buren Charter Township Miscellaneous Details, Standard SESC Details, Standard Sanitary Sewer Details, Standard Storm Sewer Details, Standard Sidewalk Details, and Standard Water Main Details.
 - ff. Mill existing wearing course and key in new asphalt where new asphalt meets existing.
 - gg. Sawcut and remove concrete paving and sidewalk as shown for site demolition. Coordinate with 03-100 Concrete.
 - hh. Fine grade and proof roll gravel base prior to placing paving, notify Construction Manager of any grade or compaction discrepancies.
 - ii. Pavement striping and markings as shown and specified.
 - jj. Furnish and install handicap parking signage and all other site signage as shown on contract documents.
 - kk. Include precast concrete block retaining wall and guardrails.
 - ll. Removal of temporary erosion control items at completion of project or as directed by permit.
 - mm. Includes cash allowances as shown in specification section 01 21 00 Cash Allowances.
2. Excludes:
- a. Underground utilities within the building footprint.
 - b. Survey/staking to be provided by Construction Manager. Coordinate with Construction manager to allow time for scheduling.
 - c. Boardwalk, Fishing Pier and Boat Docks are to be installed by Bid Category 35-100 Boardwalk, Boat Dock, and Fishing Pier.

- N. Bid Category 32-100 – Landscaping: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:

32 05 36 – Landscape Maintenance and Warranty Standards
32 14 40.15 – Porcelain Paver Paving
~~32 14 50 – Porcelain Unit Paving~~
32 18 23.29 – Synthetic Turf Non-Athletic
32 32 16 – Precast Concrete Retaining Wall System
32 84 00 – Irrigation System
32 91 19 – Topsoil
32 92 19 – Seeding
32 92 23 – Sodding
32 93 00 – Plants

1. Clarifications:
 - a. Provide all necessary staking and anchoring of trees and plants.
 - b. All landscape maintenance per the specifications and watering required to establish growth.
 - c. Coordinate locations for Owner provided playground equipment with synthetic turfgrass.
 - d. Furnish and install fall attenuation pad and nailer board for Synthetic Turf.
 - e. Includes mortar set porcelain pavers shown on landscaping plans.
 - d.f. Includes precast concrete block and wall cap for dumpster enclosure.
2. Excludes: Excludes Porcelain Unit Paving/Pedestal pavers – to be installed by bid category 09-300 Tile and Carpet. ~~N/A~~

- O. Bid Category 35-100 – Boardwalk, Boat Dock, and Fishing Pier: This bid category includes, but is not limited to, all labor, material, tools, equipment, coordination and supervision to complete all work as indicated on the drawings and as specified in the following sections outlined below. The bid category includes all specification sections of BIDDING REQUIREMENTS, CONTRACT REQUIREMENTS, AND GENERAL REQUIREMENTS OF THE CONTRACT AND THE FOLLOWING SECTIONS:

06 10 00 – Rough Carpentry
06 15 33 – Boardwalk Decking and Railings
31 62 16 – Steel Piles
31 66 26 – Helical Foundation System

1. Clarifications:
 - a. Provide dewatering as necessary to complete work.
 - b. Includes Synthetic Wood Boardwalk, Boat Dock, and Fishing Pier as shown on project documents.
 - c. Includes rough carpentry beams and framing of boardwalk, boat docks and fishing pier.
 - d. Includes composite decking of boardwalk, boat docks and fishing pier.
 - e.a. ~~Include AGS Stainless Steel Railing system on Boardwalk.~~
2. Excludes:

~~Include AGS Stainless Steel Railing system on Boardwalk.~~

 - a. Exclude AGS Stainless Steel Railing system handrails on Fishing Pier - by bid category 05-100 Structural Steel and Miscellaneous Metals.
 - b. Exclude AGS Stainless Steel Railing system on Boardwalk – by bid category 05-100 Structural Steel and Miscellaneous Metals.

1.7 SUBCONTRACTOR USE OF PREMISES

- A. Limit use of premises to allow for work by other Subcontractors.
- B. Coordinate use of premises under direction of the Construction Manager.
- C. Where the Contract Documents identify certain site elements within the construction limits, such as sidewalks, drives, and streets, that must be kept open for public or the Owner's use during construction, the Subcontractor shall be responsible for protection and maintenance of such elements as well.

- D. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, all Work at the site shall be restricted to the following hours:
 - 1. Monday Through Saturday (Except Legal Holidays): 7 a.m. to 6 p.m.
 - 2. Sundays or legal holidays with written approval of the Owner.
- E. Work Within Highway Rights-of-Way: In accordance with Division 01 Section "Regulatory Requirements."

1.8 OCCUPANCY REQUIREMENTS

- A. Owner Occupancy During Construction:
 - 1. The Owner will occupy or utilize premises for installation of Furniture, Playground equipment, Splashpad, Site furnishings, Central/Plaza Sculpture, Interior furnishings, Food Service/ Warming Kitchen equipment.
 - 2. Cooperate with the Construction Manager to minimize conflict and to facilitate the Owner's operations.
 - 3. Access to Abutting Properties: Provide at all times.
 - 4. Access for Emergency Vehicles:
 - a. Provide at all times.
 - b. Provide at least one clear lane during nonwork periods.
 - 5. Fire Hydrants: Provide access to at all times.
 - 6. Do not block fire access routes from buildings.
 - 7. Detours and Street Closure:
 - a. When provided for in the Contract Documents or approved by the Construction Manager.
 - b. Routes and barricades as indicated or as approved by road authority.
 - 8. Limit parking for construction vehicles to an area designated by the Construction Manager.

PART 2 - PRODUCTS

2.1 OTHER MATERIALS

- A. General: All other materials which are not specified herein and are not indicated on the Drawings, but are required for proper and complete performance of the Work.
- B. Procedure:
 - 1. Select new, first quality material.
 - 2. Obtain Construction Manager's review.
 - 3. Provide and install.

PART 3 - EXECUTION

3.1 SCHEDULES

- A. See attached schedule following this Section.

END OF SECTION 01 11 00

SECTION 01 21 13 – CASH ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section provides for cash allowances which are included in the Contract Price.
- B. Related Sections include Sections in Divisions 01 through 49, as identified below, provide additional information on what is covered by the respective allowances.

1.3 SCHEDULE OF ALLOWANCES

- A. Bid Category 06-100 – General Trades is to include in the Contract Price the following amounts:
 - 1. The amount of \$5,000 for interior room identification and code required signs not specified or shown on project documents. Interior emergency exit signs, exterior building signs, site signs and parking lot signs are not included in this allowance and should be included in the Contractors base bid
 - 2. The amount of \$3,000 to make adjustments to the door hardware specified in Division 08 Section “Door Hardware.” The Contractor’s base bid shall include all of the door hardware specified in Division 08. This allowance is intended to allow the Owner to add or make adjustments to the specified hardware during construction.
 - 3. The amount of \$2,000 for additional miscellaneous caulking per the direction of the Construction Manager in addition to what is shown on the project documents.
 - 4. The amount of \$2,000 for additional miscellaneous blocking per the direction of the Construction Manager in addition to what is shown on the project documents.
- B. Bid Category 23-100 – Plumbing, Heating, Ventilation, and Air Conditioning is to include in the Contract Price the following amounts:
 - 1. The amount of \$2,500 to coordinate/connect plumbing to additional Appliances, Owner provided Equipment, and Furniture in addition to what is shown on the project documents.
- C. Bid Category 26-100 – Electrical, Fire Alarm, and Audio/Visual is to include in the Contract Price the following amounts:
 - 1. The amount of \$30,000 to connect temporary power to the Fishbeck Construction Trailer, the Lakehouse, and Lake Hall.
 - 2. The amount of \$5,000 to coordinate/connect electrical to additional Appliances, Owner provided Equipment, and Furniture in addition to what is shown on the project documents.
 - 3. The amount of \$2,500 to add 110volt power to the exterior of Lake Hall as needed for Landscape Irrigation controller
 - ~~3-4.~~ The amount of \$10,000 to install the SK1 light fixture within the Sky Ring structure. Cost of light fixture is included in base bid.
- D. Bid Category 31-100 – Earthwork and Site Utilities is to include in the Contract Price the following amounts:
 - 1. The amount of \$5,000 to for regrading parking lot and snow removal per the direction of the Construction Manager as needed for safety and jobsite productivity.

1.4 CASH ALLOWANCES

- A. Costs Associated With Allowances:
 - 1. All costs, associated with allowances, which are not specifically defined in the Schedule of Allowances, paragraph 1.3 of this Section shall be included in the Base Bid.

2. Associated costs not specifically defined in the Schedule of Allowances may include, but are not necessarily limited to:
 - a. Unloading.
 - b. Handling on the Site.
 - c. Labor.
 - d. Installation.
 - e. Overhead.
 - f. Profit.

1.5 ADJUSTMENT OF COSTS

- A. Change Order: Written to adjust Contract Price if final cost is different from allowance.
- B. Documentation:
 1. Submit:
 - a. Within 60 days after completion of the work under the allowance.
 - b. Documentation of actual costs.
 2. Failure to submit claims within the designated time will constitute a waiver of claims for additional costs.
 3. At Contract closeout, reflect all approved changes in Contract amounts in the final statement of accounting.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 01 21 13

SECTION 07 54 19 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Membrane roofing.
- B. Cover board.
- C. Insulation.
- D. Vapor retarder.
- E. Substrate board.
- F. Walkways and safety strips.

1.2 RELATED REQUIREMENTS

- A. Section 06 10 00 - Rough Carpentry.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.3 REFERENCE STANDARDS

- A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2023.
- D. ASTM D41/D41M - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 2011 (Reapproved 2023).
- E. ASTM D312/D312M - Standard Specification for Asphalt Used in Roofing; 2016a (Reapproved 2023).
- F. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016 (Reapproved 2023).
- G. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a (Reapproved 2021).
- H. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications; 2016 (Reapproved 2023).
- I. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing; 2021.

- J. ASTM D6163/D6163M - Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements; 2021.
- K. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011 (Reapproved 2019).
- L. FM (AG) - FM Approval Guide; Current Edition.
- M. FM DS 1-28 - Wind Design; 2015, with Editorial Revision (2022).
- N. NRCA (RM) - The NRCA Roofing Manual; 2023.
- O. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Review preparation procedures, installation procedures, and coordination and scheduling of related work.
- B. Scheduling: Schedule applications to ensure partially completed sections of roof are not left exposed at end of workday.

1.5 SUBMITTALS

- A. Product Data: Indicate membrane materials, flashing materials, insulation, vapor retarder, cover board, and fasteners.
- B. Shop Drawings: Indicate interfaces with other materials, tapered insulation setting plan, and termination details.
- C. Manufacturer's qualification statement.
- D. Installer's qualification statement.
- E. Specimen warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with minimum 20 of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified, with minimum 5 of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original packaging, dry and undamaged, with seals and labels intact.
- B. Store materials above ground in area protected from weather.

- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.8 FIELD CONDITIONS

- A. Do not apply roofing membrane when ambient temperature range is outside manufacturer's recommendations.
- B. Do not apply roofing membrane to damp or frozen deck surface. Do not apply membrane when precipitation is expected or occurring.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than capable of weatherproofing in same day.
- D. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.
- E. Do not allow grease, oils, fats, or other contaminants to come into direct contact with roofing membrane.

1.9 WARRANTY

- A. Manufacturer Warranty:
 - 1. Single-source special guarantee includes roofing membrane, accessories, basic flashing, and other single-source components of roofing system approved by manufacturer, including roof insulation, fasteners, adhesives, vapor retarder, and manufacturer's edge metal products. Guarantee to agree to repair or replace roofing system that leaks or is damaged due to wind or other natural causes.
 - 2. Guarantee Period: 30 years from date of substantial completion.
 - 3. Guarantee for repair and replacement to include costs of both material and labor in warranty.
 - 4. Exceptions not permitted, are as follows: Damage due to wind speeds greater than 55 mph and less than 90 mph.
- B. Installer Warranty: Provide 2-year warranty for roofing commencing on date of substantial completion. Complete forms in Owner's name and register with installer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Johns Manville; JM PVC SD Plus.
- B. Carlisle SynTec Systems.
- C. GAF.
- D. Elevate Commercial Building Products.
- E. **Versico Roofing Systems.**
- F. Source Limitations: Obtain components for roofing system from a single roof membrane manufacturer or manufacturers approved by the single roof membrane manufacturer.

2.2 MEMBRANE ROOFING

- A. Roof Assembly Performance Requirements:
 - 1. Design of system to be based on:
 - a. Warranty requirements.
 - b. Building structural loading criteria.
 - c. Building structural design pressures.
 - 2. Solar Reflectance: Minimum 95 initial reflectance and minimum 80 reflectance after 3 years; calculated in accordance with ASTM E1980.
 - a. Do not use field-applied coating to achieve specified SRI.
- B. Membrane: Polyvinyl chloride (PVC) with Polyester Reinforcing; comply with ASTM D4434/D4434M, Type III, with fiber-reinforced edges.
 - 1. Thickness: 80 mils, 0.08 inch, minimum.
 - 2. Width: Factory fabricated into widest possible sheets.
 - 3. Installation: Adhered with adhesive.
 - 4. Color: White.
- C. Seaming Materials: As recommended by membrane manufacturer.

2.3 COVER BOARDS

- A. Cover Board: High compressive strength polyisocyanurate (ISO) insulation bonded to fiberglass-reinforced facer; comply with ASTM C1289, Type II, Class 1, Grade 1.
 - 1. Compressive Strength: 80 psi when tested in accordance with ASTM D1621.
 - 2. Thickness: 1/2 inch.
 - 3. Basis of Design Product: Johns Manville; Protector HD.

2.4 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of core foam.
 - a. Class 1 - Faced with glass-fiber-reinforced cellulosic facers on both major surfaces of core foam.
 - b. Compressive Strength: Grade 3, 25 psi, minimum.
 - c. Thermal Resistance R-value: R-30 minimum for roof insulation. R-value computation to include thermal insulation only. Average R-value of tapered insulation is not allowed to be included in R-value computation.
 - 2. Size: 4 by 8 feet.
 - 3. Thickness: As required to meet minimum roof R-value resistance, 2 layers minimum
 - 4. Tapered Board: Slope as indicated on drawings, with 1/4-inch minimum thickness.
 - 5. Basis of Design Product: Johns Manville; ENRGY 3.

2.5 VAPOR RETARDER

- A. Vapor Retarder: Fiber glass-reinforced, polyethylene surfaced, self-adhering sheet.
 - 1. Basis of Design Product: Johns Manville: JM Vapor Barrier SAR.
 - 2. Primer: As required by manufacturer.

2.6 SUBSTRATE BOARD

- A. Deck Substrate Boards: Glass-mat-faced gypsum panels; comply with ASTM C1177/C1177M, fire resistant type, 1/2 inch thick.
 - 1. Basis of Design Product: Georgia-Pacific DensDeck Prime.

2.7 WALKWAYS AND SAFETY STRIPS

- A. Flexible Walkways: Factory-formed, nonporous, slip-resistant PVC walkway pads with surface texture.
 - 1. Basis of Design Product: Johns Manville; JM PVC Heavy Duty Walkpad.

2.8 ACCESSORIES

- A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- B. Cant Strips and Nailers: As indicated in Division 6 - Rough Carpentry.
- C. Flashing:
 - 1. Metal Flashing: As indicated in Division 7 Section Sheet Metal Flashing and Trim.
 - 2. Sheet Flashing: Same material, thickness and color as PVC membrane.
 - 3. Termination Bar: Predrilled stainless steel bars, attached with anchors.
- D. Pre-Finished, Edge Metal / Coving: Comply with ANSI/SPRI/FM 4435/ES-1.
 - 1. Metal Flashing: As indicated in Division 07, Sheet Metal Flashing and Trim.
- E. Fasteners: Appropriate for application indicated as recommended and approved by single roof membrane manufacturer or manufacturers approved by the single roof membrane manufacturer.
- F. Adhesives: As recommended by membrane manufacturer.
- G. Primer: Manufacturer's recommended product.
- H. Roofing Asphalt: ASTM D312/D312M, Type IV, as recommended by membrane manufacturer.
- I. Asphalt Primer: Comply with ASTM D41/D41M, as recommended by membrane manufacturer.
- J. Primer for Self-Adhered Vapor Retarders: One-part penetrating primer, as recommended by membrane manufacturer.
- K. Sealants: As recommended by membrane manufacturer.
- L. Insulation Joint Tape: As recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.
- M. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify readiness of surfaces, substrates, and site conditions to receive work in accordance with manufacturer's instructions.
- B. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, sloped as indicated on drawings, and suitable for installation of roof system in accordance with approved shop drawings.
- C. Verify installation of roof openings, curbs, and penetrations is in accordance with approved shop drawings.

- D. Ensure secure deck attachment and support.
- E. Verify placement of cant strips.

3.2 PREPARATION

- A. Deck, General:
 - 1. Prime deck surface in accordance with manufacturer's instructions.
- B. Metal Deck:
 - 1. Deck Substrate Board:
 - a. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
 - b. Cut substrate board cleanly and accurately at roof breaks and protrusions to provide smooth surface.
 - c. Tape joints.
 - d. Mechanically fasten substrate board to roof deck in accordance with roofing manufacturer's instructions and FM DS 1-28.
 - 1) Fasten per manufacturer's requirements and to meet the design criteria.

3.3 INSTALLATION

- A. Perform work in accordance with NRCA (RM) and NRCA (WM).
- B. Membrane:
 - 1. Roll out membrane, free from wrinkles or tears. Place sheet without stretching.
 - 2. Attachment: Fully adhere membrane in accordance with manufacturer's instructions.
 - 3. Seams: Overlap edges and ends and seal seams by heat welding, minimum 3 inches. Seal permanently waterproof. Apply uniform bead of sealant to joint edge.
 - 4. At edge metal / coping, extend membrane under metal and to outside face of wall. Membrane flash over top of horizontal face of edge metal / coping.
 - 5. Intersections with Vertical Surfaces:
 - a. Extend membrane over cant strips and up minimum of 4 inches onto vertical surfaces. Terminate membrane as indicated on Drawings.
- C. Cover Boards:
 - 1. Attachment: Embed cover board in adhesive in accordance with roofing and cover board manufacturers' instructions.
 - 2. At roof drains, use field-trimmed boards to slope down to roof drains over distance of 18 inches.
 - 3. Install cover board with joints in continuous straight line. Stagger joints between rows in accordance with manufacturer's instructions. Fill gaps exceeding 1/4 inch with cover board.
- D. Insulation:
 - 1. Attachment:
 - a. Mechanically fasten insulation in accordance with manufacturer's instructions and FM (AG).
 - b. Embed second layer, subsequent layers and tapered insulation layer(s) of insulation into full bed of adhesive in accordance with roofing and insulation manufacturers' instructions.
 - 2. Install tapered edge strips at perimeter edges.
 - 3. At roof drains, use field-trimmed boards to slope down to roof drains over distance of 18 inches.
 - 4. Place tapered insulation in slope pattern in accordance with manufacturer's instructions.
 - 5. Lay boards with edges in moderate contact without forcing. Cut insulation to fit perimeter blocking and around roof penetrations.
 - 6. Stagger joints 6 inches minimum between layers of insulation.
 - 7. Apply low-rise foam insulation at penetrations and at seams between insulation boards.
 - 8. Tape insulation joints in accordance with roofing and insulation manufacturers' instructions.

- E. Vapor Retarder: Install in accordance with manufacturer's instructions.
 - 1. Extend vapor retarder under cant strips and extend blocking to deck edge.
 - 2. Install flexible flashing to air seal wall; lap and seal to provide air barrier continuity.
- F. Walkways: Install in accordance with manufacturer's instructions.
- G. Flashing: Install in accordance with manufacturer's instructions.
- H. Around roof penetrations (pipe); provide compatible rubber boot, seal flanges and flashings with flexible flashing. Install stainless-steel draw band at rubber boot and tighten.
- I. Around roof penetrations (curb); seal around metal flanges and metal curb flashings with flexible flashing.
- J. Around roof drains; seal around metal flanges with flexible flashing.
- K. Coordinate installation of roof drains and sumps and related flashings.

3.4 REPAIR

- A. Touch up, repair, or replace damaged finishes in manner indistinguishable from undamaged components.

3.5 CLEANING

- A. Clean roofing and other surfaces soiled by work of this section in accordance with surface manufacturer's instructions.

3.6 PROTECTION

- A. Protect installed roofing and flashings from subsequent construction operations.
- B. Do not permit traffic over completed roof membrane. Where unavoidable, protect surfaces from damage.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Mechanical and electrified door hardware
 - 2. Electronic access control system components
- B. Section excludes:
 - 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
- C. Related Sections:
 - 1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
 - 2. Division 06 Section "Rough Carpentry"
 - 3. Division 06 Section "Finish Carpentry"
 - 4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
 - 5. Division 08 Sections:
 - a. "Hollow Metal Frames"
 - b. "Architectural Wood Doors"
 - c. "Sliding and Folding Glazed Walls and Doors"
 - d. "Aluminum-Framed Entrances"
 - 6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
 - 7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.2 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
 - 2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
- B. Action Submittals:
 - 1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 - 3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
 5. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
 2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.
- D. Closeout Submittals:
1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule
 - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
 - f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.
- E. Inspection and Testing:
1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.3 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
2. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
 - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.5 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.6 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.

1.7 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

- A. Fabrication
 - 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
 - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
 - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
- C. Cable and Connectors:
 - 1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
 - 2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
 - 3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.3 HINGES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
 - 2. Acceptable Manufacturers and Products:
 - a. McKinney TB series
 - b. Best FBB series
- B. Requirements:
 - 1. Provide hinges conforming to ANSI/BHMA A156.1.
 - 2. Provide five knuckle, ball bearing hinges.
 - 3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
 - 4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
 - 5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
 - 6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
 - 7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.

8. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.4 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Select
 - b. ABH

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.5 INVISIBLE HINGE

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Soss
2. Acceptable Manufacturers:
 - a. Tectus
 - b. Sugatsune

B. Requirements

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide steel-based hinges at fire rated openings.
3. Provide hinges completely mortised in door and jamb such that hinge is concealed when door is closed and allows 180 degrees opening.
4. Adjust hinge size and type for door dimensions, weight, and conditions.

2.6 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin EPT-10
2. Acceptable Manufacturers and Products:
 - a. ABH PT1000
 - b. Precision EPT-12C

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.7 FLUSH BOLTS

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Trimco
 - 2. Acceptable Manufacturers:
 - a. Ives
 - b. Rockwood
 - c. DCI
- B. Requirements:
 - 1. Provide automatic, semi-automatic, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide flush bolts with key components constructed of stainless steel for durability. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.8 MORTISE LOCKS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Schlage L9000 series
 - 2. Acceptable Manufacturers and Products:
 - a. Sargent 8200 series
 - b. Corbin-Russwin ML2000 series
- B. Requirements:
 - 1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
 - 2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
 - 3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
 - 4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.
 - 5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
 - 6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 - 7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified and motor based latch retraction locksets that comply with the following requirements:
 - a. Low holding current (Lever control or latch retraction) – maximum 0.01 amps to produce minimal heat, eliminate "hot levers" in electrically locked applications and motorized latch retraction applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
 - b. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
 - c. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
 - d. Low maximum current draw – maximum 0.4 amps (Lever control) and maximum 2.0 amps (Latch retraction) to allow for multiple locks on a single power supply.
 - e. Connections – provide quick-connect Molex system standard.
 - 8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
 - a. Lever Design: 03A

2.9 CYLINDRICAL LOCKS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Schlage ND series
 - 2. Acceptable Manufacturers and Products:
 - a. Sargent 11-Line
 - b. Best 9K series
- B. Requirements:
 - 1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
 - 2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
 - a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
 - b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
 - c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
 - d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
 - e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
 - 3. Cylinders: Refer to "KEYING" article, herein.
 - 4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
 - 5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 - 6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 - 7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 - 8. Provide electrified options as scheduled in the hardware sets.
 - 9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Lever Design: TLR

2.10 EXIT DEVICES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Von Duprin 98/35A series
 - 2. Acceptable Manufacturers and Products:
 - a. Detex Advantex series
 - b. Precision APEX 2000 series
- B. Requirements:
 - 1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
 - 2. Cylinders: Refer to "KEYING" article, herein.
 - 3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 - 4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
 - 5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
 - 6. Provide exit devices at pool gates with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
 - 7. Provide flush end caps for exit devices.
 - 8. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
 - 9. Provide exit devices with manufacturers' approved strikes.

10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
 - a. SI
 - 1) Provide dogging indicators for visible indication of dogging status.
 - b. XP
 - 1) Rim Exit Devices: provide devices with non-tapered smart latchbolt with 90° latchbolt to strike engagement under stress and Static Load Resistance of 2000 pounds.
 - c. QM
 - 1) Rim Exit Devices: provide devices with damper-controlled re-latching to reduce operational noise. Where lever trim is specified, provide damper controlled lever return.
 - d. HH
 - 1) Provide wind and impact rated hurricane exit devices and mullions certified to comply with Florida Building Code (FBC) TAS 201, 202, 203.
 - e. HW
 - 1) Provide wind rated hurricane exit devices and mullions certified to comply with ANSI-ASTM E330.
 - f. CX
 - 1) Provide delayed egress devices, where scheduled, that are UL 294 listed, meet National Fire Protection Association (NFPA) and International Building Code (IBC) governing delayed egress, and/or other local and national fire codes acceptable to authority having jurisdiction as required.
 - a) Provide non-handed and field sizable device with 3/4 (19mm) throw deadlocking latch bolt. Device incorporates an internal RX switch that detects attempt to exit from applying less than 15lbs to the push pad, which causes this switch to start an irreversible alarm cycle. Key switch in device is capable of arming, disarming, or resetting the device; and indicator lamp determines status of the device.
 - b) Provide devices capable of standard 15 second release delay and indefinite release delay as required by code, when tied into fire alarm system will release immediately when an alarm condition exists.
 - c) Provide devices with all control inputs – door position input, external inhibit input, fire alarm input; auxiliary locking; nuisance alarm and internal horn; and, remote signaling output self-contained in the device assembly.
 - g. CVC
 - 1) Provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods are not permitted.
 - a) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
 - b) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
 - c) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper-infiltrated steel, with molybdenum disulfide low friction coating.
 - d) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90-degree engagement with strike to prevent door and frame separation under high static load.
 - e) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
 - f) Product Cycle Life: 1,000,000 cycles.

- g) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
- h) Latch release does not require separate trigger mechanism.
- i) Cable and latching system characteristics:
 - i. Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.
 - ii. Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
 - iii. Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
 - iv. Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
 - v. Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

2.11 ELECTRIC STRIKES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Von Duprin 6000 Series
 - 2. Acceptable Manufacturers and Products:
 - a. Folger Adam 300 Series
 - b. HES 1006 Series
- B. Requirements:
 - 1. Provide electric strikes designed for use with type of locks shown at each opening.
 - 2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
 - 3. Where required, provide electric strikes UL Listed for fire doors and frames.
 - 4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.12 POWER SUPPLIES

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Schlage/Von Duprin PS900 Series
 - 2. Acceptable Manufacturers and Products:
 - a. Precision ELR series
 - b. Securitron BPS series
- B. Requirements:
 - 1. Provide power supplies approved by manufacturer of supplied electrified hardware.
 - 2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
 - 3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
 - 4. Provide power supplies with the following features:
 - a. 12/24 VDC Output, field selectable.
 - b. Class 2 Rated power limited output.
 - c. Universal 120-240 VAC input.
 - d. Low voltage DC, regulated and filtered.
 - e. Polarized connector for distribution boards.
 - f. Fused primary input.
 - g. AC input and DC output monitoring circuit w/LED indicators.
 - h. Cover mounted AC Input indication.

- i. Tested and certified to meet UL294.
- j. NEMA 1 enclosure.
- k. Hinged cover w/lock down screws.
- l. High voltage protective cover.

2.13 CYLINDERS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. Schlage Everest 29 R
 - 2. Acceptable Manufacturers and Products:
 - a. Best Preferred Patented
 - b. Sargent XC
- B. Requirements:
 - 1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
 - 2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Patented Restricted Small Format: cylinder with small format interchangeable cores (SFIC) with restricted, patented keyway.
 - 3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
 - 4. Nickel silver bottom pins.

2.14 KEYING

- A. Scheduled System:
 - 1. New factory registered system:
 - a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Requirements:
 - 1. Construction Keying:
 - a. Temporary Construction Cylinder Keying.
 - 1) Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
 - a) Split Key or Lost Ball Construction Keying System.
 - b) 3 construction control keys, and extractor tools or keys as required to void construction keying.
 - c) 12 construction change (day) keys.
 - 2) Owner or Owner's Representative will void operation of temporary construction keys.
 - b. Replaceable Construction Cores.
 - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
 - a) 3 construction control keys
 - b) 12 construction change (day) keys.
 - 2. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - 3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.

- d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
- e. Quantity: Furnish in the following quantities.
 - 1) Permanent Control Keys: 3.
 - 2) Master Keys: 6.
 - 3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
 - 4) Key Blanks: Quantity as determined in the keying meeting.

