



**DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET**  
**State Facilities Administration**  
**Design and Construction Division**

## CONSTRUCTION BID ADDENDUM NO. 03

This form identifies an Addendum to Bidding Documents, and incorporates interpretations or clarifications, modifications, acceptance of proposed "or equal" materials, and other information into the Bidding Documents. Addenda will be numbered by the Professional and distributed through [www.michigan.gov/SIGMAVSS](http://www.michigan.gov/SIGMAVSS) as an attachment.

TO: <b>ALL BIDDERS</b>		DATE ISSUED 9/29/2023
PROJECT NAME Center for Forensic Psychiatry – Create Kitchen		FILE NUMBER 491/20167.SDW
PROFESSIONAL Cariann Davitt Schartow	PROJECT DIRECTOR Susan Wheaton, RA	BID OPENING DATE: <del>10/11/2023</del> 10/11/2023

### ADDENDUM ITEMS - REVISED BID OPENING DATE TO OCTOBER 11, 2023:

#### Architectural

- Item A1 – Reference Section 00010 (**Re-Issued**)
  - Revised table of contents.
- Item A2 – Reference Section 064023 (**Re-Issued**)
  - Clarification: revised to not include plastic-laminate cabinets in section 064023.
  - Added color/finish selection for solid surface countertop.
- Item A3 – Reference Section 088000 and Sheet A3.01 (**Re-Issued**)
  - Added fire rated glazing types, refer to re-issued section and sheet.
- Item A4 – Reference Sheet A2.21
  - Clarification: Added a note to infill above new door E126.A with CMU after removal of existing door with transom. Structural to add new lintel for new door.
- Item A5 – Reference Sheet A2.23 (**Re-Issued**)
  - Revised plan 17/A2.23 to show housekeeping pads and floor drains.
- Item A6 – Reference Sheet A3.01 (**Re-Issued**)
  - Revised the room finish and door schedule, refer to re-issued sheet.
  - Added brick vents and mortar net to detail 27/A3.01
- Item A7 – Reference Sheet A5.11
  - Clarification: Revised detail number callout for mechanical louver sill, to be 23/A7.01 SIM in lieu of 24/A7.02 SIM.
- Item A8 – Reference Sheet A7.01 (**Re-Issued**)
  - Added a steel angle to detail 10/A7.01.
  - Revised the through wall flashing route and removed the steel angle on detail 17/A7.01.
  - Revised steel angle and gypsum board on detail 27/A7.01.
- Item A9 – Reference Sheet A9.01
  - Clarification: Added note "stud spacing at 16" o.c. - 24" o.c. As required to access freezer components that require service" to ceiling detail 9/A9.01.

#### Food Service

- Item FS1 – Reference Sheets FS2.01 – FS2.05 (**All Re-Issued**)
  - Removed "Not for Construction" stamp on all sheets.

Structural

- Item S1 - Reference Drawing S2.01 **(Re-Issued)**
  - Non-load bearing CMU wall foundations added in (3) locations.
- Item S2 - Reference Drawing S2.02 and Drawing S7.01 **(Re-Issued)**
  - Rooftop ladder support framing added above Corridor H132.
- Item S3 - Reference Drawing S2.02 and Drawing S7.01 **(Re-Issued)**
  - Continuous bent plate added to plan and detail 12/S7.01 to match detail 14/S7.01.
- Item S4 - Reference Drawing S2.02 **(Re-Issued)**
  - Steel lintel added at door E126.A.

Mechanical

- Item M1 – Reference Section 232113 **(Re-Issued)**
  - Adjusted section 2.4 Air Control Devices to include Air Dirt Separator, Expansion Tank, and Glycol system information.
- Item M2 – Reference Sheet M2.00 **(Re-Issued)**
  - Added SAN to FD-1.
  - Revised note for clarity.
- Item M3 – Reference Sheet M3.03 **(Re-Issued)**
  - Revised construction keynote 2.
- Item M4 – Reference Sheet M5.01 **(Re-Issued)**
  - Added FD-1 in staff toilet.
- Item M5 – Reference Sheet M6.01 **(Re-Issued)**
  - Revised natural gas diagram as indicated.
- Item M6 – Reference Sheet M7.01 **(Re-Issued)**
  - Added natural gas regulator schedule as indicated.
- Item M7 – Reference Sheet M7.02 **(Re-Issued)**
  - Removed aboveground HVAC piping & valve application schedule.
- Item M8 – Reference Sheet M7.04 **(Re-Issued)**
  - Added Expansion tank schedule.
  - Added Air & Dirt Schedule.
  - Added Glycol Makeup Unit Schedule.