2.15 KEY CONTROL SYSTEM

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Telkee
 - 2. Acceptable Manufacturers:
 - a. HPC
 - b. Lund
- B. Requirements:
 - 1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.16 DOOR CLOSERS

- A. Manufacturers and Products:
 - 1. Scheduled Manufacturer and Product:
 - a. LCN 4050A series
 - 2. Acceptable Manufacturers and Products:
 - a. Falcon SC70A series
 - b. Norton 7500 series
 - c. Sargent 351 series
- B. Requirements:
 - 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
 - 2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
 - 3. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
 - 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 - 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
 - 6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.

7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 DOOR CLOSERS

- A. Manufacturers and Products:
 1. Scheduled Manufacturer and Product:
 - a. LCN 1450 series
 2. Acceptable Manufacturers and Products:
 - a. Falcon SC80A series
 - b. Norton 8000 series
 - c. Sargent 1331 series
- B. Requirements:
 1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
 2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
 3. Closer Body: 1-3/8-inch (35 mm) diameter with 5/8-inch (16 mm) diameter pinion journal diameter heat-treated pinion journal and full complement bearings.
 4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
 6. Pressure Relief Valve (PRV) Technology: Not permitted.
 7. Provide stick on and special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.18 ELECTRO-HYDRAULIC AUTOMATIC OPERATORS

- A. Manufacturers and Products:
 1. Scheduled Manufacturer and Product:
 - a. LCN 4600 series
 2. Acceptable Manufacturers and Products:
 - a. Norton 6000 series
 - b. Precision D4990 series
- B. Requirements:
 1. Provide low energy automatic operator units with hydraulic closer complying with ANSI/BHMA A156.19.
 2. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
 3. Provide units with conventional door closer opening and closing forces unless power operator motor is activated. Provide door closer assembly with adjustable spring size, back-check, and opening and closing speed adjustment valves to control door
 4. Provide units with on/off switch for manual operation, motor start up delay, vestibule interface delay, electric lock delay, and door hold open delay.
 5. Provide drop plates, brackets, and adapters for arms as required for details.
 6. Provide actuator switches and receivers for operation as specified.
 7. Provide weather-resistant actuators at exterior applications.
 8. Provide key switches with LED's, recommended and approved by manufacturer of automatic operator as required for function described in operation description of hardware group below.
Cylinders: Refer to "KEYING" article, herein.

9. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.
10. Provide units with vestibule inputs that allow sequencing operation of two units, and SPDT relay for interfacing with latching or locking devices.

2.19 DOOR TRIM

- A. Manufacturers:
 1. Scheduled Manufacturer:
 - a. Trimco
 2. Acceptable Manufacturers:
 - a. Ives
 - b. Burns
 - c. Rockwood
- B. Requirements:
 1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.20 PROTECTION PLATES

- A. Manufacturers:
 1. Scheduled Manufacturer:
 - a. Trimco
 2. Acceptable Manufacturers:
 - a. Ives
 - b. Burns
 - c. Rockwood
- B. Requirements:
 1. Provide standard stainless steel, brass, bronze, or aluminum protection plates with beveled four edges and with thickness as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
 2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
 3. At fire rated doors, provide protection plates over 16 inches high with UL label.
 4. At fire rated doors, provide protection plate with option for adhesive tape mounted protection plates over 16 inches high provide UL label stamp.

2.21 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

- A. Manufacturers:
 1. Scheduled Manufacturers:
 - a. Glynn-Johnson
 2. Acceptable Manufacturers:
 - a. Rixson
 - b. ABH
- B. Requirements:
 1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.22 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Trimco
 - 2. Acceptable Manufacturers:
 - a. Ives
 - b. Burns
 - c. Rockwood
- B. Provide door stops at each door leaf:
 - 1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
 - 2. Where a wall stop cannot be used, provide universal floor stops.
 - 3. Where wall or floor stop cannot be used, provide overhead stop.
 - 4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.23 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Scheduled Manufacturer:
 - 1. Zero International
- B. Acceptable Manufacturers:
 - 1. National Guard
 - 2. Reese
 - 3. Pemko
- C. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.
 - 1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
 - a. Provide non-corrosive fasteners for all exterior applications.
 - b. Provide security fasteners where indicated.
 - 2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.
- D. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for smoke control ratings indicated based on testing according to UL 1784.
- E. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.
 - 1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.
- F. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.
- G. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.
- H. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.
 - 1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

- I. Automatic Door Bottoms:
 - 1. Provide closed cell sponge, bulb neoprene, or EPDM type of seal as specified in hardware sets.
 - 2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.
- J. Rain Drips:
 - 1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
 - 2. Door sweeps or shoes with integral rain drip must meet ADA requirements
- K. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.
 - 1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

2.24 DOOR POSITION SWITCHES

- A. Manufacturers:
 - 1. Scheduled Manufacturer:
 - a. Schlage
 - 2. Acceptable Manufacturers:
 - a. Nascom
 - b. SDC
- B. Requirements:
 - 1. Provide recessed or surface mounted type door position switches as specified.
 - 2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.25 FINISHES

- A. Provide finishes as specified unless noted otherwise by architect/owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 - 4. Installation Guide for Doors and Hardware: DHI TDH-007-20

- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
 - 1. Install construction cores to secure building and areas during construction period.
 - 2. Replace construction cores with permanent cores as indicated in keying section.
 - 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
 - 1. Conduit, junction boxes and wire pulls.
 - 2. Connections to and from power supplies to electrified hardware.
 - 3. Connections to fire/smoke alarm system and smoke evacuation system.
 - 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 - 5. Connections to panel interface modules, controllers, and gateways.
 - 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.
- M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.
- P. Thresholds:
 - 1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
 - 2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
 - 3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

- Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- R. Perimeter Gasketing:
 - 1. Apply to head and jamb, forming seal between door and frame.
 - 2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.
- S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.3 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.4 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.5 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Hardware Group No. 01

For use on Door #(s):

104A	104B	105A	105B	105C	169A
169B	170A	170B			

Provide each SL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	SFIC MORTISE HOUSING	80-110 (CAM/RING AS REQ'D)		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	DOOR POSITION SWITCH	MP2017	↗		
		BALANCE OF HARDWARE	(BY SLIDING DOOR MANUFACTURER)			B/O

CONFIRM LOCKING FUNCTION WITH OWNER/MANUFACTURER PRIOR TO ORDERING/INSTALLING.

SWING/MAN DOOR TO RECEIVE DOOR CONTACT (1) - OMIT AT ALL OTHER NANAWALLS.

Hardware Group No. 02

For use on Door #(s):

104C

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	SFIC MORTISE HOUSING	80-110 (CAM/RING AS REQ'D)		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
		BALANCE OF HARDWARE	(BY SLIDING DOOR MANUFACTURER)			B/O

CONFIRM LOCKING FUNCTION WITH OWNER/MANUFACTURER PRIOR TO ORDERING/INSTALLING.

Hardware Group No. 03

For use on Door #(s):

101 151

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY TWP CON	 ✎	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-98-NL-OP-110MD	 ✎	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-EO	 ✎	626	VON
1	EA	SFIC MORTISE HOUSING	80-110 (CAM/RING AS REQ'D)		626	SCH
1	EA	SFIC RIM HOUSING	80-116		626	SCH
2	EA	SFIC CORE	80-037 EV29 R		626	SCH
2	EA	OFFSET LADDER PULL	AP414E-7266		630	TRM
2	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4050A (TJ MOUNT) MC		689	LCN
1	EA	SURF. AUTO OPERATOR	4642	 ✎	689	LCN
1	EA	TJ MOUNTING PLATE	4050A-18G (AS REQ'D)		689	LCN
1	EA	WEATHER RING	8310-801			LCN
1	EA	ACTUATOR BUTTON	8310-853T	 ✎	630	LCN
1	EA	ACTUATOR MOUNT BOX	8310-867S			LCN
1	EA	GASKETING/WEATHERSTRI PPING	(BY DOOR/FRAME MANUFACTURER)			B/O
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	654A-223		A	ZER
2	EA	DOOR CONTACT	679-05HM	 ✎	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ✎	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	✎		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR PUSHPAD.
5. PRESENTING VALID CREDENTIAL ENABLES EXTERIOR ACTUATOR. PUSHING EXTERIOR ACTUATOR WHEN ENABLED SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR AND ADJACENT DOOR IN SEQUENTIAL ORDER.

ROUGH IN FOR FUTURE INTERIOR ACTUATORS BUTTONS.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 04

For use on Door #(s):

101A 151A

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY		628	IVE
2	EA	DUMMY PUSH BAR	350		626	VON
2	EA	OFFSET LADDER PULL	AP414E-7266		630	TRM
2	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4050A (TJ MOUNT) MC		689	LCN
1	EA	SURF. AUTO OPERATOR	4642	 ⚡	689	LCN
1	EA	TJ MOUNTING PLATE	4050A-18G (AS REQ'D)		689	LCN
1	EA	ACTUATOR BUTTON	8310-853T	 ⚡	630	LCN
1	EA	ACTUATOR MOUNT BOX	8310-867S			LCN
1	EA	GASKETING/WEATHERSTRIPPING	(BY DOOR/FRAME MANUFACTURER)			B/O

DESCRIPTION OF OPERATION:

1. NORMALLY UNLOCKED FROM BOTH DIRECTIONS.
2. PUSHING INTERIOR ACTUATOR SIGNALS AUTOMATIC OPERATOR TO OPEN DOOR AND ADJACENT DOOR IN SEQUENTIAL ORDER.

ROUGH IN FOR FUTURE INTERIOR ACTUATORS BUTTONS.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 05

For use on Door #(s):

105 119 169

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY TWP CON	 ⚡	628	IVE
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD	 ⚡	626	VON
1	EA	SFIC RIM HOUSING	80-116		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	OFFSET LADDER PULL	AP414E-7266		630	TRM
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4050A (TJ MOUNT) MC		689	LCN
1	EA	TJ MOUNTING PLATE	4050A-18G (AS REQ'D)		689	LCN
1	EA	GASKETING/WEATHERSTRIPPING	(BY DOOR/FRAME MANUFACTURER)			B/O
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	428E		AL	NGP
1	EA	DOOR CONTACT	679-05HM	 ⚡	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ⚡	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	⚡		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR PUSHPAD.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 06

For use on Door #(s):

104 170

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY TWP CON	 	628	IVE
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD	 	626	VON
1	EA	SFIC RIM HOUSING	80-116		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	OFFSET LADDER PULL	AP414E-7266		630	TRM
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4050A (TJ MOUNT) MC		689	LCN
1	EA	TJ MOUNTING PLATE	4050A-18G (AS REQ'D)		689	LCN
1	EA	GASKETING/WEATHERSTRIPPING	(BY DOOR/FRAME MANUFACTURER)			B/O
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	654A-223		A	ZER
1	EA	DOOR CONTACT	679-05HM	 	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)			B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR PUSHPAD.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 07

For use on Door #(s):
168

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
2	EA	CONT. HINGE	112XY TWP CON	 ✎	628	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-EO	 ✎	626	VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-NL-OP-110MD	 ✎	626	VON
1	EA	SFIC MORTISE HOUSING	80-110 (CAM/RING AS REQ'D)		626	SCH
1	EA	SFIC RIM HOUSING	80-116		626	SCH
2	EA	SFIC CORE	80-037 EV29 R		626	SCH
2	EA	OFFSET LADDER PULL	AP414E-7266		630	TRM
2	EA	OH STOP	100S		630	GLY
2	EA	SURFACE CLOSER	4050A (TJ MOUNT) MC		689	LCN
2	EA	TJ MOUNTING PLATE	4050A-18G (AS REQ'D)		689	LCN
1	EA	GASKETING/WEATHERSTRIPPING	(BY DOOR/FRAME MANUFACTURER)			B/O
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	428E		AL	NGP
2	EA	DOOR CONTACT	679-05HM	 ✎	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ✎	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	✎		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR PUSHPAD.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 08

For use on Door #(s):

113 121

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
1	EA	CONT. HINGE	112XY TWP CON		✓ 628	IVE
1	EA	STOREROOM W/DEADBOLT W/ OUTSIDE INDICATOR	L9480BDC 03A 09-544 OS-OCC DM		✓ 626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	ELECTRIC STRIKE	6400 FSE		✓ 630	VON
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4050A (TJ MOUNT) MC		689	LCN
1	EA	TJ MOUNTING PLATE	4050A-18G (AS REQ'D)		689	LCN
1	EA	GASKETING/WEATHERSTRI PPING	(BY DOOR/FRAME MANUFACTURER)			B/O
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	428E		AL	NGP
1	EA	DOOR CONTACT	679-05HM		✓ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		✓ LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)		✓	B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. WHEN IN USE, THUMBTURN IS THROWN FROM INSIDE, WHICH CHANGES EXTERIOR INDICATOR TO "OCCUPIED". DEADBOLT MONITOR DISABLES CARD READER FROM OUTSIDE.
5. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 09

For use on Door #(s):

103

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	PASSAGE SET	ND10S TLR		626	SCH
1	EA	WALL BUMPER	1270-CV		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER

Hardware Group No. 10

For use on Door #(s):

153 154

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	PASSAGE SET	ND10S TLR		626	SCH
1	EA	SURFACE CLOSER	4050A EDA MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	EA	WALL STOP/HOLDER	1283-6S		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER

Hardware Group No. 11

For use on Door #(s):

108 109 111 155

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	CORRIDOR LOCK W/ OUTSIDE INDICATOR	ND73BDC TLR OS-LOC		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	1450 RW/PA (PULL SIDE MOUNT) MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	EA	DOOR STOP	1298		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER

Hardware Group No. 12

For use on Door #(s):

157

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	CORRIDOR LOCK W/ OUTSIDE INDICATOR	ND73BDC TLR OS-LOC		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	WALL BUMPER	1270-CV		626	TRM
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	DOOR SWEEP	8151AA		AA	ZER

Hardware Group No. 13

For use on Door #(s):

115 164

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8		⚡ 652	IVE
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON		⚡ 626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	1450 RW/PA (PULL SIDE MOUNT) MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	EA	WALL BUMPER	1270-CV		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
1	EA	DOOR CONTACT	679-05HM		⚡ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		⚡ LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)		⚡	B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 14

For use on Door #(s):

114 158

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	 ⚡	652	IVE
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON	 ⚡	626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	1450 RW/PA (PULL SIDE MOUNT) MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	EA	WALL BUMPER	1270-CV		626	TRM
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	DOOR CONTACT	679-05HM	 ⚡	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ⚡	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	 ⚡		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 15

For use on Door #(s):

112 163

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8		⚡ 652	IVE
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON		⚡ 626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4050A RW/PA (PULL SIDE MOUNT) MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	EA	WALL BUMPER	1270-CV		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
1	EA	DOOR CONTACT	679-05HM		⚡ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		⚡ LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)		⚡	B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 16

For use on Door #(s):

165 167

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	POWER TRANSFER	EPT10		⚡ 689	VON
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON		⚡ 626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	OH STOP	100S		630	GLY
1	EA	SURFACE CLOSER	4050A RW/PA (PULL SIDE MOUNT) ST-5203 MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
1	EA	DOOR CONTACT	679-05HM		⚡ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		⚡ LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)		⚡	B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 17

For use on Door #(s):

117 118 156 159

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	 ⚡	652	IVE
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON	 ⚡	626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	WALL STOP/HOLDER	1283-6S		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
1	EA	DOOR CONTACT	679-05HM	 ⚡	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ⚡	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	⚡		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 18

For use on Door #(s):
161

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	 ✎	652	IVE
1	EA	ELEC PANIC HARDWARE	RX-QEL-98-L-NL-03	 ✎	626	VON
1	EA	SFIC MORTISE HOUSING	80-110 (CAM/RING AS REQ'D)		626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4050A SCUSH MC		689	LCN
1	EA	KICK PLATE	K0050 10X2 LDW-CSK		630	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
1	EA	DOOR CONTACT	679-05HM	 ✎	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ✎	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	✎		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR PUSHPAD.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 19

For use on Door #(s):
166

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
4	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	POWER TRANSFER	EPT10		✓ 689	VON
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON		✓ 626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
1	EA	SURFACE CLOSER	4050A EDA MC		689	LCN
1	EA	ARMOR PLATE	KA050 36X2 LDW-CSK		630	TRM
1	EA	WALL STOP/HOLDER	1283-6S		626	TRM
1	SET	PERIMETER GASKETING	870AA-S		AA	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63A-223		A	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
1	EA	DOOR CONTACT	679-05HM		✓ BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		✓ LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)		✓	B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 20

For use on Door #(s):

169C 170C

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		633	IVE
2	EA	PANIC DEVICE	PA100F (LENGTH AS REQ X CYLINDER)		SB	CRL
2	EA	SFIC RIM HOUSING	80-116		606	SCH
2	EA	SFIC CORE	80-037 EV29 R		606	SCH
2	EA	ELECTRIC STRIKE	ESK1		SB	CRL
2	EA	SURFACE CLOSER	4050A EDA MC		696	LCN
2	EA	WALL STOP/HOLDER	1283-6S		606	TRM
1	SET	MEETING STILE	328G (2 PCS - 1 SET)		G	ZER
1	SET	PERIMETER GASKETING	870G-S		G	ZER
2	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63G-223		G	ZER
1	EA	GASKETING BRACKET	870SPB (AS REQ'D)			ZER
2	EA	DOOR CONTACT	679-05HM		BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS		LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)			B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR PUSHPAD.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 21

For use on Door #(s):
162

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
7	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	ELECTRIC HINGE	5BB1 4.5 X 4.5 CON TW8	 ✎	652	IVE
2	EA	MANUAL FLUSH BOLT	3913/3915/3917 (AS REQ'D)		626	TRM
1	EA	DUST PROOF STRIKE	3910		626	TRM
1	EA	EU STOREROOM LOCK	ND80BDCEU TLR RX CON	 ✎	626	SCH
1	EA	SFIC CORE	80-037 EV29 R		626	SCH
2	EA	SURFACE CLOSER	4050A SCUSH MC		689	LCN
2	EA	KICK PLATE	K0050 10X1 LDW-CSK		630	TRM
1	EA	GASKETING	488SBK PSA		BK	ZER
2	EA	DOOR CONTACT	679-05HM	 ✎	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ✎	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	✎		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 22

For use on Door #(s):
107

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
3	EA	INV. HINGE	218		622	SOS
1	EA	INV. ELEC HINGE	218PT		622	SOS
1	EA	ELR STOREROOM LOCK	L9580BDC LLL 03A L283-150 RX CON	 ✎	622	SCH
1	EA	SFIC CORE	80-037 EV29 R		622	SCH
1	EA	STRAIGHT LADDER PULL	AP412E-128		622	TRM
1	EA	SURFACE CLOSER	4050A SCUSH MC ST-5207		693	LCN
1	EA	GASKETING	429BK		BK	ZER
1	EA	AUTO DOOR BOTTOM	364AA-Z49		AA	ZER
1	EA	THRESHOLD	63BK-223		BK	ZER
1	EA	DOOR CONTACT	679-05HM	 ✎	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ✎	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	✎		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
3. ACCESS BY PRESENTING A VALID CREDENTIAL TO THE CARD READER, OR BY MECHANICAL KEY.
4. FREE EGRESS MAINTAINED AT ALL TIMES BY INTERIOR LEVER TRIM.

COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

Hardware Group No. 23

For use on Door #(s):
106

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		FINISH	MFR
7	EA	INV. HINGE	218		622	SOS
1	EA	INV. ELEC HINGE	218PT		622	SOS
2	EA	MANUAL FLUSH BOLT	3913/3915/3917 (AS REQ'D)		622	TRM
1	EA	DUST PROOF STRIKE	3910		622	TRM
1	EA	ELR STOREROOM LOCK	L9580BDC LLL 03A L283-150 RX CON	 ✎	622	SCH
1	EA	SFIC CORE	80-037 EV29 R		622	SCH
1	EA	STRAIGHT LADDER PULL	AP412E-128		622	TRM
1	EA	OH STOP	100S		BLK	GLY
			- INACTIVE LEAF			
1	EA	SURFACE CLOSER	4050A SHCUSH MC		693	LCN
1	EA	GASKETING	488SBK PSA		BK	ZER
1	EA	MEETING SEAL	8217SBK PSA		BK	ZER
1	EA	ASTRAGAL	905BK		BK	ZER
2	EA	DOOR CONTACT	679-05HM	 ✎	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-2RS	 ✎	LGR	SCE
1	EA	CREDENTIAL READER	(BY DIV. 28 CONTRACTOR)	 ✎		B/O

DESCRIPTION OF OPERATION:

1. NORMALLY SECURE, ACCESS CONTROLLED OPENING.
2. OPENING IS CONTROLLED (LOCKED/UNLOCKED) BY HEAD END ACCESS CONTROL SYSTEM, AND CAN BE PROGRAMMED TO LOCK/UNLOCK AT OWNERS DISCRETION.
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COORDINATE SYSTEM OPERATION AND COMPONENT LOCATIONS WITH THE OWNER, THE ARCHITECT AND ALL RELATED TRADES.

END OF SECTION 08 71 00

SECTION 115213 - PROJECTION SCREENS

PART 1 - GENERAL

1.1 SCOPE

This section includes specifications for electrically operated, ceiling recessed, front projection screens. Included are the following topics:

A. PART 1 – GENERAL

1. Scope
2. Related Work
3. Quality Assurance
4. Delivery, Storage and Handling
5. Submittals
6. Warranty

B. PART 2 – PRODUCTS

1. Manufacturers
2. Motorized, Ceiling Recessed Front Projection Screens

C. PART 3 – EXECUTION

1. Examination
2. Preparation
3. Installation
4. Field Installed Testing
5. Protection of Finished Work

1.2 RELATED WORK

Applicable provisions of Division 1 shall govern all work under this section.

A. Related Sections and Divisions:

1. Section 01 91 01 - Commissioning Process
2. Division 5 - Section 05 50 00 - Metal Fabrications: Suspension systems for projection screens.
3. Division 9 - Ceilings: Ceiling construction, openings, trim, and coordination required for recessed projection screen installation.
4. Division 26 - Common Work Results for Electrical: Power supply, conduit, electrical wiring, connections, and installation of control switches for electrically operated projection screens

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of projection screen required from a single manufacturer as a complete unit, including necessary mounting hardware and accessories.
- B. Coordination of Work: Coordinate layout and installation of projection screens with other construction supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system, and partitions.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver projection screens until the building is enclosed and other construction where screens will be installed is substantially complete.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Protect screens from damage during delivery, handling, storage, and installation.

1.5 SUBMITTALS

- A. Submit shop drawings for review and approval. All product submittals shall be in electronic form.
- B. Each projection screen shop drawing review copy shall include the following information:
 - 1. Manufacturer's product data for each type of screen specified. Include preparation instructions and recommendations, wiring diagrams for electrically operated units, storage and handling requirements and recommendations, and installation methods.
- C. Shop drawings showing the type and layout for each projection screen specified shall include:
 - 1. Location of screen centerline
 - 2. Location of wiring connections
 - 3. Detailed drawings of concealed mounting
 - 4. Connections to suspension systems
 - 5. Anchorage details
 - 6. Accessories

1.6 WARRANTY

- A. Manufacturer limited warranty: 5 years from date of purchase.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design products by Da-Lite (a brand of Legrand AV).
- B. Subject to compliance with specification requirements, equivalent products by the following manufacturers are also acceptable:
 - 1. Draper
 - 2. Stewart Filmscreen

2.2 MOTORIZED, CEILING RECESSED, FRONT PROJECTION SCREENS

- A. TYPE A - Basis of Design: Tensioned Advantage with SightLine Series as manufactured by Da-Lite. Final model number shall be selected by the General Contractor based on the scheduled screen size, image surface material, controls, and project requirements.
 - 1. Electrically operated, tab tensioned, ceiling recessed projection screen with motor in roller and SightLine cable drop system. Case fully enclosed except for slot allowing viewing surface passage. Viewing surface securely attached to roller at top and at bottom to weighted dowel. Provide with sliding installation brackets for attachment of screen housing to structure above ceiling.
 - 2. Motor UL certified, rated 120V AC, 60 Hz, three wire, instantly reversible, lifetime lubricated with pre-set accessible limit switches.
 - 3. Tab-Tensioning System: Viewing surface with integrated tabs and cable on each side of fabric to provide tension and ensure flat viewing surface. Viewing surface and tabs CNC cut as a single piece. Tabs RF welded to the back of viewing surface to prevent tab separation. Tab adhesives are not acceptable. Viewing surface inserted into aluminum bottom dowel.
 - 4. Screen Size - Refer to 'Projection Screen Type Legend' on Drawing T003 for scheduled screen size (H x W).
 - 5. Screen Surface - Refer to 'Projection Screen Type Legend' on Drawing T003 for image surface material.
 - 6. SightLine Cable Drop - Refer to 'Room Projection Screen Schedule' on T003 for scheduled cable drop dimension.
 - 7. SightLine cable drop shall be adjustable to provide the scheduled viewing surface elevation.

2.3 FRONT PROJECTION SCREEN CONTROLS

- A. General: All controls shall be UL Certified.
- B. Provide an internal low voltage control unit compatible with the projection screen motor.

- C. Provide a three-button low voltage wall switch with cover plate to raise, lower, or stop the projection screen at any point.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify rough-in openings are properly prepared.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install front projection screens with screen cases in position and relationship to adjoining construction as indicated, securely anchored to supporting substrate, and in manner that produces a smoothly operating screen with plumb and straight vertical edges and plumb and flat viewing surfaces when screen is lowered.

3.4 FIELD INSTALLED TESTING

- A. Test electrically operated units to verify that screen, controls, limit switches, closure and other operating components are in optimum functioning condition.

3.5 PROTECTION OF FINISHED WORK

- A. Provide all necessary protective measures to prevent damage to installed products from exposure to other construction activity until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

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. Refer to Division 01 Section "General Commissioning Requirements" for detailed explanation of commissioning work. Section also contains sample Cx Plan, construction checklist, and functional test.

1.2 SUMMARY

- A. This Section lists electrical systems to be commissioned. The commissioning process is described in detail in the commissioning plan (Refer to Division 01 Section "General Commissioning Requirements").

1.3 SYSTEMS TO BE COMMISSIONED

- A. The following systems will be commissioned:
 - 1. Conductors and Cables 600V and below.
 - 2. Grounding and Bonding.
 - 3. Overcurrent Protective Device Coordination Study.
 - 4. Lighting Control Devices.
 - 5. Lighting Control/Dimming Systems.
 - 6. Switchboards.
 - 7. Panelboards.
 - 8. Wiring Devices.
 - 9. Low Voltage Circuit Protective Devices.
 - 10. Enclosed Switches.
 - 11. Enclosed Controllers.
 - 12. Variable Frequency Motor Controllers.
 - 13. Engine Generators.
 - 14. Automatic Transfer Switches.
 - 15. Surge Protective Devices.
 - 16. Lighting.
 - 17. Fire Detection and Alarm.
- B. Commission Items as required by ASHRAE 90.1 2019.
 - 1. Electrical Power Systems
 - a. Automatic receptacle controls
 - b. Electrical metering systems
 - c. Demand-responsive controls where applicable
 - 2. Lighting Systems
 - a. Occupancy/vacancy sensors
 - b. Time-switch controls
 - c. Daylight-responsive controls
 - d. Automatic shutoff controls
 - e. Exterior lighting controls

Van Buren Charter Township
The Lakeside Park
Van Buren Township, Michigan
Project Number 2500281

Commissioning Of Electrical Systems

Section 26 08 00

PART 2 - PRODUCTS

2.1 NOT USED.

PART 3 - EXECUTION

3.1 NOT USED.

END OF SECTION

SECTION 274116 – INTEGRATED AUDIOVISUAL SYSTEMS AND EQUIPMENT

PART 1 - GENERAL

1.1 PROJECT OVERVIEW

- A. Van Buren Township is currently constructing the new The Lake House community center in Michigan. The new facility will include audiovisual enabled collaboration spaces supporting community events and meetings. Spaces in the building include a divisible ballroom, multipurpose space, and meeting room all of which shall include audiovisual technologies.
- B. Van Buren Township is seeking a turn-key job to be provided by one vendor to supply equipment, labor, installation materials, control systems programming, audio DSP programming, testing, training, and follow-up support for the audiovisual systems as described in this Specification.

1.2 GENERAL FOR ALL SYSTEMS

- A. The following are applicable to all systems unless noted otherwise.
 - 1. System type (i.e. SY01) refers to a system signal flow for a particular space/system. X / AVSXX indicates the sheet and the detail that the system can be found within the signal flow drawings.
 - 2. Control System
 - a. The audiovisual control system touch panel or push-button panel associated with each system shall provide control of components within the audiovisual system. Control requirements are dependent upon the functionality of the space. Control may include, but is not limited to, the following capabilities:
 - 1) Power the system on/off
 - 2) Control of source device selection
 - 3) Control of video routing to displays and other devices
 - a) The last video source routed to a display will be the audio source utilized within the space. Coordinate final configuration with the Owner.
 - b) On touch-panel control systems, this includes secure technician level access to configure or reconfigure default routing.
 - c) The Contractor shall develop an easy to use interface on the touch panel that provides control of the routing assignments of the instructor's source content to all or select displays within the space.
 - 4) Control of audio including volume up/down/mute
 - a) On touch-panel control systems, this includes secure technician level access to controllable aspects to the audiovisual system's DSP settings if applicable.
 - 5) Control room lighting by recalling presets within the lighting control system provided by others.
 - a) Coordinate with the Architect regarding spaces that will include this capability
 - 6) Include a button to reset the system to its default video routes and audio levels without having to shut down and restart the system. This is for spaces with touch panel control only.
 - b. Any other operations that the control system can control not explicitly noted.
 - c. See Section 3.2 Control System Software Design & Development for further requirements.

- d. If required, a utilities section within the user interface shall provide any user with control of additional parameters of the audiovisual system that may not need to be accessed on a regular basis.
 - e. All audiovisual control systems shall include secondary analogous control of the audiovisual system. This shall be enabled through an app and/or web interface on an Owner-provided tablet or other mobile device. See Section 3.2 Control System Software Design & Development for further requirements.
3. Connections to network outlets located outside of a rack mounted patch panel shall utilize patch cables that match the Owner's patch cable requirements for connection to the facility LAN. Reference Division 27 Communications specifications.
4. The Contractor shall coordinate with the Architect and/or Owner on the color and/or finish of the touch panel, push-button panel, flip-top control system, flip-top cable enclosure, exposed equipment racks, equipment rack cabinets, instructor stations, credenzas, loudspeakers and ceiling-mounted microphones.
5. The Contractor shall coordinate the cut-outs with the furniture supplier/Architect/Owner on the location of the flip-top cable enclosures, touch panel controllers, microphones, or any other ancillary audiovisual devices that may be located on the surface of a table, instructor's station, or presentation station. This applies to all Contractor supplied furniture or furniture supplied by others that requires integration of audiovisual components. See Scope of Work and Installation Practices for further requirements.
6. Any cables connected to a floor or wall box shall be wrapped in a flexible sheath and shall be color coded. Coordinate colors with the Owner.
7. The Contractor shall coordinate the length of any premade cable assemblies.
8. The Contractor shall provide wire-ties, hooks, raceway or cable channels as necessary within Owner provided furniture to ensure a complete and neat installation. For example, cables shall not be seen hanging or draped under a table.
9. The Contractor shall provide mounts or mounting solutions unless specified to be by others. Examples include wall or ceiling mounted flat panel displays, ceiling or wall mounted video projectors, and devices which are located behind flat panel displays, under tables, within plenum boxes or other locations that may house audiovisual equipment within the audiovisual system.
10. All instructor's stations, credenzas, and equipment racks provided by the Contractor shall all have locking doors to limit access. All locks shall be keyed identically. Coordinate requirements with the Owner.
11. Manufacturer Assistance
 - a. The Contractor shall utilize any manufacturer assistance for programming, configuring or commissioning any of the systems within the facility as required to provide fully functional systems as indicated within this specification.

1.3 SYSTEMS DESCRIPTIONS

- A. SY01 (1/AVS01) – Ballroom, Quantity 1 (Room Numbers 169 / 170 / 164). The ballroom is a two-way divisible space that shall support audiovisual presentations, special events, sound reinforcement, assistive listening, and software-based web conferencing. Each divisible section shall be capable of operating independently, and the complete Ballroom shall be capable of operating as a combined system. Video signals shall be distributed using an AVoIP system. The system shall include the following:
 1. Display System

- a. Contractor shall provide two large-format ceiling-mounted laser video projectors, complete with appropriate lenses, ceiling mounts, extension columns, mounting hardware, and associated accessories.
 - b. Projection screens and screen cases shall be OFOI.
 - 1) Contractor shall coordinate projector locations, lenses, control, and interfaces with the projection screens shown on the infrastructure drawings.
 - c. Contractor shall provide two 55-inch flat-panel confidence displays, each furnished with a mobile cart and required mounting hardware.
 - 1) In divided mode, each confidence display shall default to the presentation content associated with its respective Ballroom section.
 - 2) In combined mode, the confidence displays shall present the selected system content as directed through the audiovisual control system.
2. Source Devices
 - a. Contractor shall provide one wireless presentation device with Miracast capability for each divisible section.
 - b. Contractor shall provide one HDMI and USB-C input connection for each divisible section. Input connections shall be located at the associated floor box and extended to the AV equipment rack.
 - c. Contractor shall provide AVoIP encoders and decoders as required to route audiovisual sources to the projectors, confidence displays, USB AV bridges, and other system destinations.
 - d. Contractor shall provide one digital signage player connected to the AVoIP system and Owner's building network.
 - e. Owner-furnished computers and portable source devices may be connected to the system through the HDMI, USB-C, USB, and network interfaces indicated on the drawings.
3. Video Capture / Web Conferencing
 - a. Contractor shall provide two rear-wall-mounted PTZ cameras, one serving each divisible section. Cameras shall include the required camera extension receivers and shall be integrated with the AVoIP system.
 - b. Contractor shall provide one USB AV scaling bridge for each divisible section to support software-based web conferencing using a future Owner-furnished computer.
 - c. Each USB AV bridge shall provide selected camera video and system audio to the connected Owner-furnished computer.
 - 1) In divided mode, each section's rear-wall camera and associated audio shall default to that section's USB AV bridge.
 - 2) In combined mode, the user shall be able to select the camera routed to the USB AV bridge through the audiovisual control system.
 - d. Far-end audio received from an Owner-provided computer shall be routed through the system audio processor and reinforced over the appropriate Ballroom loudspeaker zones.
 - e. The system shall provide acoustic echo cancellation and USB audio interfacing to support web-conferencing applications running on Owner-provided computers.
4. Audio
 - a. Contractor shall provide a distributed ceiling loudspeaker system consisting of ceiling loudspeakers arranged in four independently addressable zones.
 - b. Contractor shall provide a four-channel amplifier with Dante connectivity and integrated digital signal processing to power the ceiling loudspeaker system.

- c. Contractor shall provide a digital audio processor with Dante, USB audio, acoustic echo cancellation, audio mixing, routing, and room-combining capabilities.
 - d. Contractor shall provide a four-channel digital wireless microphone system consisting of:
 - 1) Two wireless bodypack transmitters with lavalier microphones.
 - 2) Two wireless handheld microphones.
 - 3) Antenna distribution and remote antennas as required.
 - 4) Rechargeable batteries and an eight-bay rack-mounted battery charger.
 - e. The system shall route microphone, program, conferencing, and other audio signals to the appropriate loudspeaker zones based on the selected room-combining mode.
 - 1) In combined mode, audio shall be capable of being distributed throughout the Ballroom.
 - 2) In divided mode, each section's audio shall default to the loudspeaker zones serving that section.
 - f. Contractor shall provide a two-channel, Dante-enabled Wi-Fi assistive listening system, including seven portable receivers with ear speakers, two neck loops, a docking/charging station, required rack-mounting accessories, and assistive listening signage.
 - 1) Assistive listening channels shall be configured to support the programmed combined and divided operating modes.
5. Control
- a. Contractor shall provide an integrated audiovisual control system for control of room-combining functions, source selection, source routing, projector lift, projector, and screen operation, confidence displays, audio functions, microphone levels, camera selection, camera presets, and conferencing functions.
 - b. Contractor shall provide two wall-mounted touch panels, one serving each divisible section.
 - c. Contractor shall provide two tabletop touch panels, one associated with each presenter's lectern.
 - d. Contractor shall provide a partition sensor which will automatically switch the system into either divided or combined mode based on the status of the partition.
 - e. In divided mode, each section's touch panels shall control the audiovisual equipment and functions associated with that section.
 - f. In combined mode, the touch panels shall provide coordinated control of the combined Ballroom system.
 - g. Contractor shall provide technician-level control pages for system configuration, source routing, audio adjustment, camera control, and system diagnostics. Access to technician-level functions shall be password- or passcode-protected.
 - h. Contractor shall coordinate room-combining control logic with the operable partition status and the Owner's operational requirements.
6. Hardware
- a. Contractor shall provide two mobile presenter's lecterns, one for each divisible section. Each lectern shall include AV connectivity, a flip-up shelf, cable management, and provisions for the associated tabletop touch panel and Owner-furnished equipment.
 - b. Each lectern shall connect to the associated custom floor box connection plate using prefabricated tactical cabling.
 - c. Contractor shall provide one full-height AV equipment rack located in Room 164. The rack shall house the centralized AVoIP, audio processing, amplification, wireless microphone, assistive listening, control, and related equipment.
 - d. Contractor shall provide rack power distribution, rack identification panels, shelves, blank panels, ventilation accessories, cable management, mounting hardware, power supplies,

- patch cords, terminations, and other incidental materials required for a complete and operational system.
 - e. Contractor shall provide one managed AVoIP network switch with PoE and Dante support in the AV equipment rack. Contractor shall coordinate connections to the Owner's building network where indicated.
 - f. Computers and other Owner-furnished equipment shall be furnished by the Owner and installed or connected by the Contractor where indicated.
- B. SY02 (1/AVS02) – Community Living Room / Multi-Purpose Room, Quantity 1 (Room Numbers 104 / 105). The Community Living Room / Multi-Purpose Room is a divisible space that shall support audiovisual presentations, special events, sound reinforcement, assistive listening, and software-based web conferencing. Each room within this system shall function independently with the capability of the Community Living Room being used as overflow or as part of the Multi-Purpose Room. Video signals shall be distributed using an AVoIP system. The system shall include the following:
- 1. Display System
 - a. Contractor shall provide three flat panel displays, complete with appropriate mounts, mounting hardware, and associated accessories.
 - 2. Source Devices
 - a. Contractor shall provide one wireless presentation device with Miracast capability for each room.
 - b. Contractor shall provide one HDMI and USB-C input connection for room.
 - 1) For the Multi-Purpose Room (105), input connections shall be located at the associated credenza in a cable enclosure on the credenza top.
 - c. Contractor shall provide AVoIP encoders and decoders as required to route audiovisual sources to the displays, USB AV bridges, and other system destinations.
 - d. Owner-furnished computers and portable source devices may be connected to the system through the HDMI, USB-C, USB, and network interfaces indicated on the drawings.
 - 3. Video Capture / Web Conferencing
 - a. Contractor shall provide two wall-mounted PTZ cameras, each serving the Multi-Purpose Room. Cameras shall include the required camera extension receivers and shall be integrated with the AVoIP system.
 - b. Contractor shall provide one USB AV scaling bridge to support software-based web conferencing using a future Owner-furnished computer in the Multi-Purpose Room.
 - c. USB AV bridge shall provide selected camera video and system audio to the connected Owner-furnished computer.
 - d. Far-end audio received from an Owner-provided computer shall be routed through the system audio processor and reinforced over the appropriate Ballroom loudspeaker zones.
 - e. The system shall provide acoustic echo cancellation and USB audio interfacing to support web-conferencing applications running on Owner-provided computers.
 - 4. Audio
 - a. Contractor shall provide a distributed ceiling loudspeaker system consisting of ceiling loudspeakers arranged in three independently addressable zones.
 - b. Contractor shall provide a four-channel amplifier with Dante connectivity and integrated digital signal processing to power the ceiling loudspeaker system.
 - c. Contractor shall provide a digital audio processor with Dante, USB audio, acoustic echo cancellation, audio mixing, routing, and room-combining capabilities.

- d. Contractor shall provide a four-channel digital wireless microphone system consisting of:
 - 1) One wireless bodypack transmitter with lavalier microphone.
 - 2) One wireless handheld microphone.
 - 3) Antenna distribution and remote antennas as required.
 - 4) Rechargeable batteries and an eight-bay rack-mounted battery charger.
 - e. The system shall route microphone, program, conferencing, and other audio signals to the appropriate loudspeaker zones.
 - f. Contractor shall provide a two-channel, Dante-enabled Wi-Fi assistive listening system, including seven portable receivers with ear speakers, two neck loops, a docking/charging station, required rack-mounting accessories, and assistive listening signage.
 - 1) Assistive listening channels shall be configured to support the programmed combined and divided operating modes.
5. Control
- a. Contractor shall provide an integrated audiovisual control system for control of room-combining functions, source selection, source routing, and display operation, audio functions, microphone levels, camera selection, camera presets, and conferencing functions.
 - b. Contractor shall provide one wall-mounted touch panel in the Community Living Room (104). This shall control the capabilities of the Community Living Room only.
 - c. Contractor shall provide one tabletop touch panel at the credenza in the Multi-Purpose Room.
 - d. Contractor shall provide a partition sensor which will automatically switch the system into either divided or combined mode based on the status of the partition.
 - e. In divided mode, each section's touch panels shall control the audiovisual equipment and functions associated with that section.
 - f. In combined mode, the touch panels shall provide coordinated control of the combined Community Living Room / Multi-Purpose Room system.
 - g. While the Community Living Room is in overflow mode, the wall-mounted touch panel shall provide the ability to control volume levels and turning off overflow mode only.
 - h. Contractor shall provide technician-level control pages for system configuration, source routing, audio adjustment, camera control, and system diagnostics. Access to technician-level functions shall be password- or passcode-protected.
6. Hardware
- a. Contractor shall provide an AV credenza. The credenza shall include AV connectivity, cable management, and provisions for the associated tabletop touch panel and Owner-furnished equipment.
 - 1) The credenza shall house the centralized AVoIP, audio processing, amplification, wireless microphone, assistive listening, control, and related equipment.
 - b. The credenza shall connect to the associated custom wall box plate using prefabricated tactical cabling.
 - 1) Contractor shall provide a minimum of 10' length of cable slack at the credenza, allowing the user some room for future maintenance.
 - c. Contractor shall provide rack power distribution, rack identification panels, shelves, blank panels, ventilation accessories, cable management, mounting hardware, power supplies, patch cords, terminations, and other incidental materials required for a complete and operational system.
 - d. Contractor shall provide one managed AVoIP network switch with PoE and Dante support in the credenza. Contractor shall coordinate connections to the Owner's building network where indicated.

- e. Computers and other Owner-furnished equipment shall be furnished by the Owner and installed or connected by the Contractor where indicated.
- C. SY03 (2/AVS02) – Meeting Room, Quantity 1 (Room Number 118). The Meeting Room is a space that shall support audiovisual presentations, and software-based web conferencing. Video signals shall be distributed using an HDBaseT signal transport system. The system shall include the following:
- 1. Display System
 - a. Contractor shall provide one flat panel display, complete with appropriate mounts, mounting hardware, and associated accessories.
 - 2. Source Devices
 - a. Contractor shall provide one wireless presentation device with Miracast capability.
 - b. Contractor shall provide one HDMI and USB-C input connection for room.
 - c. Contractor shall provide HDBaseT transmitters and receivers as required to route audiovisual sources to the display, web conferencing soundbar, and other system destinations.
 - d. Owner-furnished computers and portable source devices may be connected to the system through the HDMI, USB-C, USB, and network interfaces indicated on the drawings.
 - 3. Web Conferencing
 - a. Contractor shall provide a web conferencing soundbar along with any required mounting solutions.
 - b. The system shall provide acoustic echo cancellation and USB audio interfacing to support web-conferencing applications running on Owner-provided computers.
 - 4. Audio
 - a. Contractor shall provide a web conferencing soundbar that will handle all program and far-end audio.
 - 5. Control
 - a. Contractor shall provide an integrated audiovisual control system for control of source selection, source routing, display operation, audio functions, camera presets, and conferencing functions.
 - b. Contractor shall provide one tabletop touch panel.
 - c. Contractor shall provide technician-level control pages for system configuration, source routing, audio adjustment, camera control, and system diagnostics. Access to technician-level functions shall be password- or passcode-protected.
 - 6. Hardware
 - a. Contractor shall provide any and all required mounting accessories to locate AV equipment as indicated on the drawings.
 - b. Contractor shall provide power distribution, ventilation accessories, cable management, mounting hardware, power supplies, patch cords, terminations, and other incidental materials required for a complete and operational system.
 - c. Computers and other Owner-furnished equipment shall be furnished by the Owner and installed or connected by the Contractor where indicated.
- D. SY04 (1/AVS03) – Outdoor Sound System, Quantity 1. The Outdoor Sound System is a system that shall support distribution of audio sources outside of both the Ballroom as well as the Community Living Room / Multi-Purpose room spaces. Audio signals shall be distributed using a Dante signal transport system. The system shall include the following:
- 1. Audio

- a. Contractor shall provide an outdoor distributed wall-mounted loudspeaker system consisting of loudspeakers arranged in five independently addressable zones.
 - b. Contractor shall provide an eight-channel amplifier with Dante connectivity and integrated digital signal processing to power the loudspeakers.
 - c. The digital audio processor associated with system SY01 shall provide the capability to use Dante, USB audio, acoustic echo cancellation, audio mixing, routing, and zone-combining capabilities.
 - d. The system shall route microphone, program, conferencing, and other audio signals to the appropriate loudspeaker zones.
 - 1) The default input for the system shall be an OFCI digital media player.
2. Control
 - a. Contractor shall provide one tabletop touch panel.
 - b. Control of the system shall be achieved via the control system processor associated with SY01 and the contractor provided touch panel referenced above.
 3. Hardware
 - a. Contractor shall install all rack mounted equipment in the AV equipment rack associated with SY01.

1.4 CONTRACTOR QUALIFICATION REQUIREMENTS:

- A. Bidder shall submit with the bid response evidence of his/her qualifications to perform the work specified. Contractor qualifications shall be the most current information available but not more than one year old. Submit one copy of documentation to both Owner and Consultant for review and approval. All contractor qualifications shall be communicated by way of the enclosed Contractor Qualification Requirements Form (APPENDIX C), and shall include the information listed below.

1. Corporate Profile
 - a. Location of Corporate Headquarters
 - b. Number of offices and locations
 - c. Location of office assigned to this project
 - d. Corporate History
 - 1) How Many years in this business?
 - 2) Under what former names has your organization operated
 - 3) Date(s) of incorporation
 - 4) State of incorporation
 - 5) Officers names and addresses
 - e. Litigation Experiences Within the Last 5 Years
 - 1) Project Related:
 - a) Nature of Litigation
 - b) Plaintiff or Defendant
 - c) Outcome
 - 2) Non-Project Related
 - a) Nature of Litigation
 - b) Plaintiff or Defendant
 - c) Outcome
2. Financial
 - 1) Trade and Bank Credit References (List 3)

- 2) Dunn & Bradstreet ranking
 - 3) Insurance Limits
 - 4) Name of Bonding Company
 - 5) Name and address of Agent
 - 6) Maximum Bonding Capacity
 - 7) Current Bonding Capacity
 - 8) Performance Bond ever exercised?
3. Staffing
- a. Number and Type of Full-Time Staff
 - 1) Total number of employees
 - 2) Number of design staff
 - 3) Number of installation staff
 - 4) Number of project management staff
 - 5) Number of software programming staff
 - b. Identify key personnel that will be assigned to this project including:
 - 1) Project Executive
 - 2) Project Manager
 - 3) Systems Engineer/Designer
 - 4) Lead Installer/Crew Chief/Superintendent/Lead Technician
 - 5) Control Systems Programmer
 - 6) Audio DSP Programmer
 - 7) Commissioning Agent
 - 8) Trainer
 - c. For each Individual listed above provide a resume that includes:
 - 1) Office Location
 - 2) Percentage of individual's time that will be allocated to this project
 - 3) Work History
 - 4) Previous Project Experience:
 - a) The assigned Project Manager shall have a minimum of five (5) years' experience in the fabrication, assembly, and installation of audiovisual systems of similar magnitude and quality to that indicated for this project.
 - b) The assigned Systems Engineer/Designer shall have a minimum of five (5) years' experience in the fabrication, assembly, and installation of audiovisual systems of similar magnitude and quality to that indicated for this project.
 - 5) Length of Employment
 - 6) Certifications: CTS, CTS-D, CTS-I, EST-L2, RCDD, PMP, Certified Control System Programmer, Certified DSP Programmer, CompTIA Network+, CCNA, other.
 - 11) The project will utilize NAV products by Extron. The Contractor's Systems Engineer/Designer shall hold a current Extron Network AV Specialist certification. The Bidder shall submit the name of the Systems Engineer/Designer, certification expiration date and certification number.
 - 12) The Contractor's Lead Installer shall hold a current CTS-I (Certified Technology Specialist – Installation) certification from AVIXA/InfoComm International. The Bidder shall submit the name of the lead installer and certification expiration dates.

- 16) The project will utilize NAV products by Extron. The Contractor's Lead Installer shall hold a current Extron Network AV Specialist certification. The Bidder shall submit the name of the Lead Installer, certification expiration date and certification number.
- 21) The project will utilize control system products by Extron Electronics. Due to the potential complexity of the control system, an Extron Certified Control Specialist(s) with active certification shall be required to author the programming component of this project. The Bidder shall provide documentation listing project team member(s) who will create the control system programming including a listing of years of experience, a statement of manufacturer authorization, certification type, date of certification and the certificate number.
- 25) Due to the potential complexity of the Audio DSP system, a QSC Q-SYS Level Two Training certified individual, with active certification(s), shall be required to author the programming for the Audio DSP component of this project. The Bidder shall provide documentation listing project team member(s) who will program the Audio DSP including a listing of years of experience, a statement of manufacturer authorization, certification type and date of certification. In addition to the DSP certifications, the bidder shall provide any audio supportive certifications of merit (i.e. Syn-Aud-Con and AVIXA/InfoComm certifications relevant to audio training and/or CompTia and Cisco certifications relevant to network training).

4. Resources

- a. A manufacturers' line card for products in which the Bidder is an authorized Distributor or Dealer. Include date initially authorized.
- b. A list of any manufacturers' specialized technical certifications or designations held by the Bidder.
- c. A list of manufacturers for whom the Bidder is an authorized service center.
- d. A list of computer software and/or systems owned by the Bidder, which will be used to communicate, measure, draw, and/or document the project.
- e. A list of system test equipment owned and used by the Bidder, including manufacturer, model number and, where applicable, latest software revision.

5. References

- a. Include three project references, including:
 - 1) Contact name
 - 2) Institution name
 - 3) Phone number
 - 4) E-mail address
- b. Include three projects of:
 - 1) Similar scope and scale.
 - 2) Similar technology applications
 - 3) Provide Project cost for each
- c. List any past projects where Bidder has worked with the Owner, Consultant, Architects, or Construction Manager who are part of this project team.

1.5 GENERAL CONDITIONS

- A. The General Conditions, Requirements, and Special Provisions, of any larger body of specifications, of which this Specification may be a part, are hereby made a part of this Specification. In the event that any clauses or provisions of the larger body of specification conflict with the letter or intent of this Specification, the Contractor shall immediately notify the Consultant for clarification and direction.

1.6 THE SPECIFICATION

- A. The "Specification" is defined as the body of documentation provided to the Contractor with the Request for Quotation, as well as all addenda to said documentation. Throughout this document, words such as "herein" refer to the entire Specification, and not just this written document.
- B. The Specification includes, but is not limited to:
 - 1. This written specification document.
 - 2. All drawings, as listed in the List of Drawings.
 - 3. Additions and/or modifications as detailed in written addenda.
 - 4. Additions and/or modifications as detailed in drawing additions or reissues.
- C. The purpose of the Specification is to provide sufficient detail for the Bidder to understand the functional requirements of the systems, the installation and performance standards that must be met, and the required scope of work, in order to generate and submit a complete and accurate bid.

1.7 DEFINITION OF TERMS

- A. Within this section of the specification, the following definitions shall apply:
 - 1. The term "Owner" is used to indicate Van Buren Township.
 - 2. The term "Architect" is used to indicate Fishbeck.
 - 3. The term "Consultant" is used to indicate: NV5, 1501 Reedsdale Street, Suite 300, Pittsburgh, PA, 15233.
 - 4. The term "Bidder" is used to indicate that entity generating the bid response.
 - 5. The term "Contractor" is used to indicate the successful Bidder to whom the Owner has awarded the contract.
 - 6. The term "Furnish" is used to indicate the responsibility to procure and ship or deliver the item to the job site, freight prepaid, for receipt, staging and installation by others.
 - 7. The term "Install" or "Installation" is used to indicate the responsibility of receiving the item at the job site, assuring adequate storage, unpacking or uncrating the item, physically securing the item, configuring and testing the item, or otherwise making ready the item for its intended use by following the instructions and approved methods of the manufacturer and any additional requirements described herein.
 - 8. The term "Provide" is used to indicate the responsibility to both "Furnish" and "Install."
 - 9. The term "Provided by Others" shall refer to material and work, which is related to this contract, but has been provided by parties other than the AV Contractor. An example might be in reference to a projection screen installed during building construction but requiring interface to the AV control system.
 - 10. The terms "NIC" and "Not In Contract" are equivalent to "Provided by Others."
 - 11. The term "OFCI" (Other Furnished Contractor Installed) shall refer to equipment that will be furnished by the Owner or others for installation by the Contractor. The Contractor shall be responsible for coordinating with the Owner regarding the specific requirements of the equipment as applicable to meet the functional requirements of the systems as specified. The Contractor shall be responsible for installing and integrating this equipment as required to produce a fully functioning system. This may include the installation and configuration of software, PCI cards or other components within or attached to OFCI computers that are required by the AV systems.

12. The term "Contractor Selected" refers to ancillary items where no specific manufacturer and/or model number has been listed as the basis of design in the Bidding Equipment List. The Contractor shall select a product that meets the performance and functional requirements of the system and submit the product as part of the line item pricing, Shop Drawings and Bill of Materials submittal process as defined herein.
13. The term "Installation Materials" shall reference installed cable, loose cable, terminations, signal extenders, cable management, voice/data/video patch cords, adapters, I/O panels, cable dressing, lacing bars, copper bus bars, labels, rack shelves, rack mounts, power supplies and adapters, power strips/distribution and other materials as needed to install the systems defined herein.
14. The term "Substantial Completion" is used to indicate the stage in the progress of the work where the systems are determined to be sufficiently complete in accordance with the Specification so that the Owner can utilize the systems for their intended use.
15. The term "Final Acceptance" is used to indicate the point in which all contract requirements have been met by the Contractor after Substantial Completion has been achieved. This includes, but is not limited to, the correction and acceptance of any remaining punch-list items, approval and delivery of all Final Documents, and user training as specified.
16. The term "shall" is mandatory; the term "will" is informative; and the term "should" is advisory.

1.8 SCOPE OF WORK

- A. The Contractor shall provide complete, turnkey audiovisual systems performing all of the services and functions as described herein, together with all other apparatus, cable, materials, labor, tools, transportation, and any other resources necessary to provide a complete system.
- B. Specifically, the work shall include, but is not limited to:
 1. Coordination
 - a. Communicating and coordinating directly with the Consultant, Owner, Architect and other trades complying with all requirements as defined under this Scope of Work and elsewhere, to fulfill all requirements of this specification.
 - b. Scheduling installation operations in sequence required in order to obtain best completion results.
 - c. Coordinating installation of different components to assure maximum accessibility for required maintenance, service, and repair.
 - d. Verifying required cable lengths for all bulk cable or manufactured cable assemblies prior to ordering as outlined in 'Installation Practices'.
 - e. Verifying the accuracy of Master Quote or other quotation numbers prior to ordering.
 - 1) Where given, Master Quote numbers or other quotation numbers have been provided as a convenience to Bidders and are intended to be used for bidding purposes only.
 - 2) Bidding Equipment List subsystem sections, where a Master Quote has been provided, may only show a small number of items to help convey the design intent of the subsystem. Refer to the Master Quote for the expanded list of subsystem components.
 - 3) A Master Quote may not be inclusive of all components or accessory items necessary to provide for a complete, functioning and properly integrated subsystem. The Bidder shall include all miscellaneous materials that may be required to complete the subsystem.
 - 4) Where discrepancies between a Master Quote and the Bidding Equipment List exist, the Master Quote shall rule.
 2. Design Verification and Documentation

- a. Generating and submitting Shop Drawings as required for approvals and As-Built drawings as specified herein.
 - b. The Contractor shall provide final complete and detailed designs, as well as complete and operational systems, based on the design intent outlined in the Specification. Any omissions, discrepancies, substitutions, or exceptions to the Specification identified by the Contractor shall be communicated to the Consultant as part of the Submittal process.
 - c. After completion of the Submittals process, the Contractor shall assume full responsibility for supplying complete and operational systems and final complete and detailed designs without claim for additional compensation. This shall include providing all equipment, Installation Materials, and labor needed to provide complete and operable system(s), even if such equipment, materials, or labor are not listed within this Specification, including the Bidding Equipment Lists.
 - d. After completion of the Submittals process, requests for additional compensation will only be considered based on the following conditions: Owner-requested changes, unexpected field issues due to work by other contractors, or schedule changes initiated by others.
 - e. If the Contractor fails to provide the required Submittals, the Contractor shall assume all responsibility for supplying complete and operational systems and designs without claim for additional compensation.
 - f. Generating and Submitting "Progress Reports" as defined herein.
 - g. Documenting the completed installed systems as defined herein.
3. Cabling, Equipment, and Installation
- a. Providing all cable in conduits for the specified systems. Place pull string in all conduits after cable installation is complete to allow for future cable installation.
 - b. Providing station and user cables for connection of audiovisual equipment to associated data network outlets, table input plates, wall plates, floor boxes, and other connection points provided by the Contractor. Including but not limited to presenter's computers, production computers, laptop connections, control system processors, codecs, displays, or other portable/user provided devices. This applies to all equipment installed by the Contractor, including Owner-Furnished (OFCI) items. Station cables for HDMI and other audiovisual-specific types shall meet all performance requirements specified herein. Coordinate station cable requirements for telecom cables with the greater building-wide structured cabling system.
 - c. Coordinating and providing cable labels as stipulated by the Owner and/or specified herein.
 - d. Furnishing and/or installing all equipment as specified.
 - e. Installing Owner furnished equipment as specified.
 - f. Providing speakers as complete assemblies with back boxes, grilles, tile bridges, wall mounts, hanging hardware and other installation hardware as required.
 - g. Coordinating with the Architect and Owner on final color selection, and/or the painting of any exposed loudspeakers and any/all exposed system components to match the room's aesthetics and finishes.
 - h. Coordinating with local entities as necessary (manufacturer, Owner, SBE, FCC, etc.) to determine final channel selection for all wireless devices and resolve conflicts where they may occur.
 - i. Providing to the Owner, upon completion, all accessories and ancillary items included with the manufacturer's equipment but not used for the physical installation of the device. This shall include all user manuals, remote controls, batteries, tools, installation hardware, carrying cases, protective covers, loose cables, etc. Batteries shall be provided for all battery-operated devices, even if not included by the manufacturer.
 - j. Furnishing all lifts, ladders, scaffolding or other resources as needed for proper safe installation. Coordinating with other trades as needed.