Electrical

- Item E1 – Reference Sheet E4.01 **(Re-Issued)**
  - Added card readers, intercoms, smoke detectors, and door releases.
- Item E2 – Reference Sheet E5.02 **(Re-Issued)**
  - Modified circuit.
- Item E3 – Reference Sheet E6.02 **(Re-Issued)**
  - Added receptacle for glycol fill station.
  - Moved power for DDC panels.
  - Added power and data for an additional DDC panel.

Communications & IT

- Item TC1 – Reference Sections 281000 thru 281800 and 283500 thru 287800 **(All Issued)**
  - Issuing specifications for communications and IT drawings.

**ACKNOWLEDGEMENT: This Addendum must be acknowledged by the Bidder in the space provided in the Bid Summary and Bid Form. Failing to acknowledge Addenda may be cause for the Bid to be rejected. Addenda will become part of the Contract Documents.**

PROFESSIONAL: Cariann Davitt Schartow

DATE: 9/29/2023

APPROVED BY: Susan Wheaton, RA

DATE: 9/29/2023

PROJECT DIRECTOR: Susan Wheaton, RA

**SECTION 00010 TABLE OF CONTENTS**

	<b>SECTION/PAGE NO.</b>
<b>SUBJECT INDEX</b>	
<b>SECTION 00020 GLOSSARY</b> .....	00020 - 1
<b>SECTION 00030 ADVERTISEMENT</b> .....	00030 - 1
<b>SECTION 00100 INSTRUCTIONS TO BIDDERS</b> .....	00100 - 1
ARTICLE 1 BIDDING DOCUMENT INTERPRETATIONS .....	00100 - 1
ARTICLE 2 QUALIFICATIONS OF BIDDERS .....	00100 - 1
ARTICLE 3 BIDDING DOCUMENTS; SITE CONDITIONS; SAFETY REQUIREMENTS; LAWS .....	00100 - 2
ARTICLE 4 INTERPRETATIONS; ADDENDA .....	00100 - 3
ARTICLE 5 BID SECURITY .....	00100 - 3
ARTICLE 6 CONTRACT TIME; LIQUIDATED DAMAGES .....	00100 - 4
ARTICLE 7 MATERIALS AND EQUIPMENT .....	00100 - 4
ARTICLE 8 SUBCONTRACTORS .....	00100 - 5
ARTICLE 9 BID FORM AND BID FORM ATTACHMENTS .....	00100 - 5
ARTICLE 10 PREPARATION AND SUBMISSION OF BIDS .....	00100 - 6
ARTICLE 11 BID WITHDRAWAL; BID MODIFICATION .....	00100 - 6
ARTICLE 12 BID OPENING; OBJECTION TO THE AWARD .....	00100 - 7
ARTICLE 13 BIDS TO REMAIN OPEN .....	00100 - 7
ARTICLE 14 AWARD OF THE CONTRACT .....	00100 - 7