- k. Interconnecting all components, both internal and external to rack cabinets.
 - l. Ensuring that all cabling, equipment, and terminations are installed in accordance with accepted industry standards, approved Shop Drawings, manufacturer's recommendations and as stipulated herein.
 - m. Providing cable management hardware as required including; that required internal to rack cabinets; that required between pieces of equipment not housed in rack cabinets; and that required to extend cabling from rack cabinets and equipment to the greater facility cabling infrastructure.
 - n. Providing equipment mounting hardware as required including; that required for mounting equipment behind flat panel displays; that required to mount equipment within equipment racks; that required for other locations where equipment will be housed.
 - o. Providing custom cover plates, wall plates, I/O connection plates, floor box insert plates as required. Coordinate with the Architect and/or Owner on the final selection of finishes.
 - p. Ensuring that all equipment, with the exception of portable equipment, is firmly fastened or attached in place. A safety factor of at least five shall be utilized for all brackets, fasteners and attachments. Provide safety retention cables for overhead equipment such as loudspeakers, projectors, etc.
 - q. Ensuring that all equipment mounting styles and locations comply with the current ADA Standards for Accessible Design. If any device or location specified herein is found to be in conflict, a confirming RFI should be issued prior to relocating.
 - r. Providing all projector mounts, including guy wires, clamps, or support assemblies back to structural members. Obstructions vary from room to room; Contractor must pay close attention to this issue on a room-by-room basis.
 - s. Field verifying all projector locations and resolving any obstruction conflicts for optimal performance. The Contractor shall reference the infrastructure drawings for screen sizes and initial throw distance calculations. Field verify measurements to confirm throw distances and validate the appropriate lens requirement prior to procurement.
 - t. Providing all projector lenses as required.
 - u. Mounting / aligning the projectors so that digital keystone correction is not required. Optical lens shift shall be employed, only if necessary, to align the image with the image area. Where possible all projectors mounted below the ceiling shall be mounted and adjusted to be perpendicular to the screen surface.
 - v. Coordinating with the General Contractor and/or Electrical Contractor on the audiovisual control system connection to the projection screens, as required
 - w. Performing final adjustments to motorized projection screens provided by Others to include:
 - 1) Screen travel limits as required optimizing the amount of black drop in conjunction with projection system geometry, field conditions and manufacturer recommendations. Refer to the Drawings for specified dimensions.
 - 2) Tab-tension systems (where specified) to ensure a flat projection surface free of wrinkles, waves or other anomalies which might indicate that the tensioning cables require adjustment.
 - x. Providing a list of all Owner Furnished Contractor Installed equipment to the Owner including a date when all equipment must be received to ensure the installation is completed on time.
 - y. Providing any/all patching, caulking, fire stopping, and painting required to restore damaged finishes during installation.
4. Furniture
- a. Providing audiovisual lecterns and technical furniture as specified.

- b. Coordinating with the Consultant, Architect and Owner on the final selection of all technical furniture including design details (make/model), available options, dimensions, cable management needs, color, and finish.
 - c. Coordinating with furniture manufacturer or others who are providing all necessary furniture/millwork modifications ("cut-outs" or other) as required allowing for a neat and professional installation of integrated technology system components. This includes, but is not limited to: integrated table/lectern "cubbies", table-top microphones, cable management grommets, etc., and providing manufacturers' cutout templates to others when requested.
 - d. Coordinating with the furniture manufacturer, Owner, and Architect on cable management, thermal management, and equipment installation requirements in all spaces so equipped and as outlined in 'Installation Practices'. Providing manufacturer's product cut sheets and/or equipment samples where they may be needed to assist in the design by Others towards integrating such equipment into furniture systems or architectural features.
5. Coordination with Owner's Network
- a. Securing from Owner private IP addresses for use by Ethernet equipped audiovisual devices. No Ethernet equipped device shall be connected to Owner's network without the express permission of Owner. This shall include, but is not limited to configuration parameters such as DHCP, IP addresses, subnet information, VLAN setup and authorization.
 - b. Confirming with the Consultant that coordination with the Owner regarding Ethernet equipped audiovisual devices as outlined in 'Submittals – Software'.
6. Programming and Software
- a. Developing and installing all custom control system programming code as required and/or as specified herein.
 - b. Developing and installing all custom DSP programming code as required and/or as specified herein.
 - c. Providing Control System design submittals and two Control System design revisions as outlined in 'Submittals – Software'.
 - d. Providing centralized media control systems including GUI (Graphical User Interface) and code development in order to satisfy the guidelines outlined herein.
 - e. Developing Control System help-desk and system administrator functionality as defined herein.
 - f. Coordinating with the Electrical Contractor and/or others on the control system interfaces to mechanical systems including motorized screens, as specified.
 - g. Coordinating with the Electrical Contractor and/or others on the low voltage control system interfaces to facility lighting where specified.
 - h. Providing the executable (uncompiled) programming control code as defined herein.
 - i. Developing and installing all custom software for DSP devices as required to optimize system performance.
 - j. Configuring all installed components including the assignment of device host name, configuration of network settings, configuration of user and administrative access names and passcodes, and configuration of all settings required for proper operation within the specified system.
 - k. Installing, configuring, and testing all manufacturer provided software applications included with the specified equipment.
 - p. Coordinating Audio DSP settings with Consultant for the purposes of integrating any necessary recalls into the control software.

- q. Coordinating with Consultant to communicate any conditions or circumstances that do not satisfy the functionality described herein.
 - r. Loading and testing any control programming code updates prior to Substantial Completion and during the Warranty period.
- 7. Testing, Training, Acceptance, and Warranty
 - a. Ensuring that all individual components function as intended by this Specification.
 - b. Ensuring that the entire audiovisual systems function as intended by this Specification.
 - c. Testing, adjusting, and fine-tuning the completed systems and components.
 - d. Coordinating and participating in a Systems Performance Verification review with the Owner and/or Consultant.
 - e. Coordinating and conducting an acceptance walk-through and sign-off session with the Owner and/or Consultant.
 - f. Providing "sign-off" documents for each space and/or space type as defined herein.
 - g. Conducting training in systems operation for the Owner's designated representative(s).
 - h. Providing a warranty service contract as defined herein.
- C. Work Excluded: Work not included under this contract unless noted otherwise shall be:
 - 1. Providing conduit, power receptacles, junction boxes, cable raceways, electrical back-boxes, and floor boxes.
 - 4. Providing lighting fixtures, lighting dimming systems, lighting controllers, and lighting system low voltage AV interfaces at the dimmer side.
 - 5. Providing millwork except where otherwise specified herein.
 - 6. Providing wall or ceiling mounted projection screens, and projector lifts.
 - 7. Providing recessed wall boxes for video cameras.
 - 8. Providing blocking as required to support wall-mounted audiovisual components.
 - 9. Providing window treatments and motorized shade system low voltage AV interfaces at the controller side.
 - 10. Providing telecommunications structured cabling systems, including horizontal and backbone cabling and termination, voice and data face plates, associated racks and cabinets, raceway, and cable management.

1.9 JOB CONDITIONS

- A. Space Conditions:
 - 1. Architectural reference drawings provided to the Contractor for bidding purposes may not reflect construction site as-built conditions. It shall be the responsibility of the Contractor to field-verify all site conditions relevant to his/her work.
 - 2. The Contractor shall verify dimensions of equipment, equipment arrangements, space availability (including any millwork or cabinetry provided by others) and provide systems that work within the constraints of the space available. The Contractor shall notify the Consultant of any situation where space constraints are a problem, prior to the submission of shop drawings or the ordering or purchase of equipment. The Contractor shall bear the expense of providing alternate equipment, which will work within the available space, if space availability problems are discovered after shop drawings are submitted and approved.
 - 3. If new or changed space condition issues are identified by the Contractor or others after the approval of shop drawings, the Contractor shall provide a proposed solution for the identified issue. The proposed solution shall include any potential impact to cost and/or schedule.

Proposed solutions will be reviewed and approved by the Owner, Architect and/or Consultant, or alternate solutions will be recommended.

4. Drawings indicate locations of equipment and components. Changes in the location, and offsets of same to accommodate building conditions, and coordination with the work of other trades shall be made prior to initial installation, without additional cost to the Owner.
5. The Contractor shall ensure during installation that access is provided to equipment and components requiring operation, service or maintenance within the life of the system.
6. It shall be the responsibility of the Contractor to identify any condition where the recommended environmental and/or electrical operating parameters for specified equipment/products cannot be assured. Should such condition exist, it shall further be the responsibility of the Contractor to notify the Architect and Consultant of any such condition.

B. Conduit and Cabling Pathways

1. The Contractor shall review and verify all conduit, boxes, and other cabling pathways as indicated in the infrastructure Reference Drawings and provided by others. This review shall include the drawings as well as as-built conditions on site.
2. The Contractor shall notify the Consultant, General Contractor, and Architect of any deficiencies, issues, or incorrect installations on site that may impact the installation of the audiovisual systems cabling or equipment as specified.
3. Failure to perform this review will result in a revised cabling approach to be designed, proposed, and implemented by the Contractor, with any additional costs borne by the Contractor.

1.10 LAWS AND REGULATIONS

- A. All equipment, cabling, materials, and installation methodology shall conform to the requirements of the National Board of Fire Underwriters, the current published edition of the National Electrical Code, and all other applicable laws and regulations. The Contractor shall obtain and pay for any additional permits and inspections required by all legal authorities and agencies having jurisdiction over the Contractor's work.

1.11 QUALITY ASSURANCE

- A. Unless otherwise stated, all equipment for this installation will be new, less than one year from the date of manufacture, and without blemish or defect.
1. All electrical, electronic and optical equipment provided by the Contractor shall be a product of companies regularly engaged in the manufacture of electrical, electronic or optical equipment.
 2. All equipment must be purchased from a manufacturer-approved distributor or reseller. Purchase of equipment from a non-approved reseller is prohibited.
 3. The equipment shall be the latest model or type offered which meets the applicable specifications at the time of the submittal. Discontinued items replaced by newer models or versions are prohibited from use in the project. It shall be the Contractor's responsibility to provide the Consultant with information regarding discontinued products listed in the specification.
 4. Where applicable, all equipment must have the manufacturer's latest firmware version installed prior to Testing and Systems Performance Verification.
- B. Quality of workmanship and fabrication of all equipment and components, which are custom fabricated shall be comparable to professional equipment produced by specialized manufacturers of the trade involved and shall be verified by observation. Only firms having 10 years' experience

in all aspects of the fabrication and installation of similar systems shall be allowed to perform the work.

- C. The work specified herein, and in each of the allied sections, shall be accomplished by a single Audiovisual Contractor experienced in the design, fabrication, installation, checkout and warranty contract management of systems such as those described in each section.
 - 1. The Audiovisual Contractor shall have complete responsibility for the systems described herein and shall be the single contract point for the Architect, the Consultant and/or the Owner with respect to all work specified herein.
 - 2. The Contractor shall maintain the same project manager and field supervisor throughout the installation, and where practical, maintain the same installers.
- D. The Contractor shall supply and install any incidental equipment needed in order to result in a complete and operable system without claim for additional payment, even if such equipment is not listed in this Specification.
- E. All work related to this Specification shall be completed in a professional manner by fully qualified workers.

1.12 POST-AWARD SUBSTITUTIONS

- A. It shall be the Contractor's responsibility to provide the Consultant with information regarding products listed in the specification that have been discontinued or may not be available in time to meet the project schedule.
- B. If a product listed is discontinued prior to installation or will not be available in time to meet the project schedule, the Contractor shall submit a Substitution Request.
 - 1. Substitution Request shall include:
 - a. Name of material, product, or equipment originally specified.
 - b. Name of material, product, or equipment to be substituted.
 - c. Complete description of proposed substitution including cut sheets, drawings, performance data and other information necessary to demonstrate that the substitution will meet all intentions of this Specification or required for a complete evaluation.
 - d. Any requested changes to the contract value or project schedule.
 - 2. Contractor shall assume and bear all responsibility for coordinating, documenting, and/or performing related changes in the Work necessitated by such substitution. This includes, but is not limited to, changes to other related audiovisual components, OFCI components, Installation Materials, architectural integration details, software programming, required infrastructure, and any related work provided by Others.
 - 3. All requirements of the Specification shall apply to substituted products.
 - 4. The Contractor shall receive written response within 5 working days of receipt of the Substitution Request by the Owner/Consultant.

1.13 RELIABILITY

- A. General: The systems are designed to provide professional quality operation over a period of several years without the need for continual maintenance. Equipment that has a high failure rate is not acceptable for installation as part of the systems.
- B. Warranty: The Bidder shall make known, in writing, at time of Bid any exceptions that might exist between conditions described herein and Bidders policy of warranty. After acceptance of bid, all conditions and requirements of warranty described herein shall apply.
 - 1. The Contractor shall guarantee all equipment, materials, and labor for a period of 1 year from the date of Substantial Completion.

2. Bidders shall maintain permanent fabrication, service and support facilities within (100) miles of the Project site during the Work and Warranty period.
3. During the warranty period, within 24 hours of notification, the Contractor shall answer all service calls and requests for information.
4. During the warranty period, within 96 hours of original notification, the Contractor shall provide emergency service to restore operation of the system, replacing defective materials, repairing faulty workmanship, making temporary repairs, and providing loaner equipment as necessary, all at no charge.
5. The Contractor shall notify the Owner before any service call whether such call is or is not covered under warranty. The Owner may be billed for non-warranty calls. The Contractor shall notify the Owner of any service call or work to be performed for which charges may be incurred before such work commences.
6. Improper functioning, for warranty purposes, means failure of the system to meet the intentions of the specification because of internal defects. It does not include Owner caused malfunctions such as re-adjustment of the controls, re-tuning of the system, or injury to the system beyond normal wear. Nor does the warranty cover paint, exterior finishes, fuses, lamps (including projection lamps) or associated labor, unless the damage or failure results from defective materials or workmanship covered by the warranty.
7. The Contractor shall take such actions at the time of installation to ensure that all equipment is installed in accordance with the manufacturer recommended environmental and electrical operating conditions and requirements. After installation, the Contractor shall be responsible for the repair or replacement of said equipment that the Contractor installs which fails due to environmental or electrical conditions, even if not covered by the manufacturer's warranty. The Contractor shall not be held responsible for damages due to changes in environmental conditions, which occur after the date of Substantial Completion.
8. Unless otherwise directed, the Contractor shall activate all manufacturer warranties in the Owner's name. The start date of the warranties shall be the date of Substantial Completion.
9. If the Contractor has modified certain components, the manufacturer warranty may be void. In this case, the Contractor is responsible for providing warranty coverage equal to that of the manufacturer.
10. Certain subsystems and system components may require installation by authorized representatives in order for the complete manufacturer warranty to apply. If this pertains to any subsystem or component for this project, it is the Contractor's responsibility to make arrangements for the complete manufacturer warranty to apply. These arrangements are to be at no additional cost to the Owner.
11. As part of the Bid Response, the Contractor shall provide the Owner with a proposal to extend the Warranty to cover Year 2, Year 3, and Year 4 of operation. These offerings are to include all parts and all labor; all conditions and restrictions listed above apply.

1.14 SUBMITTALS

A. General:

1. The Consultant shall review the Submittals and Shop Drawings listed below. Submittal and Shop Drawing review shall be based on conformance to the Specification and adherence to the design intent of the Specification. The Consultant's review of the Contractor's Submittal shall not constitute a certification of accuracy or completeness regarding equipment, quantities, installation techniques and details, control system software programming, audio DSP software programming, equipment interoperability, safety factors, scheduling, coordination with other trades, or any other aspects of the work which are the responsibility of the Contractor. The Consultant shall perform no more than two reviews per submittal listed below. The Contractor shall be responsible for providing any equipment, Installation

Materials, and labor needed to result in complete and operable systems, even if such equipment, materials or labor are not listed within this Specification, including the Bidding Equipment Lists.

3. The Contractor shall maintain a Master Set of this entire Specification, including all drawings and addenda, at the site at all times during the installation. Any deviations from the Specification made during the installation shall be marked on this Master Set. The Master Set along with all relevant support documentation shall be provided as part of the As Built submittal in the format outlined under Final Documentation.

B. Submittal Format:

1. All documents, configuration files and drawings shall be submitted in the following format:
 - a. Electronically in PDF format.
 - b. Executable configuration file (where applicable).
 - c. Other formats may be acceptable upon prior approval by the Consultant and/or Owner.
 - d. All .PDF files shall be submitted at the documents' native scale. For example, a PDF created from a drawing whose native format was standard 'E' size (42"x30") shall be created at 42"x30" (full size) to ensure that there is no loss of resolution should the file be viewed or printed at a later date by the Owner.

C. Schedule:

1. The Contractor shall obtain from the Owner, Architect, or Consultant a project master timeline schedule showing projected dates when the relevant areas will be available to the Contractor for the on-site installation.
2. Within 15 days of notification of contract award, the Contractor shall provide a schedule of major project milestones to the Owner, Architect, or Consultant. The schedule shall show the following milestones, but may include others as required for overall site-work coordination:
 - a. Shop Drawings and Submittals
 - b. Order and receipt of materials
 - c. In-shop testing to validate software functionality prior to on-site installation.
 - d. Delivery of materials to the work site for installation by Others
 - e. Delivery of major system components to the work site
 - f. Receipt of Owner furnished equipment for installation by the Contractor
 - g. Control systems GUI requirements meeting with Owner
 - h. Development and submittal of control system GUI submittals
 - i. Control System Control Surfaces / GUI Prototype Submittal review meeting with Owner
 - j. Development and submittal of DSP submittals
 - k. 50% completion of work by area
 - l. 95% completion of work by area
 - m. Installation of control system code
 - n. 100% completion of work by area
 - o. Testing and debugging on-site
 - p. Final punch list
 - q. Submittal of Final Documentation
 - r. Training
3. If the Contractor feels that they will have any problems with meeting the scheduled project milestone deadlines, they must inform the Owner, Architect, and Consultant at the earliest possible opportunity.

D. Submittal Log

1. Contractor shall provide a Submittal Log listing all required submittals, anticipated issue dates, and parties responsible for review.
2. The Submittal Log shall be maintained throughout the course of the project and made available to the Owner, Architect, Consultant, and General Contractor / Construction Manager when requested.

E. Progress Reports

1. Contractor shall submit a brief Progress Report via e-mail to the Consultant. The Progress Reports should be concise, utilizing bullet points or other efficient format.
2. The reports shall be submitted by noon on Fridays to Justin.Gurevitch@NV5.com, and bbarbaza@vbtmi.gov at the following intervals:
 - a. After contract award, while working off-site: every two weeks
 - b. While working on-site: every week.
3. Progress Reports shall list the following information in three sections:
 - a. Progress: List the tasks accomplished since the previous report. This is to include both completed tasks and work-in-progress.
 - b. Work Planned: List the tasks scheduled for the time period extending until the next report. This section should also include both completed tasks and work-in-progress.
 - c. Issues. List any factors that are delaying progress or have the potential to delay progress that involve the Owner, Architect and/or Consultant.
 - 1) Provide a proposed solution for each issue listed. The proposed solution shall include any potential impact to cost and/or schedule. Proposed solutions will be reviewed and approved by the Owner, Architect and/or Consultant, or alternate solutions will be recommended.
 - 2) For equipment related issues, include a manufacturer's service ticket number, service log number, or similar means of documenting communications between the Contractor and manufacturer.

F. Shop Drawings

1. The Contractor must receive written approval from the Owner or an authorized representative of the Owner, in writing, prior to purchasing, fabricating or installing any equipment or materials. Approval to proceed will be given based upon Shop Drawings.
2. The Shop Drawings shall indicate complete details of work to be performed.
3. The Contractor shall provide one electronic copy (two copies, if printed) of the Shop Drawings each to the Owner and to the Consultant for review and approval.
 - a. Drawings shall include a title block naming the Project, Consultant, and Contractor, shall include a drawing title, drawing number, revision number if applicable and date.
 - b. Unless otherwise agreed to in writing, Contractor shall meet with the Owner and Owner's designated representative to review the Shop Drawing submittal. The Contractor shall be prepared to review the functional capabilities and characteristics of the systems for compliance with Owner requirements.
4. The Shop Drawings listed below are required of the Contractor. Submit all Shop Drawings complete as a single submission. Isolated items will not be accepted, except with prior approval.
 - a. System Signal Flow – Complete functional system signal flow drawings of all systems described herein and meeting the functions indicated in the Specification. System Signal Flow/Shop Drawings to illustrate and identify:
 - 1) Each component indicating signal flow; signal type, connector types, and equipment interconnectivity.

- 2) All used and unused input/output connections for all devices.
 - 3) IP address and device host name labels for each component connecting to any IP network. If unknown at the time of Shop Drawings a placeholder must be shown and filled out as part of the As-Built drawing submission.
 - 4) Physical location callout indicating the component's physical location (i.e. equipment rack #, lectern, wall mounted, etc.)
 - 5) Cable fan-outs.
 - 6) Wire/cable tags.
 - 7) 70-volt loudspeaker tap settings.
 - 8) Amplifier/loudspeaker zone assignments.
 - 9) Patch panels, adapters, pre-made cable assemblies and other details as needed to accurately document the signal interconnectivity of the systems.
- b. Equipment Locations
- 1) The Contractor shall document the location of all audiovisual devices on the floor/ceiling plans, including the device's IP address, hostname, and/or a unique device name/code (as defined by the Owner).
- c. IP Network Diagram – Complete functional network diagram of all network components required to support the systems described herein and meeting the functions indicated by this Specification. Network Diagram to illustrate and identify each major component including all switch accessories, uplink ports noted with bandwidth capacity, stacking cable connections noted with backplane bandwidth capacity, power supplies noted with PoE capacities per switch or switch stack, and other details as needed to accurately document the signal interconnectivity of the systems.
- d. Cabling Schedule – Document complete wire run information, including the cable type, cable marker identifier, and origination and destination location and connector types for each cable. Wire run information shall be conveyed:
- 1) Within the System Signal Flow drawings, and/or
 - 2) A separate list containing all wire run information
- e. Examples representative of the Contractor's final cable marking technique for each cable type.
- f. Loudspeaker Layouts – Scaled ceiling and/or floor plan drawings showing loudspeaker locations, including coverage patterns for ceiling-mounted loudspeakers. Loudspeaker zone groups shall be identified such that they are relatable to the System Signal Flow drawings.
- g. Loudspeaker Mounting Details – Scaled drawings of complete loudspeaker mounting details, hardware and support surfaces, including details on all load requirements, safety factors, safety cables and structural materials.
- h. Projector Mounting Details – Scaled drawings of complete projector mounting details, hardware and support surfaces, including details on all load requirements, safety factors, structural materials and any required safety cables.
- i. Microphone Layouts - Scaled ceiling and/or floor plan drawings showing microphone locations and orientation within tables or fixed in ceilings and planned position of steerable microphone lobes if applicable.
- j. Structural Anchorage – If required by the Authority Having Jurisdiction, provide structural calculations, drawings and details for the anchorage of equipment racks, loudspeaker rigging hardware, and all other mounts or hardware that attach to structure. The design shall be reviewed and approved by a Structural Engineer registered in the state in which the installation work is performed.
- k. Optical Systems – The Contractor shall be responsible for field verification of the on-site conditions and submit scaled drawings to verify that the proposed projection devices,

lenses and related optical systems will provide the desired image size without distortion, vignetting or any other image aberrations.

- I. Panels – Scaled drawings of interconnect panels, control surfaces, and other custom interfaces.
- m. Peripheral Equipment – Scaled drawings of mounting arrangements of any peripheral equipment, which may be included in this Specification.
- n. Equipment Rack Layouts – Fully detailed rack drawings indicating equipment orientation within the equipment rack.
- o. Technical Furniture – Scaled drawings of all technical furniture indicating the furniture dimensions, materials, finishes, equipment locations and orientation within the furniture, cable management accommodations, and all other details necessary to convey the physical and functional aspects of the furniture as it will be installed in each individual room space.
- q. Others, as may be required by the Architect, Consultant or Owner.
 - 1) Inquire with the Architect and Consultant whether submissions of finishes/materials which will be visible to the public are required and submit accordingly.
 - 2) Typical sample items of interest include: receptacles and controls with associated trim plate and each type of loudspeaker baffle and/or grille.
5. Approval: The Contractor shall receive written response indicating approval to proceed, or changes required to the Shop Drawings submittal, within 10 working days of receipt of the submittal by the Owner/Consultant.
6. Modifications: The Contractor shall be responsible for updating the Shop Drawing package throughout the course of the project to document any Owner-requested changes, approved product changes, changes due to field conditions, or any other changes to the approved Shop Drawing package. Drawing modifications may be reviewed by the Consultant as-required, and the Contractor shall make current Shop Drawings available to the Consultant within seven calendar days of request.

G. Bill of Materials

1. The Contractor shall submit a comprehensive Bill of Materials concurrently with the Shop Drawing submittal.
2. The Bill of Materials shall be submitted electronically in Microsoft Excel format, unless an alternate format is approved in writing by the Consultant, Architect, or Owner.
3. The Bill of Materials shall be organized by room or system type, with a separate spreadsheet tab for each.
4. The Bill of Materials submittal shall contain at a minimum the following fields for each item: Quantity, Manufacturer Name, Manufacturer's Model Number, Description, Color/Finish (if applicable). Items that are Owner Furnished should be identified as such. Additional columns may be added for notes or other supplemental information as needed.

H. Owner Furnished Contractor Installed Equipment

1. The Contractor shall submit a comprehensive list of all equipment that shall be provided by the Owner for installation by the Contractor.
- I. Product Cut Sheets: Upon request, the Contractor shall prepare a package of product cut sheets for review with the Owner at the time of the Shop Drawings review meeting. The Product Cut Sheets package is not a formal submittal to be reviewed by the Consultant
 1. The package shall include manufacturer's cut sheets for all user interfaces, all exposed items not mounted in equipment racks, and all items requiring color or finish selection.