ARTICLE 15 EXECUTION OF THE AGREEMENT .....	00100 - 9
ARTICLE 16 MOBILIZATION PAY ITEM .....	00100 -10
ARTICLE 17 SOIL EROSION AND SEDIMENTATION CONTROL-FINE FOR NON-COMPLIANCE .....	00100 -10
<b>ATTACHMENT A TO SECTION 00100: BIDDER'S CHECK LIST</b> .....	00110 - 1
<b>SECTION 00120 SUPPLEMENTARY INSTRUCTIONS</b> .....	00120 - 1
<b>SECTION 00210 INFORMATION FOR BIDDERS</b> .....	00210 - 1
<b>SECTION 00300 BID SUMMARY</b> .....	00300 - SUMMARY
<b>SECTION 00300 BID FORM</b> .....	00300 - 1
ARTICLE 1 THIS BID IS SUBMITTED TO THE STATE OF MICHIGAN ("THE OWNER") .....	00300 - 1
ARTICLE 2 THE BIDDER'S REPRESENTATIONS .....	00300 - 1
ARTICLE 3 TIME OF COMPLETION .....	00300 - 2
ARTICLE 4 ATTACHMENTS INCLUDED WITH THIS BID .....	00300 - 2
ARTICLE 5 DEFINED TERMS .....	00300 - 2
ARTICLE 6 BID SCHEDULE .....	00300 - 3
ARTICLE 7 SCHEDULE OF CHANGE ORDER PRICES .....	00300 - 5
ARTICLE 8 BID SUBMITTED ON .....	00300 - 6
<b>SECTION 00310 BID BOND</b> .....	00310 - 1
<b>SECTION 00320 NONCOLLUSION AFFIDAVIT</b> .....	00320 - 1
<b>SECTION 00410 BID BREAKDOWN</b> .....	00410 - 1
<b>SECTION 00420 ONAIRE</b> .....	00420 - 1
ARTICLE 1 ORGANIZATION .....	00420 - 1
ARTICLE 2 SPECIALTY CONTRACTOR LICENSES .....	00420 - 1
ARTICLE 3 EXPERIENCE .....	00420 - 1
ARTICLE 4 ADDITIONAL QUALIFICATIONS .....	00420 - 2
ARTICLE 5 REFERENCES .....	00420 - 2
REFERENCES ATTACHMENT .....	00420 - 3
<b>SECTION 00430 LIST OF SUBCONTRACTORS</b> .....	00430 - 1
<b>SECTION 00440 SCHEDULE OF MATERIALS AND EQUIPMENT</b> .....	00440 - 1
ARTICLE 1 BID MATERIALS AND EQUIPMENT - <i>LISTED (NAMED OR SPECIFIED) ITEMS</i> .....	00440 - 1
ARTICLE 2 BID MATERIALS AND EQUIPMENT - <i>OPEN SPECIFICATIONS</i> .....	00440 - 3
<b>SECTION 00500 AGREEMENT</b> .....	00500 - 1
ARTICLE 1 THE CONTRACT; THE PROJECT; THE WORK .....	00500 - 1
ARTICLE 2 CONTRACT DOCUMENTS .....	00500 - 1
ARTICLE 3 CONTRACT PRICE .....	00500 - 2
ARTICLE 4 CONTRACT TIME; LIQUIDATED DAMAGES .....	00500 - 2
ARTICLE 5 PAYMENTS TO <b>CONTRACTOR</b> .....	00500 - 3