2. The Product Cut Sheets package is not a means for proposing product substitutions. Requested substitutions shall be submitted via a 'Substitution Request Form' (Appendix D) including drawings, performance and test data, and other information necessary to demonstrate that the substitution will meet all intentions of the Specification.
- J. Cabling: The Contractor shall submit specifications for each cable type to be used for the project.
 1. The Contractor shall receive written approval from the Owner or an authorized representative of the Owner, in writing, prior to purchasing or installing any cabling.
 2. The Contractor shall verify colors for all cabling that will be exposed or visible as part of the Submittal process.
- K. Wireless Frequency Table: The Contractor shall submit a table of wireless devices including wireless microphones and intercom transceivers. Each device shall be listed individually along with the manufacturer recommended frequency setting per the location of the installation.
- L. Equipment Rack Digital Photographs: The Contractor shall submit digital photographs of completed equipment racks for approval prior to delivering the racks to the project site.
 1. All photographs must be properly exposed and focused, clearly showing the rear and front of each equipment rack. The rear photos must clearly show internal rack cabling, terminations, and cable management such as lacing bars and support brackets. Front photos must show equipment front-panels, labels, vent panels, blank panels, drawers, etc.
 2. Subject areas must be free from glare as a result of flashes or other ambient lighting. Subject areas shall fill the image frame in a suitable manner. For large equipment racks, multiple exposures may be required, each indicating a separate portion of the rack.
 3. All digital images shall be submitted in JPEG file format unless an alternate format is approved in writing by the Consultant, Architect, or Owner.
- M. Network Coordination
 1. The Contractor shall provide a private wired control network that shall function independently of the Owner's network.
 - a. The Contractor shall coordinate with the Owner and verify which system components, if any, shall be connected to the Owner's network.
 - b. The Contractor shall coordinate with the Consultant and verify which system components, if any, shall be connected to the Owner's network.
 2. As indicated, the Contractor shall connect required AV components to the existing building LAN.
 3. The Contractor shall work with the Owner's IT department to identify all PoE, VLAN, firewall and other networking requirements to provide a fully functioning AV system. The Contractor shall generate a schedule of all AV components that will be connected to the building LAN and submit it to the Owner's IT department for implementation.
 4. The Contractor shall, as required, obtain from the Owner's IT department blocks of static IP addresses sufficient for current system implementation as well as future system growth.
 5. The Contractor shall develop a device host naming scheme in coordination with the Owner's IT department to be assigned to each IP enabled device.
 6. The IP Addressing schedule shall list, at minimum, for each connected device:
 - a. Product make and model
 - b. LAN port connection location
 - c. VLAN Assignment – If applicable
 - d. Assigned Static or DHCP Reserved IP address
 - e. Product MAC address

- f. Device Host Name
- 7. The IP Addressing schedule shall be submitted electronically in Microsoft Excel .xls format, compatible with Windows 10 or newer operating systems, unless an alternate format is approved in writing by the Consultant or Owner.
- 8. Approval: The Contractor shall receive written response indicating approval to proceed, or changes required to the IP Addressing Schedule, within 10 working days of receipt of the submittal by the Owner/Consultant.
- N. Software: The Contractor shall secure from the Owner or Owner's Representative, in writing, approval for all customized software applications prior to installation, including but not limited to:
 - 1. Audio Digital Signal Processing (DSP):
 - a. The Contractor's Audio DSP submittal shall communicate the internal signal flow, preliminary setup and the configuration of the Audio DSP processors that is required to meet the AV systems functional and performance requirements. Final level settings and internal preset configurations shall be the Contractor's responsibility during system setup and commissioning.
 - b. Format: The preferred Audio DSP Systems submittal is the manufacturer's DSP software configuration files. If requested, the submittal may be provided in the form of signal flow drawings.
 - c. Audio DSP Software Configuration File Submittal Format:
 - 1) Provide the manufacturer's software configuration files, custom designed for each unique system type, compatible with Windows 10 or newer operating systems.
 - 2) DSP configuration files shall include custom labeling of all internal DSP device inputs and outputs provided with labeling capability. Labeling of the external hardware interface points shall match the externally connected devices as shown in the signal flow drawings.
 - 3) The Contractor shall provide one copy of the electronic files to the Owner and one to the Consultant for review.
 - d. Audio DSP Signal Flow Drawing Submittal Format:
 - 1) Provide block diagram signal flow drawings, custom designed for each unique system type and include at minimum the following information:
 - a) The audio DSP manufacturer make and model.
 - b) The system names and/or locations (room names) that will be served by the audio DSP device.
 - c) The names of all internal DSP components.
 - d) The names of all internal inputs and outputs.
 - e) The names of all external input and output connections.
 - f) Show interconnectivity between the internal components and I/O's (indicating DSP internal signal flow).
 - 2) DSP signal flow submittals may be sized to match the AV signal flow drawings, in the form of JPEG image files (maximum 1920x1080 pixels) or PDF files.
 - 3) The Contractor shall provide one copy each of the submittal to the Owner and to the Consultant for review.
 - e. The Contractor shall receive written response indicating approval to proceed, or changes required to the DSP submittal, within 10 working days of receipt of the submittal by the Owner/Consultant.
 - 2. Control System Control Surfaces / GUI Prototype submittal
 - a. The intent of the Control System Control Surfaces / GUI Prototype Submittal is to create a base level collaboration process whereby the Programmer can solicit direction from the

Owner and Consultant towards a mutually agreeable design. Unless otherwise agreed to in writing the Contractor shall meet with the Owner and Owner's designated representative to review the Control System Control Surfaces / GUI Prototype Submittal. The Contractor shall be prepared to review the functional capabilities as well as the aesthetic characteristics of the control surfaces for compliance with Owner preferences and standards.

- b. Where Owner control surface or GUI standards are lacking, the Contractor shall provide:
 - 1) Preliminary control surface layouts for all pushbutton panels, touch sensitive panels, PC based controllers or other control surfaces. The Programmer should make the preliminary layouts with a monochrome, basic, wireframe style to clearly demonstrate the functionality of control surface. The layouts should illustrate all pushbuttons, labels, bar graphs, timers, video windows, etc. for each control panel and each system page. The Programmer should include suggestions for color schemes and graphic styles where applicable. The touch panel control surface submittal shall be created utilizing a collaborative, browser based application allowing for live review and comment by the Owner and Consultant, such as InVision or Moqups (UX design software).
 - 2) JPEG images (or PDF format file) of the finished look of all interface elements including but not limited to menu bars, buttons, down/up states of buttons, labels, bar graphs, timers, video windows, etc.
 - 3) A sample touch panel page as a separate file, or in a PDF format so that all parties understand the finished aesthetic.
 - c. Where Owner control surface or GUI standards are made available, the Contractor shall provide:
 - 1) Preliminary control surface layouts for all pushbutton panels, touch sensitive panels, PC based controllers or other control surfaces. The Programmer shall develop the preliminary layouts utilizing the Owner's standards. The layouts should illustrate all pushbuttons, labels, bar graphs, timers, video windows, etc. for each control panel and each system page. The touch panel control surface submittal shall be created utilizing UX design software for live review and comment by the Owner and Consultant.
 - d. The Contractor shall receive written response indicating approval to proceed, or changes required to the control surfaces layouts, within 10 working days of receipt of the submittal by the Owner/Consultant.
3. Control System Control Surfaces/GUI Submittal
 - a. The Contractor shall generate a revised control surfaces layout submittal to include the additions, changes or revisions generated by the prototype submittal review as well as to integrate the graphic style into the design. The form and quantity of the submittal shall be as complete as possible and ready to be programmed unless otherwise directed. The touch panel control surface submittal shall be created utilizing UX design software for live review and comment by the Owner and Consultant.
 - b. If the revised control surfaces submittal reflects those additions, changes or revisions called for in the prototype submittal review, the Contractor shall receive written approval to proceed within 10 working days of receipt of the submittal by the Owner/Consultant.
 4. Post-Integration Control Surfaces Adjustments
 - a. If so requested by the Owner or Owner's representative, and within 90 days of Substantial Completion, the Contractor shall be prepared to make one visit to the site to make final minor adjustments to the control system code or programming without additional compensation. This could include, but may not be limited to, renaming or changing the size or location of buttons, page flip calls, or adjustments to code to provide a fully functioning system. If engraved control system panels require modification at a

cost to the Owner, such cost information must be submitted to the Owner for approval prior to any work being performed.

- b. The Contractor shall be responsible for ensuring that any changes to the control system or control surfaces that are made post integration are appended to the Final System Documentation.

O. Cable Testing

1. The Contractor shall secure from the Owner or Owner's Representative, in writing, approval for all cable test reports prior to Final Testing and System Performance Verification. Test reports shall include testing of all systems cabling and shall include:
 - a. Loudspeaker line testing:
 - 1) Low impedance loudspeaker lines:
 - a) Impedance at 1000Hz.
 - b) Polarity of installed loudspeakers.
 - 2) 70 volt loudspeaker lines:
 - a) Watts load at 1000Hz.
 - b) Polarity of installed loudspeakers.
 - b. Analog audio microphone and line level cable testing:
 - 1) Continuity of each conductor.
 - 2) Signal loss.
 - 3) Signal polarity.
 - 4) Shielding.
 - c. UTP, STP, F/UTP and S/FTP cable testing:
 - 1) Category 5, 5e and 5e+ cables:
 - a) ANSI/TIA-568.2-D Category 5e Permalink test.
 - b) ANSI/TIA-568.2-D Category 5e Channel test.
 - 2) Category 6 and 6+cables:
 - a) ANSI/TIA-568.2-D Category 6 Permalink test.
 - b) ANSI/TIA-568.2-D Category 6 Channel test.
 - 3) Category 6a and 7a cables:
 - a) ANSI/TIA-568.2-D Category 6a Permalink test.
 - b) ANSI/TIA-568.2-D Category 6a Channel test.
 - 4) Shield test (required for shielded cables only).
 - 5) Nominal Velocity of Propagation test.
 - 6) Testing to be performed using a Fluke DSX-5000, or equal.
 - d. Fiber Optic cable testing:
 - 1) All fiber optic installed and patch cables shall be tested to meet loss and polarity standards:
 - a) ANSI/TIA-568-C.3 Cable Link test.
 - b) ANSI/TIA-568-C.3 Cable Channel test.
 - e. 2K HDMI and Digital Signal cable testing:
 - 1) Wire test function.
 - 2) Testing to be performed using a Quantum Data 780a, or equal.
 - f. 4K HDMI and Digital Signal cable testing:
 - 1) Wire test function.
 - 2) Testing to be performed using a Quantum Data 780b, or equal.

- h. Digital video coaxial cable testing:
 - 1) EDH, CRC & Jitter tests
 - 2) Eye pattern measurement
- P. Preliminary As-Built Drawing Submittal
 - 1. Upon completion of the work, and prior to Final Testing and System Performance Verification, the Contractor shall condense the Master Set along with any Shop Drawings into a single "As Built" drawing set. Any markings or deviations, which cannot be made clear on drawings, shall be accompanied by attached documentation, photos, or written addenda.
- Q. Final Documentation Submittals
 - 1. Within 30 calendar days following Substantial Completion, the Contractor shall prepare and submit a Final Documentation set to the Consultant. The Final Documentation Submittal shall include any and all adjustments or changes identified during the Preliminary As-Built Drawing Submittal review. All documentation shall list the Owner, Project Name, Consultant, and Contractor. Any documentation appended and reissued during the Warranty period shall also include this information.
 - 2. Format: All documents and drawings shall be submitted in the following format:
 - a. Electronically in PDF format, with a link provided for electronic file transfer.
 - b. Other formats may be acceptable upon prior approval by the Consultant and/or Owner.
 - c. All .PDF files shall be submitted at the documents' native scale. For example, a PDF created from a drawing whose native format was standard 'E' size (42"x30") shall be created at 42"x30" (full size) to ensure that there is no loss of resolution should the file be viewed or printed at a later date by the Owner.
 - 3. Printed submittals
 - a. If requested, provide (2) printed copies of all documents and drawings. The documentation shall be bound in three ring binders with covers and spines listing the Owner, Project Name, Consultant, and Contractor.
 - 4. Documentation: The Final Documentation Submittal shall include:
 - a. As-Built Drawings: The as-built drawings must reflect all changes to the system(s) made after the original bid documentation.
 - 1) The size of the as-built drawings shall be identical to the original drawings provided to Contractor.
 - 2) As-Built drawings shall conform to all of the requirements listed under "Submittals / Shop Drawings" listed above.
 - 3) Any markings or deviations, which cannot be made clear on drawings, shall be accompanied by attached documentation, photos, or written addenda.
 - 4) The Contractor shall include any additional drawings which are necessary to properly document the as-built systems, but not included in the bid documents, including:
 - a) Rack elevations
 - b) Custom panel details
 - c) Patch bay layouts
 - d) Cable pull lists
 - 5) Submission of digital As-Built drawings files, which are generated by the Contractor based on drawing files provided by the Consultant under separate agreement, shall be subject to submission by the Contractor as defined under said agreement.
 - b. A schedule of IP and MAC Addresses for all Ethernet enabled AV devices, organized by room name and number.
 - d. A complete cable testing schedule.

- e. A listing of each supplied item with manufacturer, model number and serial number, organized by room name and number.
- f. Operator's manuals for each piece of equipment supplied by the Contractor.
- g. Quick Reference Guides
 - 1) The Contractor shall develop system operating instructions for the operations of all contractor-fabricated devices and installed equipment items as part of the work. These operating instructions shall include detailed descriptions of how to operate the system as a whole. Component manuals are not acceptable to meet this requirement unless approved by the Owner and Consultant.
 - 2) Quick Reference Guides shall be one page (front and back as necessary) heat-laminated cards or tents providing simplified instructions for operation of all major system functions.
 - 3) Content of the quick reference guide shall focus on the controls and must include high quality graphics / photos of the controls themselves with explanations and step by step instructions.
 - 4) Pages shall be appropriately sized for the content required. (Half or other sized pages are appropriate for simple rooms.)
 - 5) Described functions shall include as a minimum:
 - a) Power on/off
 - b) Source selection
 - c) Volume control
 - d) Connection of auxiliary sources
 - e) Other functions as appropriate for the system, such as lighting and shade control.
 - f) Coordinate with the Owner and the Audiovisual Consultant regarding additional content desired. For example, the Owner may wish to include instructions for contacting local support personnel.
- h. Software
 - 1) Where custom software is developed by the Contractor as part of this project, the system source code, passwords, and any associated related files, referenced files, and development software (and all relevant documentation and license) used to compile, develop, and build, etc. the executable code must be provided. The source code should be well documented in accordance with industry software engineering practices.
 - 2) The software developer shall retain intellectual property rights; the Owner shall have a license for perpetuity for use as it applies solely to this project, including the right to modify/enhance. The software code may not be sold or used, in part or in whole, in any other project or application other than that intended by this specification, in part or in whole, by the Owner or any other party.
 - 3) If a Subcontractor is used to write the software, the Contractor shall include, as part of the Final Documentation submittal, a signed letter on Subcontractor letterhead, granting the Owner ownership, use, and modification rights of the code and documentation as defined herein. The software shall be provided to the Owner via a link provided for electronic file transfer.
 - 4) The Owner may supply the Contractor or allow the Contractor to use certain proprietary information, including service marks, logos, graphics, software, documents and business information and plans that have been authored or pre-owned by the Owner. All such intellectual property shall remain the exclusive property of the Owner and shall not be used by the Contractor for any purposes other than those associated with delivery of the systems specified herein.

- i. **Warranty Statement:** A statement on the Contractor's letterhead listing the official start and end dates for the Contractor's warranty on all equipment, materials, and labor used in the project. The start date shall correspond with the established Substantial Completion date, and the end date shall be based on the timeframe of warranty coverage purchased by the Owner as part of the contract.
5. **Delivery**
 - a. If the Final Documentation submittal is determined by the Consultant to be complete and accurate, the Consultant will approve the submittal and forward the Final Documentation package to the Owner.
 - b. If the Final Documentation Submittal is determined by the Consultant to not be complete and/or inaccurate, the Consultant will return the package to the Contractor with a written listing of the required modifications. Upon completion of all of the required modifications, the Contractor shall resubmit the Final Documentation to the Consultant for approval. The Final Documentation Submittal, and therefore the project, shall not be considered to be complete until all required documentation modifications have been made and approved by the Consultant on behalf of the Owner.

1.15 TESTING AND SYSTEMS PERFORMANCE VERIFICATION

B. Final Tests

1. **System Performance Verification Scheduling**
 - a. Upon approval of the Contractor's test report and receipt of the "Systems Performance Verification Request" form, the Contractor shall assist the Consultant in the final Systems Performance Verification. The Contractor shall allow three (3) days to perform the review at a time that is mutually acceptable to the Contractor and Consultant. The Contractor's representatives assisting in the performance of the Systems Performance Verification shall be thoroughly familiar with the details of the system and shall include the field supervisor responsible for installing, testing, control system programming, audio DSP programming, and commissioning the system.
2. **System Performance Verification**
 - a. All control system, DSP and device programming shall be completed and in working order prior to the System Performance Verification.
 - b. A physical inventory shall be taken of all equipment on site and justified against the Contractor's Bill of Materials submittal and the original Bidding Equipment Lists.
 - c. The Consultant shall require tests completed by the Contractor which demonstrate the operation of all system components and to determine that the systems meet the criteria as outlined in 'Performance Standards'.
 - d. The Contractor shall supply test equipment to be used during the System Performance Verification. The test equipment shall be present, in working order and connected prior to the System Performance Verification.
 - 1) **Video Test Equipment**
 - a) Computer video signal generator(s) capable of outputting all signal types included in the system design. (Extron VTG 400DVI & Marshall Electronics V-SG4K-HDI or equivalent)
 - c) Digital discs including both program content and test signals. Blu-Ray discs are required if players are included in the systems.
 - d) Adapters and interconnect cabling as necessary to complete testing.
 - 2) **Audio Test Equipment**
 - a) Analog Audio Signal Generator, Impedance Meter and Line Analyzer: NTi MR-PRO (or equivalent).
 - b) Condenser microphone: Shure SM86 (or equivalent).

- c) Active speaker: Fostex 6301NE (or equivalent).
- d) Digital Audio Signal Analyzer: NTi DL1 (or equivalent).
- e) Hardware-based Acoustic Analyzer: NTi AL1 or NTi XL2 (or equivalent).
- f) Software-based Acoustic Analyzer: Smaart with reference microphones and all necessary accessories (or equivalent).
- g) Compact Discs (CD's) including both program content and test signals.
- h) Media as necessary to test all playback and recording functions of the system. I.E. compact flash card, MP3 Player, USB media.
- i) Adapters and interconnect cabling as necessary to complete testing.
- 3) Video and Audio Teleconferencing:
 - a) Contractor shall coordinate a test call with a far-end site scheduled for the time the Consultant is performing the Systems Performance Verification.
- e. Contractor shall have tools available on the day of the System Performance Verification for system inspection and adjustments.
- f. Contractor shall coordinate with Owner so that all spaces are unlocked and available for inspection.
- g. Preliminary As-Built documentation shall be available for reference and inspection.
- h. If the Contractor's work is found to be incomplete, and subsequent visits to the site by the Consultant are required by the Owner, the Owner may elect to have the Consultant's travel costs, billable time, and all other related travel expenses be deducted from the Contractor's final payment.
- 3. Punch List Report and Correction
 - a. Following the completion of the Systems Performance Verification, the Owner and/or Consultant will issue a punch list report to the Contractor, identifying omissions, adjustments, and corrections to the work necessary to meet the requirements of the Specification.
 - b. The Contractor shall correct all punch list items resulting in fully functional systems that meet all requirements of the Specification and can be utilized by the Owner as-intended.

1.16 SUBSTANTIAL COMPLETION

- A. The project shall be deemed substantially complete by the Consultant and/or Owner at the stage in the progress of the work where the systems are sufficiently complete in accordance with the Specification so that the Owner can utilize the systems for their intended use.

1.17 TRAINING

- A. The Contractor shall provide a total of four (4) hours of on-site training for the Owner's staff at a time that is mutually agreeable for the Owner and Contractor.
 - 1. The Contractor should anticipate two sessions of 120-minutes each.
 - 2. The Owner may choose to have the sessions spread out over a maximum of two (2) different days.
 - 3. Address in the training the general configuration of the system, basic functionality, correct operation procedures, routine maintenance and upkeep.
 - 4. The Owner shall be permitted to video record the Contractor-provided training sessions for the future use of training faculty and staff.

1.18 EVENT TECHNICAL SERVICE

- A. In addition to the training listed above, the Contractor shall provide a total of eight (8) hours of on-site technical assistance for an Owner-defined event. It is expected that this event will occur within the first 60 days after Substantial Completion.

1.19 FINAL ACCEPTANCE

- A. Final Acceptance shall be granted by the Owner based on the successful completion of the following activities:
1. All items required to obtain Substantial Completion have been achieved.
 2. Any punch list corrections not required to obtain Substantial Completion have been completed by the Contractor and accepted by the Owner and/or Consultant.
 3. The Contractor's Final Documentation Submittals have been reviewed by the Consultant and deemed to be complete, and have been delivered to the Owner.
 4. The Contractor has provided all required training for the Owner as defined herein.
 5. Any remaining items required by the Specification, but not listed above, have been completed by the Contractor.

1.20 SUBMISSION FOR PUBLICATION

- A. Prior written consent from the Owner is required before submitting any information about this project for publication or award. This shall include, but not be limited to, photographs, descriptions, drawings, renderings, equipment lists, or any other information regarding the project. If written consent is provided by the Owner, any submission for publication or award must properly credit the Owner, Architect, and Consultant.

PART 2 - PRODUCTS

2.1 APPROVED CABLING

- A. The following table lists cabling products and types that have been pre-approved for use. This is not an all-inclusive list of the cabling products and types required to complete this project. The Contractor shall reference the cabling products in this table as a baseline of performance for each cable category. The Bidder or Contractor may submit cable part numbers, models and manufacturer's product other than those listed in this table for consideration and approval per the substitution procedures defined in this Specification. Acceptable alternate manufacturers include Liberty Wire & Cable, West Penn Wire, and Windy City Wire.

Type/Application	Description	Manufacturer	Model No.	Comment
Microphone or Line Level Audio	22 AWG STP	Belden	9451	or equal
Microphone or Line Level Audio – Multi Pair (2)	22 AWG STP	Belden	1814R	or equal
Microphone or Line Level Audio – Multi Pair (4)	22 AWG STP	Belden	1815R	or equal
Microphone or Line Level Audio – Multi Pair (8)	22 AWG STP	Belden	1817R	or equal
Microphone or Line Level Audio – Multi Pair (12)	22 AWG STP	Belden	1818R	or equal
Microphone or Line Level Audio – Multi Pair (16)	22 AWG STP	Belden	1819R	or equal
Microphone or Line Level Audio – Multi Pair (24)	22 AWG STP	Belden	1821R	or equal

Type/Application	Description	Manufacturer	Model No.	Comment
Microphone or Line Level Audio – Multi Pair (32)	22 AWG STP	Belden	1823R	or equal
Audio – Coax - Digital	19 AWG Coax	Belden	1694F	or equal
Audio Line – Digital Ready – Single Pair	24 AWG STP	Belden	1800B	or equal
Digital Audio – CAT6	23 AWG UTP	Belden	4812	or equal
Loudspeaker or LV Power Supply, 10 AWG	10 AWG UTP	Belden	5T00UP	or equal
Loudspeaker or LV Power Supply, 12 AWG	12 AWG UTP	Belden	5000UE	or equal
Loudspeaker or LV Power Supply, 14 AWG	14 AWG UTP	Belden	5100UE	or equal
Loudspeaker or LV Power Supply, 16 AWG	16 AWG UTP	Belden	5200UE	or equal
Loudspeaker or LV Power Supply, 18 AWG	18 AWG UTP	Belden	5300UE	or equal
Digital Video (Up to 6GHz)	20 AWG Coax	Belden	1505A	or equal
Digital Video (Up to 12GHz)	18 AWG Coax	Belden	4694R	or equal
HDBaseT Shielded CAT5e+	4-Pair CAT5e+ F/UTP 350 MHz	Belden	1212F	or equal
HDBaseT Unshielded CAT6A	4-Pair CAT6A U/UTP 625 MHz	Belden	10GX12	or equal
4K Ultra-High-Definition Media Cable, Shielded	4-Pair F/UTP	Belden	2183R	or equal
USB Extension Shielded CAT5e+	4-Pair CAT5e+ F/UTP 350 MHz	Belden	1212F	or equal
Control (RS-232/422)	2-Pair 24 AWG Stranded TC	Belden	8102	or equal
Control (RS-232/422)	3-Pair 24 AWG Stranded TC	Belden	8103	or equal
Control (RS-232/422)	4-Pair 24 AWG Stranded TC	Belden	8104	or equal
Ethernet Control Unshielded CAT5e	4-Pair CAT 5e U/UTP 200 MHz	Belden	1583A	or equal
Fiber Optic Cable, Multi-mode	2 Strand MM OM4 Fiber Riser Cable	Belden	FI4D002R9	or equal
Fiber Optic Cable, Multi-mode	6 Strand MM OM4 Fiber Riser Cable	Belden	FI4D006R9	or equal
Fiber Optic Cable, Multi-mode	12 Strand MM OM4 Fiber Riser Cable	Belden	FI4D012R9	or equal
Fiber Optic Cable, Multi-mode	24 Strand MM OM4 Fiber Riser Cable	Belden	FI4D024R9	or equal
Fiber Optic Cable, Multi-mode	2 Strand MM OM4 Fiber Plenum Cable	Belden	FI4D002P9	or equal
Fiber Optic Cable, Multi-mode	6 Strand MM OM4 Fiber Plenum Cable	Belden	FI4D006P9	or equal
Fiber Optic Cable, Multi-mode	12 Strand MM OM4 Fiber Plenum Cable	Belden	FI4D012P9	or equal
Fiber Optic Cable, Multi-mode	24 Strand MM OM4 Fiber Plenum Cable	Belden	FI4D024P9	or equal

INTEGRATED AUDIOVISUAL SYSTEMS AND EQUIPMENT

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Type/Application	Description	Manufacturer	Model No.	Comment
SMPTE 311M HDTV Cable	1 Channel SMTE 311M HDTV Fiber Cable	Belden	7804R	or equal
SMPTE 311M HDTV Cable	3 Channel SMPTE 311M HDTV Fiber Cable	Belden	7824R	or equal
AMX DXLink Shielded CAT5e+	4-Pair CAT5e+ F/UTP 350 MHz	Belden	1212F	or equal
AMX DXLink Unshielded CAT6A	4-Pair CAT6A U/UTP 625 MHz	Belden	10GX12	or equal
AMX AXLink Cable	22AWG Shielded Pair 18AWG Power Pair	Belden	1502R	or equal
Crestron DM 4K Ultra Cable Shielded CAT7a	4-Pair 7a S/FTP 1000 MHz	Crestron	DM-CBL-ULTRA-NP	or equal
Crestron DM 4K Ultra Cable Shielded CAT7a	4-Pair 7a S/FTP 1000 MHz, Low Smoke	Crestron	DM-CBL-ULTRA-LSZH	or equal
Crestron DM 8G+ Shielded CAT5e+	4-Pair CAT5e+ F/UTP 350 MHz	Crestron	DM-CBL-8G-NP	or equal
Crestron Fiber Optic Cable, Multimode	8G Multimode Fiber Optic Cable, 50/125 x4	Crestron	CRESFIBER-8G-NP	or equal
Crestron Fiber Optic Cable, Singlemode	8G Singlemode Fiber Optic Cable, x2 zip-cord construction plenum/non-plenum	Crestron	CRESFIBER-8G-SM-P	or equal
Crestron (Cresnet) Cable	2-18 AWG UTP with 2-22 AWG STP	Crestron	CRESNET-NP	or equal
Extron XTP/DTP Shielded CAT6+	4-Pair CAT6+ SF/UTP 475 MHz	Extron	XTP DTP 24	No Known Equal
Wireless Microphone Antenna Extension	RG213/U	Belden	8267	or equal
Ampetronic Hearing Loop Copper Foil Tape	18mm x 0.25mm Single Conductor	Ampetronic	FB 1.8	No Known Equal
Ampetronic Hearing Loop Direct Burial Cable	1.0mm dia. (18 AWG) Single Conductor, Buriable	Ampetronic	DBC 1.0	No Known Equal
Ampetronic Hearing Loop Direct Burial Cable	2.5mm dia. (10 AWG) Single Conductor, Buriable	Ampetronic	DBC 2.5	No Known Equal
Williams Sound Hearing Loop Copper Foil Tape	0.75 in. x 0.010 in. Single Conductor	Williams Sound	PLW F	or equal
Williams Sound Hearing Loop Cable	18 AWG Single Conductor	Williams Sound	PLW 037	or equal
Williams Sound Hearing Loop Cable	14 AWG Single Conductor	Williams Sound	PLW 014	or equal

- B. Environmental Suitability: The cabling listed above is all Indoor rated (non-plenum). The Contractor is responsible for providing equivalent cabling that is appropriate for the environment in which it is installed.

1. All cables running below slab on grade or in an outdoor setting shall be Outdoor rated.

2. All cables being installed within a plenum environment must be Plenum rated.
- C. All connections between mobile equipment and connection panels must be prefabricated, stage-grade cabling.

2.2 EQUIPMENT

A. Bidding Equipment List (BEL)

1. Bidding Equipment Lists are provided to the Contractor for use in preparing the bid response. These lists include major system components and peripherals, but should not be considered to be all inclusive. The complete equipment package bid response will take into account this document, all drawings, written addenda, any or all drawing additions or reissues, as well as implied system operability.
2. Bidding Equipment Lists are included as an Appendix in this specification.

B. Connectors, Adapters and Assemblies

1. Field terminated connectors shall be compatible and approved for use for a specific cable type and application by the cable and equipment manufacturer.
2. Connectors shall be manufactured by Neutrik, Switchcraft, AMP, Amphenol, Kings, Canare, Crestron, Extron, or equal.
3. Manufacturer constructed cable adapters and assemblies shall be provided by Crestron or Extron, or be of equal quality and durability.

C. Panels, Plates and Keypads

1. The Contractor shall provide a cover panel for all junction boxes which comprise the audiovisual infrastructure (wall, floor and ceiling). This includes pull boxes, splice boxes and unused or abandoned junction box locations.
2. Custom Fabricated Panels and Plates
 - a. Submit custom panel designs per Submittal requirements prior to fabrication or purchase.
 - b. Custom panels and plates shall be machined aluminum, nominal thickness 0.125", with beveled edges and a brushed, anodized finish. Confirm with the Architect required finish color for each panel location. Use of the pull-box manufacturer's construction cover shall not be permitted.
 - c. All panel connectors shall be labeled with engraved lettering, minimum 0.10" letter height, and provided with contrasting paint fill.
 - d. Panels and plates for non-gang pull boxes shall extend past the height and width of the pull box by a minimum of one-half inch on each side.
 - e. Cable access holes in cover plates shall not capture the cables and shall have a protective grommet to prevent cable damage.
3. Manufactured I/O Panels, Control Panels, Keypads and Plates
 - a. Submit proposed panel designs per Submittal requirements prior to purchase.
 - b. Panel functionality shall be as defined in the Specification.
 - c. Coordinate color and style with the Architect and/or Consultant.
4. Abandonment Cover Plates at Future Use, Unused or Abandoned Audiovisual Junction Box Locations
 - a. Submit proposed abandonment plate selections per Submittal requirements prior to fabrication or purchase.
 - b. Contactor shall coordinate with the Architect and/or Consultant regarding the style, finish and paint color of abandonment cover plates.

- c. Cover plates for standard gang junction boxes shall match the manufacturer style and color of architectural cover plates used elsewhere on the project.
 - d. For non-standard gang junction box locations provide the box manufacturer's paintable abandonment finish plate.
 - e. At non-standard gang sized junction box locations where a manufacturer's abandonment finish plate is not available, a custom, paintable abandonment plate shall be provided. Custom abandonment plates shall be sized to extend past the height and width of the box by a minimum of one-half inch on each side to mask any gap between the box edge and wallboard.
- D. AV Rack Accessories
1. Provide manufacturers' rack mount adapters where available.
 2. Where manufacturers' rack mount adapters are not available, provide Middle Atlantic Products RSH4S-series custom rack shelf adapters, with -C clamping option as appropriate, or equal.
 3. Blank rack panels: Flanged steel with black textured powder coat finish, Middle Atlantic Products, SB-series, or equal.
 4. Vented rack panels: Middle Atlantic Products black powder coat finish VT-series, or equal.
 5. Rack screws, lacer bars and accessories: Middle Atlantic Products, or equal.
 6. Rack Drawers: Middle Atlantic Products, black textured powder coat finish, TD-series, or equal.
 7. Rack ID Panel: Include single space (1 RU) rack ID panel, RCI Custom Part# NV5001-250217MM-02 at the top of each equipment rack, or group of racks. Panel shall be digitally printed with logo and contact information for Consultant and Contractor. Manufacturer contact: quotes@rcicustom.com
 8. Confirm with the Owner any requirements for security-type rack rail screws, prior to rack fabrication and assembly. Rack rail security screws shall be Middle Atlantic Products, approved style and installation/removal tool type, or equal.
 9. Where locking doors are provided, confirm with the Owner any requirements for keying and, if requested, provide locks keyed alike at no additional cost, if available.
- E. AV Rack Power Distribution Equipment
1. Where the Technical Power supply to the rack is IG (isolated ground), provide a power distribution system within the rack that maintains the integrity of the IG system.
 2. Where 20A power is specified, ensure that all power distribution products are rated for 20A.
 3. Vertical power strips: Middle Atlantic Products PDT-series, or equal.
 4. Rack rail power strips: Middle Atlantic Products PD-series, or equal.
 5. Provide a sufficient number of AC convenience outlets to accommodate all installed equipment plus an extra 20% spare capacity.

PART 3 - EXECUTION

3.1 INSTALLATION PRACTICES

A. General

1. All equipment shall be installed in accordance with this Specification, approved Shop Drawings, and manufacturer's recommendations.

2. All equipment with the exception of portable equipment shall be firmly fastened or attached in place. A safety factor of at least five shall be utilized for all brackets, fasteners and attachments. Provide safety retention cables for overhead equipment such as loudspeakers, projectors, etc.
3. In the installation of equipment and cable, consideration shall be given not only to operational efficiency, but also to overall aesthetic factors.
4. The Contractor shall ensure that all equipment is installed such that proper cooling and ventilation is provided.
5. All equipment shall be installed in a manner, which prevents hum, RF/EMI/EMF interference, and mechanical vibration based noises (e.g. fan mounts, etc.)
6. Projectors, lenses, and mirrors shall be solidly mounted and braced so that there will be no observable movement in the image induced by motor vibration or other mechanical operations.
7. All equipment that includes keyed locks shall be keyed alike, per equipment category. This includes, but is not limited to equipment racks, lecterns, other technical furniture, security mechanisms, etc. The Contractor shall coordinate with the Owner on keying preferences before ordering equipment.
8. All equipment shall be protected from construction dust and debris until the date of Substantial Completion.
9. All equipment shall be protected from theft, damage, or vandalism until the date of Substantial Completion.
10. Any equipment designed for use by end-users in the facilities must be installed with theft deterrence/protection mountings and fasteners. Any tools required to mount/un-mount this equipment must be furnished to the Owner at the date of Final Acceptance.

B. Furniture

1. The Contractor shall ensure that equipment or mounting hardware is compatible with and suitable for installation in furniture specified by the Architect, Consultant, or Furniture Supplier. It shall further be the Contractor's responsibility to ensure that such coordination with the Architect, Consultant, or Furniture Supplier occurs. The Contractor shall exchange with and follow such Shop Drawings as to ensure that dimensions and structural supports are adequate for the installation of specified equipment. In addition, the Contractor shall confirm that the furniture accommodates the audiovisual equipment's' environmental and electrical operating parameters. It is the Contractor's responsibility that the request and delivery of such critical coordination information is satisfactorily executed. In as much as the Contractor has control over the delivery of such information, they shall deliver it as requested by the Architect, Consultant, or Furniture Supplier.

C. Equipment Racks and Equipment Rack Cable Management

1. Racks shall be installed in such a way so as to permit access to all equipment for service.
2. Racks are considered complete components and should be completely assembled and tested at the Contractors facility prior to onsite installation.
3. All equipment in racks shall be fitted with vent panels and/or fans as required to provide ventilation and cooling according to equipment manufacturer's recommendations.
4. Unused front facing rack spaces shall be fitted with blank rack panels.
5. Adjacent racks shall be bolted together with appropriate ganging hardware.
6. Use rear and mid rails for intermediate terminations. Maintain accessibility to the rear of the equipment.

7. Mid rails must be used to support equipment weighing more than 50 pounds.
8. As a general practice, all power cables, control cables, and high-level cables shall be dressed to the left rear of an equipment rack. Audio and video cables shall be dressed to the right rear of the rack. Audio, video and control cables shall be bundled separately and spaced not less than three (3) inches apart.
9. Internal equipment rack cabling shall be supported by lacing strips, support brackets, or other cable management systems as required to ensure that all cabling is supported in both the vertical and horizontal planes within the rack.
10. With the exception of ganged equipment rack assemblies, cabling routed between equipment racks or pieces of equipment exterior to equipment racks, or extending to the greater facility cabling infrastructure, shall be completely protected, end-to-end, by a raceway, wire-way, or duct appropriately sized for the cable run.
11. Cabling between rolling pieces of equipment not housed in rack cabinets or a rolling equipment rack and any device to which it is connected, shall be protected by a split-loom corrugated tubing wrap or other such flexible cable management system appropriately sized for the cable run.
12. Any controls not to be adjusted by the user and accessible from the front of the equipment rack must be furnished with security panels.
13. Devices installed behind flat panel displays shall be mounted near the edge of the displays for easy physical access and for easy visual verification of indicator lights.

D. Video Displays

1. All permanently mounted projectors shall be installed with the center line of the projector perpendicular to the projection screen. All projected images shall be squarely converged to the projection screen. Keystone or geometric correction shall not be employed without the written consent of the Consultant.
2. Turn off or disable all eco, green or energy saving modes on all flat panel and projector displays where displays are to be controlled by an external control system
3. Video settings should be adjusted on all flat panel displays to optimize color and contrast. Settings should be identical between multiple displays within the same room, area, or room type. Any dynamic contrast modes within flat panel displays shall be disabled.

E. Video Cameras

1. Configure all video cameras with proper output resolution, network settings, physical positioning and white balancing. White balancing of cameras shall occur after the camera is installed, the room finishing is complete with the room lighting and shades properly set.
2. Program no less than four presets for all PTZ cameras.
3. Prior to installation, the Contractor shall work in close coordination with the Owner to determine the optimal locations for all video cameras to ensure that the camera positions meet the requirements of the Owner for the field of view.
4. If so requested by the Owner or Owner's representative, and within 90 days of Substantial Completion, the Contractor shall be prepared to make one visit to the site to make adjustments to the locations of the video cameras within accessible ceilings without additional compensation. If camera placement is required in an inaccessible ceiling or wall and will incur a cost to the Owner for finishing, painting, cable pathways, mounting, etc., such cost information must be submitted to the Owner for approval prior to any work being performed.
5. The Contractor shall be responsible for modifying and reissuing any items within the Final Documentation package that have been impacted by post integration camera adjustments.

F. Cabling

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1. All cabling and termination shall be executed in adherence to standard industry practices and as outlined in:
 - a. AV Installation Handbook: Best Practices for Quality Audiovisual Systems: AVIXA/InfoComm International, latest edition.
 - b. Philip Giddings - Audio Systems Design and Installation: Boston Focal Press, latest edition.
 - c. Kenneth T. Deschler - Cable System Design and Installation: McGraw-Hill, Inc. latest edition.
2. Cable Length Verification: Cable lengths where given in the Specification, for bulk or manufactured cable assemblies, have been provided to assist the Contractor in the bidding process. Cable run lengths, where specified, are end-point-to-end-point estimates and include consideration for tails. Estimates may be based upon cable tray systems; raceways, conduit runs, and furniture layouts indicated on construction drawings and may vary from the actual installed cable pathways. It is responsibility of the Contractor to field verify required cable lengths for bulk cable or manufactured cable assemblies prior to ordering.
3. Cable Installation
 - a. Non-contiguous cable support mechanisms such as hangers, rings, and hooks shall not be spaced farther than four (4) feet apart. All manufactured raceways used for cables shall be installed according to the raceway manufacturer's specifications
 - b. Cable runs shall be supported with devices designed for this purpose and are to be installed independent of any other structural component.
 - c. Cables routed vertically up walls, or between floors as vertical riser, shall be supported with clamps or other mechanisms. These supports shall occur at least three times per floor.
 - d. The Contractor shall maintain, or where not already existing, provide through penetration fire stop systems to prevent the spread of fire through openings made in fire-rated walls or floors to accommodate penetrating items such as conduit, cables or other pathway. Fire stop shall restore floor and wall to the original fire rated integrity. The fire stop systems and products shall have been tested in accordance with the procedures of U.L. and material shall be U.L. classified as materials for use in through-penetration fire stops.
 - e. The fire stop system shall comply with the NEC and with NFPA 101-Life Safety Code (latest edition) and shall be made available for inspection by the local inspection authorities prior to cable system acceptance. The Contractor shall be responsible for verifying the fire rating of all walls and floors affected by his/her work.
 - f. Cables shall not be exposed to paint, paint remover, water, or any liquids which may degrade the performance of the cable, void the manufacturer's warranty, alter the flame and/or smoke characteristics of the cable, or obscure the flame rating designations printed on the jacket. Cables exposed to paint, paint remover, water, or any liquid shall be replaced by the Contractor.
 - g. Cable pulling tension may not exceed manufacturer recommendations. Where cable-pulling lubricant is used, the lubricant must be compatible (non-damaging) with the conduit and cable sleeve materials and must not harden over time to prevent future pulls.
 - h. Cable stapling of any recognized media type shall not be permitted.
 - i. Cables shall be dressed in conveniently sized bundles and either laced or banded. Lacing or banding shall not be so tight as to deform cable bundles. Hook and loop cable ties shall be utilized, and plastic zip ties are not permitted.
 - j. Cabling installed with a bend radius less than that recommended by the cabling manufacturer is not acceptable.
 - k. Cables and bundles terminating at equipment or connector panels shall be supported so as not to put strain on connections or connectors.

- l. All cabling between mobile equipment and connection panels must be prefabricated, tactical cabling.
 - m. All cabling between network ports, jacks, patch panels and equipment must utilize prefabricated CAT6a, or better as required by the application, patch cables of appropriate length.
 - n. All cables, with the exception of video or pulse cables, which must be cut to an electrical length, shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes without prior approval of the Consultant.
 - o. Cabling for equipment mounted in drawers or on slides shall be provided with a service loop of appropriate length. A cable management support for the service loop shall be provided to prevent the service loop travel from interfering with the operation of the drawer or slide or snagging on adjacent cabling.
 - p. Microphone level, line level, loudspeaker level, and video lines shall be run in separate conduits, trough, raceway divider, and cable bundles. Low voltage DC and control may be run along with any but microphone or line level audio runs.
- 4. Termination
 - a. All termination components must meet or exceed all specifications for given media type and application as described in this document and system drawings.
 - b. Crimp on connectors shall be installed only on the appropriate size cable using the manufacturer recommended crimp tool and die set.
 - c. Connections to electronic devices providing screw terminals shall be terminated using the appropriate gauge insulated spade or ring crimp terminal connector and crimp tool.
 - d. All mechanical solder-on connectors shall be attached to cable ends using rosin core solder.
 - e. Audio signal cable shields shall be protected with the appropriate gauge Teflon or heat-shrinkable tubing. The jacket end of each audio cable shall be fitted with the appropriate gauge heat shrinkable tubing to provide additional protection to the base of the shield or shield foil. This also applies to the inside of mechanical connectors and cables that terminate at partitioned barrier strips.
- 5. Analog Audio Microphone and Line Level Systems
 - a. General
 - 1) All analog audio microphone and line level cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer's specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. The cabling system shall be tested, verified and documented.
 - b. Test for continuity of each conductor, polarity, signal loss and proper shield grounding and integrity.
 - c. Testing to be performed using an NTi MR-PRO Audio Generator and Impedance Meter, or equal.
- 6. Analog Audio Loudspeaker Line Level Systems
 - a. General
 - 1) All analog audio loudspeaker line level cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer's specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. The cabling system shall be tested, verified and documented.

- b. Test for continuity, polarity, impedance, signal loss and (if required) proper shield grounding and integrity.
 - c. Low impedance loudspeaker lines:
 - 1) Test impedance at 1000Hz.
 - 2) Test polarity of installed loudspeakers.
 - d. 70 volt loudspeaker lines:
 - 1) Test watts load at 1000Hz.
 - 2) Test polarity of installed loudspeakers.
 - e. Testing to be performed using an NTi MR-PRO Audio Generator and Impedance Meter, or equal.
7. Category Cabling and Connectors for AV Systems
- a. General
 - 1) All category cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer's specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. Cables shall be bundled in groups of 24 cables maximum. The category cabling system shall be tested, verified and documented to meet the ANSI/TIA-568.2-D Standard, including all applicable Addenda.
 - b. HDBaseT and Similar Distribution Systems (DTP, XTP, DM, etc.)
 - 1) AV Contractor provided signal distribution equipment that requires RJ-45 style connectors at room boundary wall panel or floor box panel connections, with the exception of those connecting a piece of AV equipment to the Owner's LAN, shall be color-coded Neutrik EtherCON CatX rated shielded panel connectors and manufacturer compliant shielded CatX rated inline connectors in the appropriate color-coded Neutrik EtherCON connector carrier and specified to keep the CatX rating of the signal cable. Manufacturer approved RJ45 cable connectors shall be used at all manufacturer equipment connections. All wires within the cable must be connected and shielded.
 - 2) Each digital AV over RJ-45 receptacle, permanently installed cable, equipment cord, patch cord and patch panel will be of a color or have markings that are non-standard with the voice/data system, and be plainly and permanently labeled "AV ONLY".
 - c. AV Control Ethernet Systems
 - 1) AV Contractor provided network equipment and connections for AV equipment control over Ethernet: all RJ-45 style room boundary wall panel or floor box panel connections provided by the AV Contractor shall be mechanically keyed with color-specific positive and negative keying features to prevent unintentional mating with unlike keyed or non-keyed patch cables.
 - 2) Each digital AV permanently installed category cable, equipment cord patch cord and patch panel will be of a color or have markings that are non-standard with the voice/data system, and be plainly and permanently labeled "AV ONLY – NOT DATA".
 - d. Category Cabling Systems Installation and Testing
 - 1) Where indicated, the Contractor will be required to provide a dedicated system of category cabling to support the transmission of digital AV signals. Depending upon the application, the cabling system topology may be point-to-point or be comprised of a system of work area outlets terminated at patch panels.
 - 2) The Contractor shall test, verify and document the length, wire map and transmission performance of each Channel Link (Permanent Link + Station Cables) using a Fluke DSX-5000 Cable Analyzer System, including DSX-5000 Versiv Mainframe and

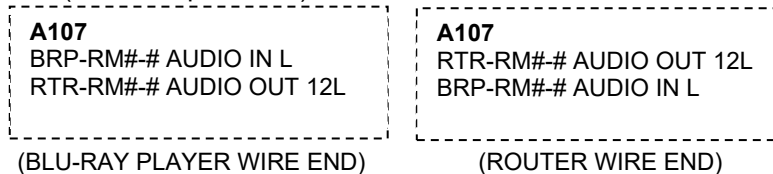
Remote, LinkWare PC Software, CAT 6A/Class EA Permanent Link Adaptors and CAT 6A/Class EA Channel Adapters. This tester shall be used during testing of this project. Included features shall include the ability to integrate with labeling and cable management software, which yields downloadable 606-A cable IDs, ensuring data accuracy. Channel tests are the only acceptable test format for testing Category cabling. Link tests will not be sufficient.

- 3) All category cable Channel and Permanent Links shall be tested to prove compliance with the current industry standard, ANSI/TIA-568.2-D and any subsequent addenda. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-C including applicable Technical Service Bulletins and amendments. The appropriate level III tester shall be used to verify each individual type of category cabling systems.
 - 4) Category 5, 5e and 5e+ testing of channel, permanent link and twisted pair cables shall be performed using the recommended test equipment specifically designed to test cables for all ANSI/TIA-568.2-D Category 5e parameters from 1 – 100 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The Contractor may be required to provide documentation (or demonstration) that the testers used are properly programmed as described above.
 - 5) Category 6 and 6+ testing of channel, permanent link and twisted pair cables shall be performed using the recommended test equipment specifically designed to test cables for all ANSI/TIA-568.2-D Category 6 parameters from 1 – 250 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The Contractor may be required to provide documentation (or demonstration) that the testers used are properly programmed as described above.
 - 6) Category 6A and 7a testing of channel, permanent link and twisted pair cables shall be performed using the recommended test equipment specifically designed to test cables for all ANSI/TIA-568.2-D Category 6A parameters from 1 – 500 MHz. Testers shall be loaded with the most recent test values per the above referenced standard. The Contractor may be required to provide documentation (or demonstration) that the testers used are properly programmed as described above.
8. Digital Video Cable Installation and Testing:
- a. General
 - 1) All digital video cabling installed by the Contractor to support AV Systems connectivity shall meet the equipment manufacturer's specifications for cable and connector types, installation methods and routing, separation distance from adjacent services, maximum number of disconnect points and maximum overall cable run lengths required to meet the systems design performance criteria. The cabling system shall be tested, verified and documented.
 - b. When issues (such as cable length) compromise specifications or the integrity of the AV system, active cable equalization, twisted pair extenders, or fiber-optic extenders shall be employed as appropriate.
 - 1) When using twisted pair extenders, the type of cable used and its shielding must comply with the extender manufacturer's recommendations for optimum performance.
 - 2) When using products that draw power from the +5V line, the system must be configured to ensure that source power is not overdrawn.
 - c. The bend radius of each cable shall not be less than the minimum recommended by the cable manufacturer.
 - 1) System interconnects shall not exceed the minimum required for system functionality.
 - 2) Cable splices, joiners, and gender changers shall not be used.
 - d. Test for continuity of each conductor, signal loss and proper shield grounding and integrity.

- e. Perform EDH, CRC & Jitter tests.
- f. Perform Eye Pattern Measurement test.
- g. Testing to be performed using a Phabrix SxE, or equal.

G. Labels / Wire Markers

1. For cable labeling, reference ANSI/INFOCOMM Standard F501.01:2015, Cable Labeling for Audiovisual Systems (CLAS)
2. Except where otherwise indicated, all rack-mounted equipment, switches, controls, and interface panels shall be clearly labeled.
 - a. Panels and plates shall be a minimum 1/8" thick anodized aluminum etched and epoxy filled unless otherwise specified.
 - b. Rack mounted equipment shall be labeled with engraved and filled plastic laminate. Where appropriate, the function of, or the input, output, or loudspeaker(s), served by each device shall be indicated. Other methods of labeling rack mounted equipment may be accepted pending prior approval by the Consultant and/or Owner.
 - c. All cables shall be permanently identified at each end by machine printed cable markers.
 - 1) Every cable shall have a unique tag number identifier for each cable. The Contractor shall include this unique tag number on the As-Built signal flow documentation.
 - 2) Cable markers shall be placed two (2) inches from where the cable exits the strain relief of the connector, but never within a cable bundle.
 - 3) Each cable marker shall include, in addition to the unique tag number identifier, the device host name of the origination and destination equipment termination at each cable end (see example below).



H. Technical Power

1. Separate electrical power for media systems has been provided at this site and is designated as "technical power." The technical power grid incorporates a grounding system utilizing a dedicated insulated ground cable for each receptacle, each of which is connected to the main technical power distribution panel. The Contractor shall be responsible for verifying that all media systems electronics, racks, and components derive their power from technical power receptacles only.
 - a. All AC power distribution within equipment racks shall utilize a star grounding topology and isolated ground receptacles.
 - b. Equipment rack power distribution systems shall be grounded by way of the 3-conductor AC line cord(s) provided with such equipment.

I. Grounding

1. To avoid system noise, data errors, safety hazards, and equipment damage, all devices and cabling shall be installed using a consistent grounding scheme.
3. This section offers guidelines for grounding and shielding methodology. Grounding and shielding methodology may need to be augmented or modified for certain pieces of equipment or interconnections in order to meet the requirements of other sections of this specification. The Contractor shall be responsible for making necessary alterations in accordance with industry practices and such that the Performance Standards detailed in 'Performance Standards' are met.

- a. Grounding and shielding systems shall be executed in adherence to standard industry practices and as outlined in:
 - 1) AV Installation Handbook: Best Practices for Quality Audiovisual Systems – Second Edition: AVIXA/InfoComm International, 2009
 - 2) Basics of Audio and Visual Systems Design handbook: Section 10, “Technical Power and Grounding Systems” – Revised Edition: AVIXA/InfoComm International 2003
 - b. Ground conductors referred to in this section shall be 10AWG insulated solid copper cable. Ground conductors shall be terminated using a closed ring lug, of proper size for each application, which shall be connected to system electronic components and the equipment rack master bus using nuts, bolts, and lock washers.
 - c. Under no circumstances shall an AC neutral conductor be used to ground equipment.
 - d. Audio and Video Patch Fields
 - a) Unless otherwise specified, all patch fields shall be configured such that device outputs appear on the top row connectors of the patch field, and device inputs appear on the bottom row. Any exceptions to this rule require the prior approval of the Consultant.
 - b) All connectors used on patch fields shall be of such design that they are electrically isolated from the patch field panel.
 - e. Interconnection
 - 1) All audio interconnections with cable lengths greater than 10 feet shall use balanced (differential) signaling.
 - 2) All connectors used on system I/O panels shall be electrically isolated from the panel and provide a pass through (uninterrupted) ground connection.
 - 3) All audio signal cable shields shall be grounded only at the output connection of each device. Signal cable shields, both connected to devices and floating, shall be protected by the appropriate gauge heat shrinkable tubing. Cable shields at the input connector end of the cable shall be folded back over the cable jacket and covered with heat-shrinkable tubing. Do not cut off unused shields.
 - 4) Microphone cable shields shall be connected at both ends.
 - 5) Coaxial video and RF shields shall be connected at both ends.
- J. Pull Strings
- 1. A nylon pull string shall be left in every conduit. In the event additional cables are pulled in after the initial cable pull, a nylon pull string shall be pulled with the added cable.

3.2 CONTROL SYSTEM SOFTWARE DESIGN & DEVELOPMENT

A. Control System Overview

- 1. Extron control system processors shall provide local audiovisual systems and supplemental architectural device control for each of the controlled spaces.
- 2. Extron touch panels, button panels and software applications shall be provided as the human interface devices for each of the control systems.
- 3. Extron existing meta-control software and database servers shall provide asset management, control scheduling, help desk, messaging, system administration and reporting functionality for the local audiovisual control systems.
- 4. Extron new room scheduling software and database servers shall provide room availability, room scheduling and meeting notifications for the room scheduling display system.

B. Meta Control System

1. Where specified, the Contractor shall integrate the control systems into an existing Extron server-based meta-control system currently utilized by the Owner to provide capabilities that include Asset Management and Scheduling, Control System Help Desk and Messaging, and System Administration and Reporting.
 2. The Contractor shall secure private IP addresses from the Owner for use by Ethernet equipped control system processors and control panels. The Contractor shall coordinate with the Owner, or representative of the Owner, to develop the required services, determine system user level access rights, and to establish control system network standards for TCP/IP addressing.
 3. Meta control server software shall feature multiple user-access levels, assignable to any number of user logon accounts. Less-restricted accounts will be assigned to system administrators and security personnel, enabling them to monitor overall and equipment-specific status, take direct control over any control processor or control panel and generate statistical usage reports. More restricted accounts will be assigned to typical end users or presenters, enabling them to schedule a room, make equipment reservations, and specify the equipment "environment" for a room prior to the start of a meeting.
 4. Extron control system processors and associated control panels will provide local control for all of the spaces. Each processor shall be equipped with either integral Ethernet port(s) and/or Ethernet expansion cards and memory expansion as required to support their operation. A connection between each processor and the building LAN will provide communications between the device and the Meta Control System.
 5. Meta Control functionality shall include, but not be limited in the ability to:
 - a. View real-time power status for all A/V systems facility-wide.
 - b. Manually turn on/off A/V systems power in any room.
 - c. Schedule A/V systems power on/off for individual rooms.
 - d. Provide real-time status of video projector lamps.
 - e. Provide self-generated equipment failure notifications.
 - f. Create a database of equipment for asset management, tracking, and maintenance.
 - g. Create reports, either scheduled or on-demand, indicating room and equipment usage.
 - h. Schedule rooms, if desired, based on functionality, location, and availability.
 - i. Provide Help Desk functions including chat and service notifications sent via e-mail.
 6. Control system processors shall feature password protected remote login capability via a web-based interface, enabling the end user to directly monitor and control the processor via the LAN.
 7. Where requested by the Owner, touch panel pages shall be converted, formatted, and exported for use with Apple® and/or Android® and/or Windows mobile devices.
- C. Room Scheduling Display System
1. Where a separate Room Scheduling Display System is specified, the meta control server and database server shall provide software or software plug-in functionality to provide at each individual room display:
 - a. Interactive room schedule and availability
 - b. Interactive local room booking
 - c. Digital signage display
- D. Graphical User Interface / Touch Panels
1. General
 - a. The following guidelines are not intended to limit the creativity of the Programmer when designing the software nor are they all-inclusive. Rather, they are concepts and

guidelines to ensure that a fully functional, easy to operate control system for the Owner is provided.

- b. The Control System shall employ an easy to use, intuitive, touch panel graphical user interface. Touch panel control shall be icon based and utilize graphical representations that mimic the actual device for all devices under control. In every case where the device under control offers feedback, the Control System shall provide indication on the touch panel(s) of individual component control state conditions.
- c. A "Quit", "System Shutdown" or similar button shall be available from the Main Menu. When the User has selected this button, a confirmation screen indicating that the shutdown sequence has been selected, and a message will pop-up reminding the User to remove all media such as Blu-Ray discs. A second button press shall be required to initiate the power down sequence. If a lamp-based component such as a video projector has a significant cool down and warm-up time between its on and off state, the warning should indicate that this particular device will be unavailable for a specified period of time. This might be done using a graphical representation of a clock, a countdown timer, bar graph, etc.
- d. All pages shall maintain a consistent graphical "look and feel."
- e. The opening page should have, at a minimum, an Owner logo, a large button to start the system, and the ability to control the lighting system (and motorized shades if so equipped) without powering up the entire system.
- f. After system start-up, the primary page or main menu in each presentation space shall display (at a minimum) a room identifier; all relevant input sources grouped together, all environmental controls grouped together, a quit option, a date icon displaying the current date, and a clock indicating current local time
- g. The AV Contractor will determine with the Owner those control panels requiring passwords and limited access.
- h. Each touch panel shall provide a method for service personnel to access detailed system information and configuration menus. This information might be accessed by service personnel via a hidden button and/or by entering a password. Configuration menus should include lowering projector lifts to the service position, projector zoom and focus, and other control functions useful to service personnel.
- i. The information page should include the following: "System Designed by NV5. ph.(412)-323-8580 <http://www.NV5.com/tech>"; "System Installed by _____, ph. (xxx) xxx-xxxx, and website address; "Programming Supplied by _____" "Program Name"; "Compiler Version X.0"; "Panel File #"; and other relevant system software information.

2. Video Preview Function

- a. Where specified components permit, a video preview function shall be provided on the touch panel.
- b. The video preview function shall operate such that, when any video source is selected, its output will be automatically routed to a video preview window on the touch panel.
- c. Touching the video preview window on the touch panel will toggle the video display between a predetermined sized video window and full screen display on the touch panel.
- d. Control buttons for the selected video source device shall always be present below the video preview window and/or overlaid onto the full screen display.
- e. Switching and control shall be such that a user may preview and cue video on the touch panel from a selected video source device at the same time that program material is running, uninterrupted, on the systems primary display device and sound reinforcement system.
- f. Pressing a video source device button followed by pressing a 'display' (or similarly labeled) button will route the source's video signal to the primary display.