ARTICLE 6 THE PROFESSIONAL SERVICES CONTRACTOR .....	00500 - 3
ARTICLE 7 <b>CONTRACTOR'S</b> REPRESENTATIONS .....	00500 - 3
ARTICLE 8 MISCELLANEOUS .....	00500 - 3
ARTICLE 9 NOTICE AND SERVICE .....	00500 - 4
<b>SECTION 00520 ATTACHMENT "A" TO AGREEMENT</b> .....	00520 - 1
<b>SECTION 00610 PERFORMANCE BOND</b> .....	00610 - 1
<b>SECTION 00620 PAYMENT BOND</b> .....	00620 - 1
<b>SECTION 00700 GENERAL CONDITIONS</b> .....	00700 - 1
ARTICLE 1 INTERPRETATIONS .....	00700 - 1
1.1 Section 00020 Glossary: .....	00700 - 1
1.2 Intent of the Contract Documents: .....	00700 - 1
1.3 Priority of the Contract Documents: .....	00700 - 2
1.4 Interpretation of Indemnification Provisions: .....	00700 - 2
1.5 Additional Interpretations: .....	00700 - 2
1.6 Ownership and Use of the Contract Documents: .....	00700 - 3
1.7 Copies of the Contract Documents: .....	00700 - 3
ARTICLE 2 THE <b>OWNER</b> –GENERAL PROVISIONS .....	00700 - 3
2.1 Availability of Lands, Areas, Properties and Facilities: .....	00700 - 3
2.2 Reference Points; Base Lines and Benchmarks: .....	00700 - 3
2.3 Stop Work Order: .....	00700 - 3
2.4 Limitations on the <b>Owner's</b> Responsibilities: .....	00700 - 4
2.5 Additional General Provisions: .....	00700 - 4
2.6 Partnering Charter: .....	00700 - 4
ARTICLE 3 THE <b>PROFESSIONAL</b> – GENERAL PROVISIONS .....	00700 - 4
3.1 <b>Owner's</b> Representative: .....	00700 - 4
3.2 Clarifications and Interpretations: .....	00700 - 4
3.3 Minor Variations and No-Cost Changes; Minor Delays: .....	00700 - 5
3.4 Determinations by the <b>Professional</b> : .....	00700 - 5
3.5 Limitations on the Professional's Responsibilities: .....	00700 - 5
ARTICLE 4 CONTROL OF WORK – GENERAL PROVISIONS .....	00700 - 5
4.1 Review of the Contract Documents: .....	00700 - 5
4.2 Management, Supervision, and Personnel: .....	00700 - 5
4.3 Materials and Equipment: .....	00700 - 6
4.4 Concerning Control of Work: .....	00700 - 6
4.5 Patent Fees and Royalties: .....	00700 - 7
4.6 Use of Premises: .....	00700 - 7
4.7 Record Documents: .....	00700 - 7
4.8 Emergencies: .....	00700 - 8
4.9 Indemnification: .....	00700 - 8
ARTICLE 5 SUBCONTRACTORS AND SUPPLIERS .....	00700 - 8
5.1 Employment of Subcontractors: .....	00700 - 8
5.2 "Or Equal" and Substitute Materials and Equipment: .....	00700 - 9
5.3 The <b>Contractor's</b> Continuing Responsibilities: .....	00700 - 9
ARTICLE 6 SUBMITTALS .....	00700 - 9
6.1 Shop Drawing, Sample and Other Technical Submittals: .....	00700 - 9
6.2 Review and Return of Technical Submittals: .....	00700 - 10
6.3 Progress Schedule Submittals: .....	00700 - 10
6.4 Review and Return of Progress Schedule Submittals: .....	00700 - 10
6.5 Additional Provisions Concerning Submittals: .....	00700 - 10
ARTICLE 7 LEGAL REQUIREMENTS; INSURANCE .....	00700 - 11
7.1 Laws; Permits (Which Include Approvals and Licenses): .....	00700 - 11
7.2 Sales and Use Tax and Other Similar Taxes: .....	00700 - 12
7.3 Safety and Protection: .....	00700 - 12
7.4 Bonds and Insurance - General Requirements: .....	00700 - 12
7.5 The <b>Contractor's</b> Liability Insurance: .....	00700 - 12
7.6 Pollution Liability Insurance: .....	00700 - 13
7.7 Property Insurance (Builder's All Risk Insurance): .....	00700 - 13
7.8 Waiver of Rights: .....	00700 - 13
7.9 Receipt and Application of Proceeds: .....	00700 - 13