3. Audio Control

INTEGRATED AUDIOVISUAL SYSTEMS AND EQUIPMENT

Section 274116 - 46

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- a. A volume control icon shall be available to the User at any time there is an audio enabled system.
 - b. Program audio: provide both level up/down and mute controls.
 - c. Speech audio: provide both level up/down and mute controls separate from the Program audio.
 - d. Microphone levels: when multiple microphone level control is required, provide a separate gain and mute control for each microphone in the mix. Microphone mix controls shall be on a separate, password protected setup page.
 - e. A clearly visible mute button with positive feedback to an on/off indicator on the touch panel shall also be included.
 - f. The AV Contractor shall set the system's master gain control such that the user has a reasonable range of audio level, but the maximum level is set below that which could allow the user to inadvertently cause harm to system components or cause feedback in the system.
 - g. The control system shall automatically reset the audio levels to an indexed preset level each time the system is shut down or restarted.
 - h. Pressing a video source device button followed by pressing a 'display' (or similarly labeled) button will route the source's video signal to the primary display. The source device's audio will be simultaneously routed to the room's sound reinforcement system (audio follow).
 - i. In systems with multiple assignable video displays:
 - 1) The video preview window shall include a button, or buttons, representing each assignable video display connected to the system. Where touch panel size permits, this should take the form of a graphical representation of the room with a display assignment button showing the relative location of each display.
 - 2) Pressing a video source device button followed by pressing a display assignment button will route the source's video signal to that display. This process can be repeated to assign a single video source to multiple displays.
 - j. In systems with multiple assignable video displays and a single sound reinforcement system:
 - 1) A method shall be provided by which users may select which video source's audio signal is to be routed to the room's sound reinforcement system (audio break away).
 - k. In systems with multiple assignable video displays and a multiple sound reinforcement systems:
 - 1) A method shall be provided by which users may select which video source's audio signal is to be routed to each sound reinforcement system (audio break away). An example might be a room with a projection screen that also contains multiple collaboration pods served by flat panel displays with integral loudspeakers.
4. Lighting Control
- a. Touch panel layouts will include lighting preset recalls in each room. A minimum of eight scene presets should be provided. For lighting zones where a dimming system is employed, the touch panel shall include "Brighter" and "Dimmer" or "Plus" and "Minus" buttons allowing the User to increase or decrease the level of lighting for any given preset.
 - b. If so requested by the Owner, an Auto-Lights feature may also be provided for all or select spaces. The Auto-Lights feature, when enabled, would recall a specific lighting preset when, for instance, projection or video conferencing is called for.

E. Controlled Devices

1. Where specified components permit, the Control System shall provide positive feedback of individual component control-state conditions to the touch panel. For example, the touch

panel page to control a Blu-Ray player shall have a status window indicating the status of the device (such as "Play Mode") or the absence of media (such as "No Disc"). If environmental controls are triggered with a particular device, the trigger for that environmental control should be feedback from the device rather than a simple button push. For example, if the control system is to automatically lower the lights when the media player is placed in "Play" mode, the control system should not directly trigger the lighting preset from the "Play" button press, but rather by first confirming that a disc is present in the player and that the player is in fact in "Play" mode.

2. Where specified, the AV Contractor shall provide a Control System interface to mechanical or electronic devices such as screens, window shades, or room lighting. Wherever such operation is available at the mechanical device under control, a stop or halt button shall always be provided in addition to buttons to drive normal equipment operation.
3. Remote power relays, when employed, shall be used to switch AC power to those devices whose power on/off function is otherwise not controllable. When such devices are audio power amplifiers, the Contractor shall program system control such that the audio power amplifiers are the last components to turn on during power up, and the first devices to turn off during power down.
4. Control system processors shall be programmed with an Auto Shutdown feature. Auto Shutdown will automatically power down a system at a given time unless overridden by the local User or System Administrator. Coordinate with the Owner via the submittal process described herein to confirm which systems shall have this feature. The Auto Shutdown feature shall function as follows: For any given room, when Auto Shutdown is set to "On", the system will power down at a time specified by the Owner, 10:00 PM for example. Ten minutes prior to the specified time, the touch panel shall display a warning message and beep indicating that the system will shut down unless the local defeat button on the panel is pressed within the ten-minute time limit. Pressing the local defeat button will delay the Auto Shutdown sequence by one-hour, or other set length of time as requested by the Owner. Fifty minutes after the one-hour delay button has been pressed, the warning message and beep indicating that the system will shut down unless the local defeat button on the panel is pressed within the ten-minute time limit will appear. This sequence shall continue so long as the operator continues to press the delay button. Controls to adjust shutdown time, and defeat button duration shall be provided. This may be on a hidden or restricted-access page at the Owner's discretion.
5. Resident PCs should be connected to constant power sources, not switched power, and should never be powered down from the control system.
6. If a device can play multiple types of media, has bi-directional communication with the control system, and its API permits, the system shall read the media type and adjust the screen options as appropriate for the playback option selected. For example, if a particular media player is able to play multiple media formats and has RS-232 control, the system shall display different options appropriate to that media type when detected by the unit (such as a video preview window and the ability to route the signal to a display device versus just audio playback transport controls). In this example, "graying out" the inappropriate buttons for options is acceptable.
7. For a video projector with an automatic set-up, auto image adjust or similar button, control of this feature should be provided on every logical page, such as VGA analog input pages.
8. For systems involving a video projector or similar display device, control the power to these devices separately. Users should be able to operate audio only playback devices, or control lighting or room dimming systems without automatically powering the projectors. If the system is initially started without projection, and the user subsequently attempts to project a source, the system should then ask if the user would like to power-up the projector(s) and if selected, display a progress bar during the warm-up process and then return to the current touch panel page.

F. Videoconferencing and Cameras

1. The AV Contractor shall establish 4-6 go-to camera presets and provide a simple scheme whereby the User may easily recall these presets during a presentation. The Contractor shall determine all camera presets in coordination with the Owner. The setup of the camera presets shall be on a password protected technician's page, with provisions for naming each preset with variable text. This will allow the Owner to use descriptive text for preset labeling rather than simple numbering.
2. Manual camera control functions shall include zoom, pan and tilt. For camera zoom, indicate the lens control with a "Plus/Minus" or similar graphical icon based labels. For pan and tilt functions, use left, right, up, and down directional arrows mimicking the manufacturer handheld remote.

3.3 PERFORMANCE STANDARDS

A. Audio

1. Speech Signal
 - a. The system shall provide a speech signal in the audience seating area that meets or exceeds the following requirements:
 - 1) Frequency response within ± 3 dB from 500 Hz to 15,000 Hz.
 - 2) Overall SPL variance of ± 3 dB.
 - 3) Measured Alcons of 10% or lower.
 - 4) Minimum average SPL of 87 dB Z-weighted (flat), with 10 dB of undistorted headroom available.
2. Music Signal
 - a. The system shall provide a music signal in the audience seating area that meets or exceeds the following requirements:
 - 1) Frequency response within ± 3 dB from 200 Hz to 17,000 Hz.
 - 2) Overall SPL variance of ± 3 dB.
 - 3) Minimum average SPL of 93 dB Z-weighted (flat), with 10 dB of undistorted headroom available.

B. Video

1. Digital Video
 - a. Based on the connectivity requirements provided by the AV systems design, the Contractor shall test the digital video system to ensure that it meets the following standards, as applicable:
 - 1) Single-link DVI
 - 2) Dual-link DVI
 - 3) HDMI (Latest Standard)
 - 4) DisplayPort (Latest Standard)
 - 5) Thunderbolt (Latest Standard)
 - 6) Mini DisplayPort (Latest Standard)
 - 7) USB-C (Latest Standard)
3. Digital Visual Interface (DVI)
 - a. The Contractor shall test the video system to ensure that it meets the Engineering Standards of Version 1.0 of the Digital Visual Interface DVI specification document as released by Digital Display Working Group (DDWG), April 1999, which applies to digital and analog video signals with DVI connectivity. This Performance Standard applies

mainly to DVI-D and DVI-I digital video connectivity. For DVI-A or DVI-I analog video connectivity, refer also to the Analog VGA Video paragraph herein.

- b. At the points of interconnection, the input and output impedance of each link shall be balanced to ground, nominally 100 ohms $\pm$ 10 ohms.
 - c. Single link DVI shall support up to and including:
 - 1) 4.95 Gbps data rate
 - 2) 1920x1200 @60Hz resolution
 - 3) 60Hz vertical frequency
 - d. Dual link DVI shall support up to and including:
 - 1) 10.2 Gbps data rate
 - 2) 2560x1600 @60Hz resolution
 - 3) 60Hz vertical frequency
 - e. The proper shape of the digital video's RGB channels, or "eye pattern", as it appears on an oscilloscope, must be maintained. Refer to the DVI specification document by DDWG for required eye opening values and minimum standards for signal integrity
4. High-Definition Multimedia Interface (HDMI)
- a. The Contractor shall test the video system to ensure that it meets the Engineering Standards of the most recent HDMI Specification as administered by HDMI Licensing, LLC.
 - b. At the points of interconnection, the input and output impedance of each link shall be balanced to ground, nominally 100 ohms $\pm$ 10 ohms.
 - c. The proper shape of the digital video's RGB channels, or "eye pattern", as it appears on an oscilloscope, must be maintained. Refer to the HDMI Specification by HDMI Licensing, LLC for required eye opening values and minimum standards for signal integrity.
5. Display Port
- a. The Contractor shall test the video system to ensure that it meets the Engineering Standards of the most recent DisplayPort Standards as administered by the Video Electronics Standards Association (VESA).
 - b. At the points of interconnection, the input and output impedance of each link shall be balanced to ground, nominally 100 ohms $\pm$ 10 ohms.
 - c. System shall support up to and including:
 - 1) 10.8 Gbps data rate
 - 2) 2560x1600 @60Hz resolution
 - 3) 60Hz vertical frequency
 - d. The proper shape of the digital video's RGB channels, or "eye pattern", as it appears on an oscilloscope, must be maintained. Refer to the DisplayPort Standards by VESA for required eye opening values and minimum standards for signal integrity.
6. High-Bandwidth Digital Content Protection (HDCP)
- a. All digital video sources, sinks, and repeaters shall comply with the most recent Digital Content Protection LLC specifications.
 - b. All digital video sources, sinks, and repeaters shall scan for the presence of HDCP and if present, perform all HDCP stages according to the HDCP specification, with no more than 5 seconds total time delay between source selection or input and video appearing:
 - 1) Authentication and Key Exchange – Keys are exchanged and verified. The hardware will store / cache the Key Selection Vector (KSV) k_m to speed up video switching.
 - 2) If receiver is a repeater, data about downstream devices is sent to transmitter.

- 3) Information is sent to transmitter every two seconds during entire HDCP session to ensure encryption is in sync between all transmitter/receiver pairs in the tree.
 - c. The distribution system shall authenticate all cached KSVs with each source up to the source's KSV limit, so that authentication does not need to be re-started each time content is routed to a new output.
 - d. The distribution system shall not send a source more KSVs than it supports.
7. Extended Display Identification Data (EDID)
 - a. All system components generating or accepting certain digital video signals shall provide the following information within the EDID transmission.
 - 1) Product make, model, and serial number
 - 2) Current EDID version and revision
 - 3) Maximum image size
 - 4) A table of supported input/output resolutions and timings
 - 5) 3D support status for each input/output
 - 6) Supported color formats
 - 7) Supported audio formats for each input/output
8. Serial Bus Communications
 - a. Based on the connectivity requirements provided by the AV systems design, the Contractor shall test all serial bus communications links to ensure that they meet the following standards, as applicable:
 - 1) USB 2.0 and 3.0
 - 2) IEEE-1394b
 - 3) Thunderbolt v1.2
9. Digital AV Over Category Cabling Systems:
 - a. UTP, STP, F/UTP and S/FTP cables installed for digital AV systems shall meet the following performance standards:
 - 1) Category 5, 5e and 5e+ cables:
 - a) ANSI/TIA-568.2-D Category 5e Permalink Specifications.
 - b) ANSI/TIA-568.2-D Category 5e Channel Specifications.
 - 2) Category 6 and 6+cables:
 - a) ANSI/TIA-568.2-D Category 6 Permalink Specifications.
 - b) ANSI/TIA-568.2-D Category 6 Channel Specifications.
 - 3) Category 6a and 7a cables:
 - a) ANSI/TIA-568.2-D Category 6A Permalink Specifications.
 - b) ANSI/TIA-568.2-D Category 6A Channel Specifications
 - b. Cable performance definitions
 - 1) NEXT: Near-End Crosstalk
 - 2) PSNEXT: Powersum Near-End Crosstalk
 - 3) ACRF: Attenuation to Crosstalk Ratio, Far-End
 - 4) PSACRF: Powersum Alien Crosstalk Ratio, Far-End
 - 5) ELFEXT: Equal-Level Far-End Crosstalk
 - 6) PSELFEXT: Powersum Equal-Level Far-End Crosstalk
 - 7) PSANEXT: Powersum Alien Near-End Crosstalk
 - 8) PSAACRF: Powersum Insertion Loss to Alien Crosstalk Ratio, Far-End
 - c. Test Results

- 1) Submission: Prior to Final Testing and Systems Performance Verification, the Contractor shall submit a copy of all applicable test results to the Owner/Technology Consultant in both electronic (file) and paper form.
- 2) Category cables: The test results submitted for category cables shall include the following:
- 3) Graphical/numerical data: Both graphical data plots and numerical data are required for the test parameters listed above.
- 4) The Category Cable Certification reports shall have complete testing of Permanent Links and Channel Links at frequency increments up to 500MHz as indicated in ANSI/TIA-568.2-D and shall include the following:
 - a) Cable/Faceplate Number -- matching faceplate numbers on patch panels
 - b) Test Date
 - c) Cable Length
 - d) Wire-Map
 - e) Return Loss
 - f) Insertion Loss
 - g) NEXT Loss
 - h) PSNEXT Loss
 - i) ACRF
 - j) PSACRF
 - k) Propagation Delay Skew
 - l) PSANEXT (Category 6A only)
 - m) PSAACRF (Category 6A only)
- 5) Provide Category Cable Certification report and include as a minimum the following information:
 - a) Test equipment make and model number.
 - b) Test equipment calibration date.

C. Optical Systems

1. Reference ANSI/INFOCOMM Standard 3M-2011, Projected Image System Contrast Ratio
2. All video projection systems shall meet the following performance standards:
 - a. The total averaged light output from a video projector, in ANSI lumens, shall be tested by the Contractor and certified to be within $\pm 15\%$ of that specified by the projector manufacturer.

3.4 SYSTEM SETUP, TUNING AND TESTING

- A. The Contractor shall install, configure, adjust, program, and calibrate all components in order to optimize the performance of all individual subsystems and the system as a whole
- B. Once the system is installed, the Contractor shall complete the following preliminary tests.
 1. Equipment Racks
 - a. Unless otherwise agreed in writing, equipment rack(s) shall be completely assembled, tested and programmed in the Audiovisual Contractor's shop. No rack assembly shall be performed at the project site. After the equipment racks are tested the Audiovisual Contractor shall notify the Owner's Representative in writing that the equipment rack assemblies are ready for observation and approval. Allow adequate time for any modifications necessary to satisfy the contract drawings and specifications.
 2. Device Configuration

- a. Configure all devices as necessary for a complete and working system and as directed by the Owner or Consultant.
 - b. Apply User and Admin security settings, user name and passwords as directed by the Owner or Consultant
 - c. Configure all networked devices in coordination with the Owner and/or Consultant including the assignment of IP address, subnet, gateway, VLAN, security settings, and host names.
 - d. Apply host name for all devices within each device's setup utility.
 - e. Verify all networked devices are configured and registered to their respective network and free of any device to device communication errors and are reachable from the necessary devices.
 - f. Verify all networked devices are registered to each manufacturers' respective software or web-based configuration tool.
 - g. Set EDID settings, color space and output resolution settings per the project designated video image resolution.
3. Network Configuration
 - a. Coordinate with the Owner's IT Department to provide required Firewall coordination, Internet services, VoIP phone provisioning, Email and Calendar credentials. DHCP Server, DNS Server, and/or Fully Qualified Domain Name (FQDN) as required to support the system functions indicated within the Specification.
 - c. Provide configuration of the IP network to support the system functions indicated within the Specification. Provide configuration of network switches, switch stacking, power management, uplinks and connections to the Owner's network as required. Configure all network settings per device manufacturers requirements including IGMP, Designated Querier, Vlan, PoE, and QoS.
4. Audio
 - a. Prior to the termination of audio amplifiers to speakers, the Contractor shall measure the resistance of the speaker line with reference to ground to determine that no short circuits or paths to ground exist in the line. The Contractor shall connect the speaker to the cable and measure the impedance of each speaker line using a 1,000Hz signal applied to the line. The Contractor shall submit a list, to the Consultant, by cable number, of the impedance of each speaker line. This test shall be performed with the amplifier disconnected from the speaker line and the speaker connected to the speaker line.
 - b. Verify all loudspeakers are working.
 - c. Verify that the system meets all Performance Standards as outlined in 'Performance Standards'.
 - d. Verify that all equipment, panels, and cables are labeled correctly.
 - e. Verify each item of equipment is functioning as intended.
 - f. Verify the installation is the same as specified.
 - g. Loudspeaker Installation:
 - 1) Verify the aiming and positioning of all loudspeakers with the Consultant.
 - 2) If the Consultant has developed an EASE software model, obtain the coverage plots from the Consultant and confirm the performance of the loudspeaker system meets or exceeds the coverage indicated in such model.
 - h. Microphone Installation:
 - 1) Verify proper positioning of all ceiling and table mounted microphones
 - 2) Configure steerable microphone array lobes to provide uniform and even coverage of all areas designated as participant seating areas or presentation areas while avoiding

areas susceptible to noise transmission such as HVAC registers, glass walls, doorways and divisible walls as required.

5. Additional Audio System Processing Adjustments

- a. Where applicable, the Contractor shall program the DSP system to include filters adjusted such that the loudspeaker zone(s) affected by same are measured to exhibit uniform (flat) frequency response (less than +/- 3 dB) at the listening location for the frequencies the transducer is designed/intended to address. The exception to this rule shall be in speech reinforcement systems where additional adjustments shall be made to ensure maximum gain with minimum feedback.
- b. Measurements utilized for determining filter adjustments shall be made on axis with respect to a single transducer (representative of the zone) in its intended field of coverage. Loudspeaker cross-over filters shall be provided first for all actively crossed transducers per loudspeaker manufacturer's instructions. Additional filters will still be required to achieve uniform frequency response measured at the various listening locations.
- c. For loudspeaker zones of small transducers, utilize high-pass filters first and foremost and then utilize parametric EQ filters to flatten the measured response.
- d. For loudspeaker zones of large transducers, where other transducers in the system will address higher frequencies, utilize low-pass filters first and foremost and then utilize parametric EQ filters to flatten the measured response.
- e. The Contractor shall program the DSP system to include delay settings adjusted so that the direct sound from the main loudspeaker clusters and the delay zone transducers in question arrives simultaneously at the listening plane served by the delay zone transducers.
- f. The Consultant may request additional filters and delay (as required) to address 'tuning preferences', but such 'tuning preferences' shall not be considered as part of the base line requirements for determining substantial completion of the audio system. Flat frequency response and time alignment of the direct sound from the loudspeakers will be considered a base line requirement for determining substantial completion of the audio system.
- g. Dante Audio Network
 - 1) Configure Dante network within Dante Controller or if specified within the project, Dante Domain Manager labeling all devices as their product host names and labeling all utilized audio channels. All unused channels shall retain their respective channel number.
 - 2) Properly designate and configure a master clock source and latency settings.
 - 3) Route audio as required.

6. Computer Configuration – OFCI (Owner Furnished Contractor Installed)

- a. The Contractor shall be responsible for coordinating with the Owner regarding the specific requirements of Owner furnished computers and/or servers as applicable to meet the functional requirements of the audiovisual systems as specified.
- b. Coordination shall ensure that the computers and/or servers meet the recommended hardware configuration required by the Audiovisual Systems as well as for all software applications, including any software provided as part of this Specification, Owner furnished software integral to the functionality of the audiovisual system, and custom software that is developed through a 3rd-party for use within the audiovisual system.
- c. Contractor coordination with the Owner on the requirements of OFCI computers shall include but may not be limited to:
 - 1) Form factor
 - 2) Firmware

- 3) Operating System (OS)
 - 4) Memory
 - 5) Hardware versus firmware, versus OS, versus software compatibility
 - 6) Video output quantity and type
 - 7) Audio output quantity and type
 - 8) Network connection(s) quantity and type
 - 9) USB port quantity and type
 - 10) Power supply(s)
 - 11) Display type, resolution, size and quantity
 - 12) Peripherals, including but not limited to:
 - a) Keyboard
 - b) Mouse
 - c) Cameras
 - d) Microphones
 - e) USB enabled devices
 - f) Others as specified
 - d. The Contractor shall further coordinate with the Owner's IT department to:
 - 1) Install and configure the furnished computer hardware to function within the audiovisual system as intended by this Specification. This includes but is not limited to the configuration of the following:
 - a) Display Settings
 - b) Audio settings
 - c) Network settings
 - d) USB devices and drivers
 - e) Others as specified
 - 2) Install and configure any software provided as part of this Specification.
 - 3) Configure any Owner provided software that is integral to the functionality of the audiovisual system.
 - e. The Contractor shall provide to the Owner a date by which all computers must be available to the Contractor for final installation and configuration.
7. Analog VGA Video, RGB Video, RGBS Video, RGBHV Video
- a. To establish that the facility cabling and terminations meet the specifications defined in 'Performance Standards', a video test signal shall be applied to each input cable and passed through the system switching and distribution networks with test patterns observed at each system display.
 - b. Test signals shall be generated using an Extron VTG 400DVI programmable video and audio test generator (or equal).
 - c. The following test patterns (at a minimum) shall be observed:
 - 1) Circles – no visible deviation from image geometry and linearity
 - 2) Safe area – no visible horizontal or vertical over or under scan
 - 3) Focus – proper image delineation in all areas
 - 4) Coarse Crosshatch – no vertical or horizontal bowing
 - 5) Fine Crosshatch – no vertical or horizontal bowing
 - 6) PLUGE – properly set black level (brightness) and display gain (contrast)
 - 7) 32-Level Split Grayscale – even transition from black to white, no color shift
 - 8) SMPTE Color Bars with PLUGE pattern – no color or pattern deviations

- 9) Flat Field – uniform white field with no color, hot or dark spotting
- 10) Hum Bar Detect – no visible hum bars
9. DVI, HDMI, DisplayPort, Mini DisplayPort and Thunderbolt Digital Video
 - a. To establish that the facility cabling and terminations meet the specifications defined in 'Performance Standards', a video test signal shall be applied to each input cable and passed through the system switching and distribution networks with test patterns observed at each system display.
 - b. Test signals shall be generated using a Quantum Data 780 (or equal).
 - c. Execute at a minimum, the following functional sink tests:
 - 1) HDCP verification
 - 2) EDID emulation
 - 3) Video pattern testing. The following test patterns (at a minimum) shall be observed:
 - a) Circles – no visible deviation from image geometry and linearity
 - b) Safe area – no visible horizontal or vertical over or under scan
 - c) Focus – proper image delineation in all areas
 - d) Coarse Crosshatch – no vertical or horizontal bowing
 - e) Fine Crosshatch – no vertical or horizontal bowing
 - f) PLUGE – properly set black level (brightness) and display gain (contrast)
 - g) 32-Level Split Grayscale – even transition from black to white, no color shift
 - h) SMPTE Color Bars with PLUGE pattern – no color or pattern deviations
 - i) Flat Field – uniform white field with no color, hot or dark spotting
 - j) Hum Bar Detect – no visible hum bars
 - d. Execute at a minimum, the following functional source tests:
 - 1) Status bar showing HDMI In
 - 2) View incoming video
 - 3) Monitor incoming audio
 - 4) EDID emulation
10. High-Bandwidth Digital Content Protection (HDCP)
 - a. Use a Quantum Data QD-882EA video test generator or similar to verify a "Pass" test that HDCP is performing to specification for source tests using a sink emulator and/or protocol analyzer; and sink devices using source emulators or protocol generators including the following parameters:
 - 1) Protocol adherence
 - 2) Audio/Video Format Switching
 - 3) Media Switching
 - 4) Force AVMUTE
 - 5) Link Integrity (Pj) Check Repeat Rate
 - 6) Pj Mismatch Response
 - 7) Number of Keys (source test with sink emulator)
11. Extended Display Identification Data (EDID)
 - a. The Contractor shall ensure that all devices capable of generating or accepting EDID information have been updated with the latest version of the EDID standard.
 - b. The Contractor shall modify all EDID tables to ensure that the highest common resolution is used by each device within a given system.

- c. The Contractor shall modify the EDID tables to include the most common computer/laptop resolutions used within the facility. Coordination with the Owner shall be required.
 - d. The Contractor shall ensure that EDID information is maintained throughout the signal chain and that intermediary devices that pass or modify the EDID information conform to the other requirements stated within this Specification.
- 12. Computer / Video Display Devices
 - a. The Contractor shall optimize display equipment for the following minimum standard scan rates and resolutions:
 - 1) NTSC / 480p
 - 2) HDTV: 720p/60, 1080i/60 and 1080p/60
 - 3) FHD: 1920 x 1080, 60 Hz
 - 4) WUXGA: 1920 x 1200, 60 Hz.
 - 5) UHD: 3840 X 2160, 60 Hz.
 - 6) 4K: 4096 X 2160, 60 Hz.
- 13. Control
 - a. Upon completion of installation, the Contractor shall test each function of each control station, push-button panel, touch screen panel, computer control interface, and all components connected to or interfaced to the Control System to verify proper operation and that each switch and indicator operates as intended.
- 14. Systems Overview
 - a. In addition, the Contractor shall:
 - 1) Verify each item of equipment is functioning as intended.
 - 2) Verify the installation is the same as specified.

END OF SECTION 274116

SECTION 274116.02 – AUDIOVISUAL SYSTEMS APPENDICES

PART 1 - APPENDIX A

1.1 LIST OF DRAWINGS

- A. Refer to drawing sheet AVS00 for sheet index of provided drawings.
- B. Audiovisual Infrastructure Reference Drawings have been included for the Bidders reference in bidding the work called for by the Contract Documents. Reference drawings may not reflect as-built conditions. It shall be the responsibility of the Contractor to field verify all site conditions.

PART 2 - APPENDIX B

2.1 SUMMARY OF AUDIOVISUAL SYSTEMS SUBMITTALS

Description	Deadline
Request for Information (Pre-Bid)	Per Owner documentation
Bonds	Per Owner documentation
Line item pricing	With Bid Response
Contractor Qualifications	Per Section 274116
Substitution Requests	Per Section 274116
Schedule	Within 15 days of notification of contract award
Submittal Log	Per Contractor's published schedule
Progress Reports	While working off-site: every two weeks While working on-site: every week.
Shop Drawings	Prior to equipment and materials purchase, fabrication, or installation
Bill of Materials	Prior to equipment and materials purchase, fabrication, or installation
Equipment Rack Digital Photographs	Prior to delivering racks to the project site
Audio Digital Signal Processing (DSP)	Per Contractor's published schedule
Control System Control Surfaces / GUI Prototype submittal	Per Contractor's published schedule
Control System Control Surfaces/GUI Submittal	Per Contractor's published schedule
Preliminary As-Built Drawing Submittal	Prior to Final Testing and System Performance Verification
Final Documentation	Within 30 days of Substantial Completion
Post-Integration Control Surfaces Adjustments	Within 90 days of Substantial Completion

PART 3 - APPENDIX C: PRE-BID FORMS

3.1 CONTRACTOR QUALIFICATION REQUIREMENTS

Corporate Profile

Location of Corporate Headquarters	
Number of Offices & Locations	
Location of Office Assigned to this Project	

Corporate History

Number of Years in Business	
Any Former Names of the Organization	
Date(s) of Incorporation	
State of Incorporation	
Officer Names & Addresses	

Litigation Experiences (Last 5 Years)

Project Related	
Nature of Litigation	
Plaintiff or Defendant	
Outcome	
Non-Project Related	
Nature of Litigation	
Plaintiff or Defendant	
Outcome	

Financial

Trade & Bank References (List 3)	
Dunn & Bradstreet Ranking	
Insurance Limits	
Name of Bonding Company	
Name & Address of Agent	
Maximum Bonding Capacity	
Current Bonding Capacity	
Performance Bond Ever Ex- ercised?	

Staffing

Total Number of Employees	
Number of Design Staff	
Number of Installation Staff	
Number of Project Management Staff	
Number of Software Programming Staff	

Project Key Personnel

Project Executive	
Project Manager	
Systems Engineer/Designer	
Lead Installer	
Control Systems Programmer	
Audio DSP Programmer	
Commissioning Agent	
Trainer	

Project Executive Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <table border="1" style="margin-left: 400px;"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>			

Project Manager Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience*				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <table border="1" style="margin-left: auto; margin-right: 0;"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>			

* The assigned Project Manager shall have at least 5 years experience with audiovisual projects of similar scope & scale.

Systems Engineer/Designer Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience*				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <table border="1" style="margin-left: 400px;"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>			
Extron NAV certification number and expiration date				

* The assigned Systems Engineer/Designer shall have at least 5 years experience with audiovisual projects of similar scope & scale.

Lead Installer Resume

Name	
Office Location	
Percentage of Individual's Time Allocated to this Project	
Work History	
Previous Project Experience*	
Length of Employment	
Certifications	<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <div style="flex: 1; border: 1px solid black; margin-top: 10px; padding: 2px;"> </div> </div>
AVIXA/InfoComm International CTS-I certification, number and expiration date	
Extron NAV certification number and expiration date	

Control Systems Programmer Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience*				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <table border="1" style="margin-left: 400px;"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>			
Extron NAV Programming certification number and expiration date				

Audio DSP Programmer Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience*				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <div> <table border="1"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table> </div>			
QSC Q-SYS Level Two Training, certification number and expiration date				

Commissioning Agent Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <table border="1" style="margin-left: 400px;"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>			

Trainer Resume

Name				
Office Location				
Percentage of Individual's Time Allocated to this Project				
Work History				
Previous Project Experience				
Length of Employment				
Certifications	<div> ☐ CTS ☐ CTS-D ☐ CTS-I ☐ RCDD ☐ PMP ☐ Certified Control System Programmer ☐ Certified DSP Programmer ☐ Others </div> <table border="1" style="margin-left: 400px;"> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>			

Resources

Manufacturers' Line Card for products Company is an authorized distributor or dealer. Include authorization date	Provide this as an attachment
List of Manufacturers' Technical Certifications or Designations	
List of Manufacturers' for Whom the Company is an Authorized Service Center	Provide this as an attachment
List of Computer Software and/or Systems that Will Be Used on the Project	
List of Contractor Owned Test Equipment. Include Manufacturer, Model, and Software Version	

References – Three Projects

1. Project Reference 1:

Institute and Project Name	
Contact Name	
Phone Number	
E-Mail Address	
Similar Scope & Scale	
Similar Technology Application	
Project Costs	

2. Project Reference 2:

Institute and Project Name	
Contact Name	
Phone Number	
E-Mail Address	
Similar Scope & Scale	
Similar Technology Application	
Project Costs	

3. Project Reference 3:

Institute and Project Name	
Contact Name	
Phone Number	
E-Mail Address	
Similar Scope & Scale	
Similar Technology Application	
Project Costs	

<p>List Any Previous Projects with Van Buren Township, NV5, or Fishbeck.</p>	
--	--

3.2 REQUEST FOR INFORMATION FORM

- A. Bidders requesting information shall utilize this process and form. No verbal questions or phone communications shall be permitted during bid process.
- B. All requests for information shall be submitted to the Owner and Consultant via e-mail.

Bidder _____

Name / Title _____

Date _____

E-mail Address _____

Phone / Fax _____

Spec Section/Article # _____

Drawing # _____

Detailed question:

3.3 SUBSTITUTION REQUEST FORM

- A. Bidders proposing product substitutions shall utilize this form. No verbal requests or phone communications shall be permitted during bid process.
- B. All substitution requests shall adhere to the procedures and policies defined herein.
- C. In addition to this form, all requests shall include cut sheets, drawings, performance data and other information necessary to demonstrate that the substitution will meet all intentions of this Specification or required for a complete evaluation.
- D. All substitution requests shall be submitted to the Owner and Consultant via e-mail.

Bidder _____

Name / Title _____

Date _____

E-mail Address _____

Phone _____

Drawing # _____

System Type/Item # _____

Originally Specified item: _____

Requested Substitution: _____

Description:

3.4 BID RESPONSE FORM

- A. The Bidder shall complete and return this form. This document, as well as all submittals outlined herein, shall be considered to be the bid.
- B. The Bidder shall provide line item pricing for all equipment as an attachment. All pricing is to be inclusive of any applicable taxes, shipping, handling, expenses, insurance or other miscellaneous charges.

Bid Form Van Buren Township - The Lake House	
	Totals
BASE BID	
Equipment and Materials	\$
Shop Drawings and Submittals	\$
In-Shop Fabrication Labor	\$
On-Site Installation Labor	\$
Software Development	\$
Final Testing and Systems Performance Verification	\$
Training and Closeout Documentation	\$
Project Management and Coordination	\$
Freight & General Administration	\$
Year One Warranty	\$
SUBTOTAL:	\$
Applicable Taxes	\$
BASE BID TOTAL:	\$
Additional Warranties	
Year Two Warranty	\$
Year Three Warranty	\$
Year Four Warranty	\$
Hourly Rates for Additional Work	Per Hour Rates
Project Engineer/Designer	\$
Project Manager	\$
Technician	\$
Programmer	\$
Trainer	\$

Bid Form	
Van Buren Township - The Lake House	
Bidder Company Name:	_____
Authorized Signature:	_____
Print Name:	_____
Date:	_____

PART 4 - APPENDIX D: POST-AWARD FORMS

4.1 REQUEST FOR INFORMATION FORM

RFI #:		Date:	
To:		From:	
Specification Section / Article:		Drawing # / Detail:	
System Type:		Room name / #:	

Request:

--

Response by:		Date:	
---------------------	--	--------------	--

Response:

--

4.2 SUBSTITUTION REQUEST FORM

- A. Post-award substitution requests shall utilize this form.
- B. In addition to this form, all requests shall include drawings, performance and test data, and other information necessary to demonstrate that the substitution will meet all intentions of the Specification or required for a complete evaluation.
- C. All substitution requests shall be submitted to the Owner and Consultant via e-mail.

Date _____

Drawing # _____

System Type/Item # _____

Originally Specified item: _____

Requested Substitution: _____

Cost impact/Credit to Owner: _____

Description/reason for post-award substitution request:

4.3 PROGRESS REPORT FORM

Project Name:	
Date:	
From:	

Progress (Tasks accomplished since the previous report; both completed tasks and work-in-progress.)

--

Work Planned (Tasks scheduled for the time period extending until the next report)

--

Issues (Factors delaying progress or have the potential to delay progress involving the Owner, Architect and/or Consultant.)

--

4.4 SUBMITTAL TRANSMITTAL FORM

Contractor:	
Project:	

This form shall accompany all Contractor Submittals.

The Contractor requests a review of the project Submittals as required by the project Specifications. By signing this form and returning it to the Consultant, the Contractor indicates that:

1. The Submittal documentation provided adheres to all requirements within the Specifications, including Specification Section 274116 "Scope of Work" and "Submittals."
2. Unless otherwise approved, all required Submittals are included within as a single submission.
3. The Contractor shall provide final complete and detailed designs, as well as complete and operational systems, based on the design intent outlined in the Specification. Any omissions, discrepancies, substitutions, or exceptions to the Specification identified by the Contractor shall be communicated to the Consultant as part of this Submittal.
4. After completion of the Submittals process, the Contractor shall assume full responsibility for supplying complete and operational systems and final complete and detailed designs without claim for additional compensation. This shall include providing all equipment, Installation Materials, and labor needed to provide complete and operable system(s), even if such equipment, materials, or labor are not listed within this Specification, including the Bidding Equipment Lists.
5. After completion of the Submittals process, requests for additional compensation will only be considered based on the following conditions: Owner-requested changes, unexpected field issues due to work by other contractors, or schedule changes initiated by others.

Any incomplete items, deviations, or exceptions to the requirements of the Audiovisual Systems Specification shall be listed by the Contractor below, or provided as an attachment:

--

By signing below, Contractor verifies that the Submittal documentation is complete and accepts the conditions of this agreement.

Signature: _____ Print Name: _____

Title: _____ Date: _____

4.5 SYSTEMS PERFORMANCE VERIFICATION REQUEST FORM

Contractor:	
Project:	

The Contractor requests a Systems Performance Verification appointment by completing this form and returning it to NV5. By signing below, the Contractor indicates that

1. The work on this contract, as defined in the Audiovisual Systems Specification, is complete and ready for the Consultant's final Systems Performance Verification.
2. All required field tests have been performed and project documentation is on-site.
3. A computer/video signal generator or generators, capable of outputting all signal types included in the system designs, will be available onsite at the time of Systems Performance Verification.
4. Physical media (Blu-Ray disc, etc.) will be available onsite to verify the performance of all applicable source devices.

Any incomplete items, deviations, or exceptions to the requirements of the Audiovisual Systems Specification shall be listed by the Contractor below, or provided as an attachment:

--

If the Contractor's work is found to be incomplete, and subsequent visits to the site by the Consultant are required by the Owner, the Owner may elect to have the Consultant's travel costs, billable time, and all other related travel expenses be deducted from the Contractor's final payment.

By signing below, Contractor verifies that the job site is ready for final Systems Performance Verification and accepts the conditions of this agreement.

Signature: _____ Print Name: _____

Title: _____ Date: _____

PART 5 - APPENDIX E: BIDDING EQUIPMENT LISTS

5.1 BIDDING EQUIPMENT LISTS

- A. Bidding Equipment Lists can be found on the following pages.
- B. Bidding Equipment Lists show quantities per room. The quantity of rooms for each system type is listed at the top of each page.
- C. Bidding Equipment Lists include manufacturers and model numbers where appropriate. Additional identification or ordering information may vary according to supplier, and the Bidder shall cross-reference with an individual supplier if required.

5.2 MASTER QUOTE NUMBERS

- A. As a convenience to the Contractor in preparing the bid response, Master Quote numbers have been provided for several equipment groups. Where given, Master Quote numbers or other quotation numbers have been provided for bidding purposes only. It shall be the responsibility of the Contractor to verify that they have received the latest versions of the Master Quotes prior to bidding, and to establish the accuracy of the quotes prior to ordering.

5.3 LIST OF BRAND SPECIFIC PRODUCTS

- A. Some manufacturer's names and product descriptions used in this specification are product specific with no substitutions allowed. The items listed as "Brand Specific" in this specification must be the manufacturer and type specified. These specific products are required for compatibility with the Owner's existing systems and to maintain continuity of support. The Brand Specific Products as specified for this project include those by:
 - 1. Extron

5.4 KEYED BIDDING NOTES

- A. OFCI (Other Furnished Contractor Installed)
- B. OFOI (Other Furnished Other Installed, or Provided by Others)
- C. Included with above package
- D. Coordinate stock color/finish with architect
- E. Custom painted. Coordinate with architect
- F. Field verify prior to submittals
- G. Special or noteworthy installation requirements – Refer to System Description for details
- H. Reference manufacturer's Master Quote

END OF SECTION 274116.02

Van Buren Township

The Lake House

ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **169 / 170 / 164**

Type : **SY01**

Name : **Ballroom**

Rm Qty : **1**

Display Surfaces

1	Generic	Projection Screen	Projection Screen per Infrastructure Reference Drawings (OFOI)	2	B
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Display Devices

2	Epson	EB-PU1008x	8,500 Lumens, 3LCD, Laser Light Projector, WUXGA w/ 4K Enhancement, Lens Not Included	2	D
3	Contractor Select	Zoom Lens	Projector Lens for Above	2	F
4	Chief	Projector Ceiling Mount	Contractor Selected Projector Ceiling Mount	2	-
5	Chief	Projector Mounting Hardware	Contractor Selected Projector Mounting Hardware as Needed	2	-
6	Contractor Select	Projector Extension Column	Projector Extension Column for Above	2	F
7	Samsung	QM55C	55" Professional LED Edge-Lit Display w/ Built-In Speakers, 3840 x 2160 Native	2	-
8	Chief	MFQUx	Medium Confidence Monitor Cart 2'	2	-

Source Devices

9	Extron	Sharelink Pro 2000 w/ Miracast	4K Wireless Presentation System w/ Miracast & ShareNext - US	2	-
10	BrightSign	XT244	4K H.265/H.264 Standard I/O Player	1	-

Video Capture, Streaming and Conferencing

11	Vaddio	RoboShot 20 UHD OneLink HDMI	UHD PTZ Camera - 12x Optical / 20x Digital Zoom - 74 Deg. FOV - HD-SDI/Network/HDBT/HDMI Outputs PoE++ - 2160p/30 Native	2	-
12	Extron	MediaPort 300	4K HDMI and Audio to USB Scaling Bridge	2	-

Signal Processing, Routing, and Distribution

13	Extron	DTP3 T 322 D	Two Input 4K/60 DTP3 Transmitter for HDMI and USB-C with Data – Decorator-Style Wallplate	2	D
14	Extron	DTP3 R 331	DTP3 Receiver for 4K/60 HDMI and USB Data	2	-
15	Extron	UPI 100	100 Watt Power Inserter for Extron USB-C Products	2	-
16	Extron	NAV E 501	1G Pro AV over IP Encoder - HDMI, Ethernet, and USB	2	H
17	Extron	NAV E 121	1G Pro AV over IP Compact Encoder - HDMI	7	-
18	Extron	NAV SD 121	1G Pro AV over IP Compact Scaling Decoder - HDMI	4	-
19	Extron	NAV SD 501	1G Pro AV over IP Scaling Decoder - HDMI, Ethernet, and USB	2	H
20	Extron	NAVigator	Pro AV over IP System Manager, 16 Endpoints	1	H
21	Netgear	M4250-40G8XF-PoE++	40 Port, 1G Ports, PoE++ (720/1650/2880W), (8) 10G SFP, 240 Gbps, AV Line Managed Network Switch	1	-

Van Buren Township

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ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **169 / 170 / 164**

Type : **SY01**

Name : **Ballroom**

Rm Qty : **1**

Speech Reinforcement System/Audio Conferencing					
22	Extron	DMP 128 Plus C AT	12x8 ProDSP Digital Matrix Audio Processor w/ USB Audio, Dante, and AEC	1	-
23	Shure	ULXD4Q	Quad Channel Digital Wireless Receiver	1	F
24	Contractor Select	Antenna Distribution	Contractor Select Antenna Distribution Systems	1	-
25	Shure	ULXD1	Wireless Bodypack Transmitter w/ On/Off Switch and LED Status, TQG Connector (Black Only)	2	F
26	Shure	WL185	Cardioid Lavalier Microphone	2	-
27	Shure	ULXD2/B58	Handheld Digital Wireless Microphone Transmitter w/ Beta 58 Cartridge	2	F
28	Shure	SB900C	Rechargeable Lithium-Ion Battery	4	-
29	Shure	SBRC-US	8-Bay Battery Rack Charger (SB900A)	1	-

Sound Reinforcement System					
30	Extron	NETPA U 2004 FX	4-CH, 200W @ 70V/80hm/40hm Amplifier with Local and Dante Inputs, Integrated DSP	1	-
31	QSC	AD-C6T-xx	6" 2-Way Ceiling Speaker, Weather-Resistant, w/70V/100V transformer & 80hm Bypass	21	D
32	Listen Technologies	LW-170-02-09	Listen Everywhere 2 Channel Server, Dante	1	-
33	Listen Technologies	LA-480-01	16 Unit Docking / Charging Station	1	-
34	Listen Technologies	LA-438	Advanced Neck Loop (Adult)	2	-
35	Listen Technologies	LW-307	ListenWIFI Hearing Assistance Signage	1	-
36	Listen Technologies	LWR-1020	Listen EVERYWHERE Wi-Fi Audio Receiver 1020	7	-
37	Listen Technologies	LA-401	Universal Ear Speaker	7	-
38	Listen Technologies	LA-326	Universal Rack Mounting Kit	1	-

Control System					
39	Extron	IPCP Pro 360Q xi	IP Link Pro Processor, Quad Core, (3) RS-232, (4) Relay, (4) I/O, Lan, (3) AV Lan Ports	1	-
40	Extron	TLP Pro 1035M	10.1" Wall Mount TouchLink Pro Touchpanel (Select Color)	2	D
41	Extron	TLP Pro 1035T	10.1" Tabletop TouchLink Pro Touchpanel (Select Color)	2	D
42	AV Contractor Select	Partition Sensor	Contractor Selected Partition Sensor	1	-

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ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **169 / 170 / 164**

Type : **SY01**

Name : **Ballroom**

Rm Qty : **1**

Rack, Panels, Misc.					
43	Middle Atlantic	L2	Pre-Configured Lectern, 28" W x 25" D. With AV Connectivity and Flip Up Shelf	2	D
44	Middle Atlantic	BGR-4532-AV	BGR-Series 45RU, 32"D Equipment Rack Pre-Configured For AV	1	-
45	Middle Atlantic	PDX-920R-SP	NEXSYS 9 Outlet, 20 Amp Rackmount Power with Series Surge Protection	1	-
46	Middle Atlantic	PDT-1620C-NS	Vertical Power Distribution Strip, (16) Outlets, 20A	1	-
47	RCI Custom	NV5001-250217MM-02	Shared Credit Rack ID Panel with RJ45 Passthrough	1	-
48			Installation Materials as Defined in AV Systems Specification	Lot	
49			Custom Wall/Floor Box and Decorator-Style Plates as Needed	Lot	
50			Pre-Made Loose Cabling and Field Cabling as Needed	Lot	
51			Rack Panels, Vents, Mounts, Shelves, Other Rack Materials as Needed	Lot	
52			Rack ID Panels per Specification, See AV Rack Accessories	Lot	
53			Wall, Ceiling Mounts and Mounting Hardware as Needed	Lot	
54			Control System Accessories as Needed	Lot	
55			Power Supplies and Power Distribution as Needed	Lot	
56			Cable Terminations, Cable Dressing, Labels, Ties, Cable Management as Needed	Lot	

End of System

Van Buren Township

The Lake House

ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **104 / 105**

Type : **SY02**

Name : **Community Living Room / Multi-Purpose Room**

Rm Qty : **1**

Display Devices					
1	Samsung	QM98x	98" Professional LED Edge-Lit Display w/Built-In Speakers, 3840x2160 Native (Latest Model)	2	-
2	Chief	Wall Mount	Contractor Selected Flat Panel Display Wall Mount	2	-
3	Samsung	QM55C	55" Professional LED Edge-Lit Display w/ Built-In Speakers, 3840 x 2160 Native	1	-
4	Chief	AS3LDP7	Tempo™ Flat Panel Wall Mount System w/ PDU	1	-

Source Devices					
5	Extron	Sharelink Pro 2000 w/ Miracast	4K Wireless Presentation System w/ Miracast & ShareNext - US	3	-
6	Extron	Cable Cubby 202	Cable Enclosure, Flip Top, Basic, (1) AC & Cable Pass Through Bracket	1	-
7	Extron	Cable Enclosure Inserts	Inserts And Blank Plates For Above - Refer To System Diagram For Details	1	-
8	Extron	Cable Enclosure Accessories	Accessories For Above As Required (e.g. Cloaks, Brackets, Etc)	1	-

Video Capture, Streaming and Conferencing					
9	Vaddio	RoboShot 20 UHD OneLink HDMI	UHD PTZ Camera - 12x Optical / 20x Digital Zoom - 74 Deg. FOV - HD-SDI/Network/HDBT/HDMI Outputs PoE++ - 2160p/30 Native	2	-
10	Extron	MediaPort 300	4K HDMI and Audio to USB Scaling Bridge	1	-

Signal Processing, Routing, and Distribution					
11	Extron	NAV E 222	1G Pro AV Over IP Encoder with USB-C and HDMI	1	-
12	Extron	UPI 100	100 Watt Power Inserter for Extron USB-C Products	1	-
13	Extron	NAV E 121	1G Pro AV over IP Compact Encoder - HDMI	5	-
14	Extron	NAV SD 121	1G Pro AV over IP Compact Scaling Decoder - HDMI	3	-
15	Extron	NAV SD 501	1G Pro AV over IP Scaling Decoder - HDMI, Ethernet, and USB	1	H
16	Extron	NAV E 111 DTP3	1G Pro AV over IP Encoder with DTP3 Input	1	H
ADDENDU M 02.1	Extron	NAV E 111 DTP3	1G Pro AV over IP Encoder with DTP3 Input	(1)	H
17	Extron	DTP3 T 212 D	Two Input 4K/60 DTP3 Transmitter for USB-C and HDMI – Decorator-Style Wallplate, 18 Gbps	1	D
ADDENDU M 02.2	Extron	DTP3 T 212 D	Two Input 4K/60 DTP3 Transmitter for USB-C and HDMI – Decorator-Style Wallplate, 18 Gbps	(1)	D
18	Extron	NAVigator	Pro AV over IP System Manager, 16 Endpoints	1	H
19	Netgear	M4250-40G8XF-PoE++	40 Port, 1G Ports, PoE++ (720/1650/2880W), (8) 10G SFP, 240 Gbps, AV Line Managed Network Switch	1	-

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ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **104 / 105**

Type : **SY02**

Name : **Community Living Room / Multi-Purpose Room**

Rm Qty : **1**

Speech Reinforcement System/Audio Conferencing					
20	Extron	DMP 64 Plus C AT	6x4 Digital Matrix Processor w/ AEC and Dante	1	-
21	Shure	MXA925x-R	Ceiling Array Microphone & Integrated Loudspeaker w/ Dante, PoE+, Round	2	D
22	Shure	ULXD4Q	Quad Channel Digital Wireless Receiver	1	F
23	Shure	ULXD1	Wireless Bodypack Transmitter w/ On/Off Switch and LED Status, TQG Connector (Black Only)	1	F
24	Shure	WL185	Cardioid Lavalier Microphone	1	-
25	Shure	ULXD2/B58	Handheld Digital Wireless Microphone Transmitter w/ Beta 58 Cartridge	1	F
26	Shure	SB900C	Rechargeable Lithium-Ion Battery	2	-
27	Shure	SBRC-US	8-Bay Battery Rack Charger (SB900A)	1	-

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ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **104 / 105**

Type : **SY02**

Name : **Community Living Room / Multi-Purpose Room**

Rm Qty : **1**

Sound Reinforcement System					
28	Extron	NetPA U 1004-70V	4-CH, 100W @ 70V Amplifier with Local and Dante Inputs, Integrated DSP	1	-
29	QSC	AD-C6T-xx	6" 2-Way Ceiling Speaker, Weather-Resistant, w/70V/100V transformer & 8Ohm Bypass	16	D
30	Listen Technologies	LW-170-02-09	Listen Everywhere 2 Channel Server, Dante	1	-
31	Listen Technologies	LA-423	4-Port USB Charger For Use w/ Assisted Listening Receivers	1	-
32	Listen Technologies	LA-438	Advanced Neck Loop (Adult)	2	-
33	Listen Technologies	LW-307	ListenWIFI Hearing Assistance Signage	1	-
34	Listen Technologies	LWR-1020	Listen EVERYWHERE Wi-Fi Audio Receiver 1020	2	-
35	Listen Technologies	LA-401	Universal Ear Speaker	2	-
36	Listen Technologies	LA-326	Universal Rack Mounting Kit	1	-

Control System					
37	Extron	IPCP Pro 255Q xi	IP Link Pro Control Processor, Quad Core, (1) Bidirectional RS-232 Serial Port, (1) Bidirectional RS-232/RS-422/RS-485 Serial port, (1) IR/Serial Port, (4) Digital I/O ports, (2) Relays, Dual NIC	1	-
38	Extron	TLP Pro 1035M	10.1" Wall Mount TouchLink Pro Touchpanel (Select Color)	1	D
ADDENDU M 02.3	Extron	TLP Pro 1035M	10.1" Wall Mount TouchLink Pro Touchpanel (Select Color)	(1)	D
39	Extron	TLP Pro 1035T	10.1" Tabletop TouchLink Pro Touchpanel (Select Color)	1	D
40	AV Contractor Select	Partition Sensor	Contractor Selected Partition Sensor	1	-

Rack, Panels, Misc.					
ADDENDU M 02.4	Middle Atlantic	C5-FF27-2	C5-Series Frame, (2) Bay, 27"D	(1)	-
ADDENDU M 02.5	Middle Atlantic	C5-FF27-3	C5-Series Frame, (3) Bay, 27"D	1	-
ADDENDU M 02.6	Middle Atlantic	C5K2A1xxx	C5 Wood Kit 2-Bay 27"D 32"H	(1)	D
ADDENDU M 02.7	Middle Atlantic	C5K3A1xxx	C5 Wood Kit 3-Bay, 27" D x 32" H	1	-
41	Middle Atlantic	PDX-920R-SP	NEXSYS 9 Outlet, 20 Amp Rackmount Power with Series Surge Protection	2	-
42	RCI Custom	NV5001-250217MM-02	Shared Credit Rack ID Panel with RJ45 Passthrough	1	-
43			Installation Materials as Defined in AV Systems Specification	Lot	
44			Custom Wall/Floor Box and Decorator-Style Plates as Needed	Lot	
45			Pre-Made Loose Cabling and Field Cabling as Needed	Lot	
46			Rack Panels, Vents, Mounts, Shelves, Other Rack Materials as Needed	Lot	
47			Rack ID Panels per Specification, See AV Rack Accessories	Lot	
48			Wall, Ceiling Mounts and Mounting Hardware as Needed	Lot	
49			Control System Accessories as Needed	Lot	
50			Power Supplies and Power Distribution as Needed	Lot	
51			Cable Terminations, Cable Dressing, Labels, Ties, Cable Management as Needed	Lot	

End of System

Van Buren Township

The Lake House

ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **118**

Type : **SY03**

Name : **Meeting Room**

Rm Qty : **1**

Display Devices					
1	Samsung	QM65x	65" Professional LED Edge-Lit Display w/Built-In Speakers, 3840x2160 Native (Latest Model)	1	-
2	Chief	AS3LDP7	Tempo™ Flat Panel Wall Mount System w/ PDU	1	-

Source Devices					
3	Extron	Sharelink Pro 2000 w/ Miracast	4K Wireless Presentation System w/ Miracast & ShareNext - US	1	-
4	Extron	Cable Cubby 202	Cable Enclosure, Flip Top, Basic, (1) AC & Cable Pass Through Bracket	1	-
5	Extron	Cable Enclosure Inserts	Inserts And Blank Plates For Above - Refer To System Diagram For Details	1	-
6	Extron	Cable Enclosure Accessories	Accessories For Above As Required (e.g. Cloaks, Brackets, Etc)	1	-

Video Capture, Streaming and Conferencing					
7	Logitech	Rally Bar	All-In-One Video Bar w/ Camera, Speakers, and Beamforming Microphone	1	D

Signal Processing, Routing, and Distribution					
8	Extron	DTP3 T 321	4K/60 USB-C DTP3 Transmitter with Data and Power Delivery	1	-
9	Extron	DTP3 R 331	DTP3 Receiver for 4K/60 HDMI and USB Data	1	-
10	Extron	UPI 100	100 Watt Power Inserter for Extron USB-C Products	1	-

Control System					
11	Extron	IPCP Pro 255Q xi	IP Link Pro Control Processor, Quad Core, (1) Bidirectional RS-232 Serial Port, (1) Bidirectional RS-232/RS-422/RS-485 Serial port, (1) IR/Serial Port, (4) Digital I/O ports, (2) Relays, Dual NIC	1	-
12	Extron	TLP Pro 1035T	10.1" Tabletop TouchLink Pro Touchpanel (Select Color)	1	D

Rack, Panels, Misc.					
13			Installation Materials as Defined in AV Systems Specification	Lot	
14			Custom Wall/Floor Box and Decorator-Style Plates as Needed	Lot	
15			Pre-Made Loose Cabling and Field Cabling as Needed	Lot	
16			Rack Panels, Vents, Mounts, Shelves, Other Rack Materials as Needed	Lot	
17			Rack ID Panels per Specification, See AV Rack Accessories	Lot	
18			Wall, Ceiling Mounts and Mounting Hardware as Needed	Lot	
19			Control System Accessories as Needed	Lot	
20			Power Supplies and Power Distribution as Needed	Lot	
21			Cable Terminations, Cable Dressing, Labels, Ties, Cable Management as Needed	Lot	

End of System

Van Buren Township

The Lake House

ADDENDUM 02

Bidding Equipment List

*See 274116 Appendices

ID	Manufacturer	Model	Item / Description	Unit Qty	Bidding Notes*
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Number : **N/A**

Type : **SY04**

Name : **Outdoor Sound System**

Rm Qty : **1**

Source Devices					
1	Owner Furnished	DMP	Digital Media Player (OFCL)	1	A

Sound Reinforcement System					
2	Extron	NetPA U 2008 FX	8-Ch, Configurable Output Dante Amp, 200 watts,	1	-
3	QSC	AD-S8T-xx	8" Two-Way Wall-Mounted Speaker w/ 70V/100V Transformer & 8Ohm Bypass, Includes Mounting Hardware.	5	D
4	Contractor Select	Wall Mount	Contractor Selected Wall Mount For Above	5	-

Control System					
5	Extron	TLP Pro 835T	8" Tabletop TouchLink Pro Touchpanel (Select Color)	1	D

Rack, Panels, Misc.					
6			Installation Materials as Defined in AV Systems Specification	Lot	
7			Custom Wall/Floor Box and Decorator-Style Plates as Needed	Lot	
8			Pre-Made Loose Cabling and Field Cabling as Needed	Lot	
9			Rack Panels, Vents, Mounts, Shelves, Other Rack Materials as Needed	Lot	
10			Rack ID Panels per Specification, See AV Rack Accessories	Lot	
11			Wall, Ceiling Mounts and Mounting Hardware as Needed	Lot	
12			Control System Accessories as Needed	Lot	
13			Power Supplies and Power Distribution as Needed	Lot	
14			Cable Terminations, Cable Dressing, Labels, Ties, Cable Management as Needed	Lot	

End of System