7.10	Unfair Labor Practice: .....	00700 - 13
7.11	Michigan Right-To-Know Law: .....	00700 - 13.
7.12	Nondiscrimination: .....	00700 - 14
7.13	Michigan Residency for Employees:.....	00700 - 14
ARTICLE 8 PROSECUTION; SUBSTANTIAL COMPLETION .....		00700 - 15
8.1	Starting the Work: .....	00700 - 15.
8.2	Revision 0 (Rev. 0) Schedule and Cost Submittals: .....	00700 - 15
8.3	Compliance with Contract Time Requirements:.....	00700 - 15
8.4	Substantial Completion: .....	00700 - 15
8.5	Partial Use: .....	00700 - 16
8.6	Division of Responsibilities: .....	00700 - 16
8.7	Suspension of Work:.....	00700 - 16
8.8	Sharing of Total Float on Non-Critical Paths:.....	00700 - 16
ARTICLE 9 WARRANTY; TESTS, INSPECTIONS, AND APPROVALS; CORRECTION OF WORK.....		00700 - 17
9.1	Warranty: .....	00700 - 17
9.2	Tests, Inspections and Approvals: .....	00700 - 17
9.3	Uncovering Work: .....	00700 - 17
9.4	Correction of Work: .....	00700 - 17
9.5	Special Correction Period Requirements:.....	00700 - 18
9.6	Special Maintenance Requirements: .....	00700 - 18
ARTICLE 10 CHANGES .....		00700 - 19
10.1	Changes in the Work: .....	00700 - 19
10.2	Differing Subsurface or Physical Site Conditions:.....	00700 - 19.
10.3	Responsibilities for Underground Utilities: .....	00700 - 20
10.4	Hazardous Material Conditions:.....	00700 - 20
10.5	Incidents with Archaeological Features: .....	00700 - 20
10.6	Unit Price Work: .....	00700 - 21
10.7	Cash Allowances; Provisionary Allowances: .....	00700 - 21
10.8	Change Orders; Change Authorizations: .....	00700 - 21
ARTICLE 11 CHANGES IN CONTRACT PRICE; CHANGES IN CONTRACT TIME .....		00700 - 22
11.1	General Provisions:.....	00700 - 22
11.2	Changes in Contract Time: .....	00700 - 22
11.3	Methods for Making Adjustments in Contract Price: .....	00700 - 22.
11.4	Labor, Subcontract and Material/Equipment Costs: .....	00700 - 23
11.5	Construction Equipment Costs: .....	00700 - 23
11.6	Rented or Leased Construction Equipment: .....	00700 - 23
11.7	Owned Construction Equipment: .....	00700 - 24
11.8	General Conditions Costs:.....	00700 - 24
11.9	Limitations on Allowable Costs: .....	00700 - 24
11.10	Costs Covered by the Fee for the Work Involved (and not Allowable as Cost of the Work Involved): .....	00700 - 24.
11.11	Limits on the Fee for the Work Involved: .....	00700 - 25.
11.12	Fee for Unabsorbed Home Office Overhead: .....	00700 - 25
11.13	Changes in Contract Time for Early Completion:.....	00700 - 25
11.14	Access to Records: .....	00700 - 26
11.15	Price Reduction for Defective Cost and Pricing Data: .....	00700 - 26
ARTICLE 12 PROGRESS PAYMENTS; FINAL PAYMENT .....		00700 - 26
12.1.	Schedule of Values: .....	00700 - 26
12.2	Requests for Payment: .....	00700 - 27
12.3	Review of Request for Payment; Intent of Review:.....	00700 - 27
12.4	Refusal to Make or to Recommend Payment: .....	00700 - 27.
12.5	Final Request for Payment: .....	00700 - 27
12.6	Final Payment and Acceptance: .....	00700 - 28
12.7	<b>Contractor's</b> Continuing Obligation: .....	00700 - 28
12.8	Waiver of Claims: .....	00700 - 28
ARTICLE 13 OTHER WORK .....		00700 - 28
13.1	Related Work at Site: .....	00700 - 28
13.2	Coordination Requirements: .....	00700 - 29
13.3	Claims Between the <b>Contractor</b> and Other Parties: .....	00700 - 29

ARTICLE 14	TERMINATION .....	00700 - 29
14.1	Notice Requiring Assurance of Due Performance: .....	00700 - 29.
14.2	<b>Contractor</b> Default and Termination for Cause: .....	00700 - 30
14.3	Surety Default: .....	00700 - 31
14.4	Termination for Convenience of the <b>Owner</b> : .....	00700 - 31
14.5	The <b>Contractor</b> May Suspend Work: .....	00700 - 31.
ARTICLE 15	DISPUTES .....	00700 - 31
15.1	Claims Under This Article: .....	00700 - 31
15.2	Requirement for Certification of <b>Contractor</b> Claims: .....	00700 - 32
15.3	Recommendations or Decisions from the <b>Professional</b> : .....	00700 - 32
15.4	Determinations by the <b>Director-DCD</b> : .....	00700 - 32
15.5	Supplements to AAA Arbitration: .....	00700 - 33
15.6	Interest on a Judgment; Payment of Judgment: .....	00700 - 33
15.7	Venue; Flow-Through Provision: .....	00700 - 33
<b>SECTION 00800</b>	<b>SUPPLEMENTARY CONDITIONS</b> .....	00800
<b>SECTION 01310</b>	<b>PROGRESS SCHEDULE</b> .....	01310 - 1

#### DIVISION 00 - PROCURMENT OF CONTRACTING REQUIREMENTS

003132            GEOTECHNICAL DATA  
005000            AVAILAILABILITY OF ELECTRONIC FILES

#### DIVISION 01 - GENERAL REQUIREMENTS <AD3>

012500            MATERIALS AND EQUIPMENT  
013214            SCHEDULE REQUIREMENTS  
013300            SUBMITTAL PROCEDURES  
014516.01        CONCRETE TESTING  
014516.02        DENSITY AND AGGREGATE TESTING  
015000            CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS  
015726            DUST CONTROL  
017113            MOBILIZATION  
017123.16        CONSTRUCTION STAKING BY CONTRACTOR  
017450            CLEANUP AND RESTORATION

#### DIVISION 02 – EXISTING CONDITIONS

024113.13        PAVEMENT REMOVAL  
024119            SELECTIVE DEMOLITION

#### DIVISION 03 - CONCRETE

033000            CAST-IN-PLACE CONCRETE

#### DIVISION 04 - MASONRY

042000            UNIT MASONRY

#### DIVISION 05 – METALS <AD3>

051200            STRUCTURAL STEEL FRAMING  
052100            STEEL JOIST FRAMING  
053100            STEEL DECKING  
054000            COLD-FORMED METAL FRAMING  
055000            METAL FABRICATIONS  
055100            METAL STAIRS AND RAILINGS

#### DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES

061053            MISCELLANEOUS ROUGH CARPENTRY  
061600            SHEATHING  
064023            INTERIOR ARCHITECTURAL WOODWORK

**064116 PLASTIC LAMINATE CLAD ARCHITECTURAL CABINETS****DIVISION 07 - THERMAL AND MOISTURE PROTECTION**

<b>071113</b>	<b>BITUMINOUS DAMPPROOFING</b>
<b>071416</b>	<b>COLD FLUID-APPLIED WATERPROOFING</b>
<b>072100</b>	<b>THERMAL INSULATION</b>
<b>072600</b>	<b>VAPOR RETARDERS</b>
<b>075323</b>	<b>ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING</b>
<b>076200</b>	<b>SHEET METAL FLASHING AND TRIM</b>
<b>077100</b>	<b>ROOF SPECIALTIES</b>
<b>078413</b>	<b>PENETRATION FIRESTOPPING</b>
<b>079200</b>	<b>JOINT SEALANTS</b>
<b>079513.13</b>	<b>INTERIOR EXPANSION JOINT COVERS</b>
<b>079513.16</b>	<b>EXTERIOR EXPANSION JOINT COVERS</b>

**DIVISION 08 - DOORS AND WINDOWS <AD3>**

<b>081113</b>	<b>HOLLOW METAL DOORS AND FRAMES</b>
<b>081416</b>	<b>FLUSH WOOD DOORS</b>
<b>083313</b>	<b>COILING COUNTER DOORS</b>
<b>083323</b>	<b>OVERHEAD COILING DOORS</b>
<b>083463</b>	<b>DETENTION DOORS AND FRAMES</b>
<b>084113</b>	<b>ALUMINUM FRAMED STOREFRONT</b>
<b>087100</b>	<b>DOOR HARDWARE</b>
<b>088000</b>	<b>GLAZING</b>
<b>089000</b>	<b>LOUVERS AND VENTS</b>

**DIVISION 09 – FINISHES <AD3>**

<b>092216</b>	<b>NON-STRUCTURAL METAL FRAMING</b>
<b>092900</b>	<b>GYPSON BOARD</b>
<b>093013</b>	<b>CERAMIC TILING</b>
<b>095113</b>	<b>ACOUSTICAL PANEL CEILINGS</b>
<b>096513</b>	<b>RESILIENT BASE AND ACCESSORIES</b>
<b>096516</b>	<b>RESILIENT FLOORING</b>
<b>096519</b>	<b>RESILIENT TILE FLOORING</b>
<b>099113</b>	<b>EXTERIOR PAINTING</b>
<b>099123</b>	<b>INTERIOR PAINTING</b>

**DIVISION 10 - SPECIALTIES**

<b>102800</b>	<b>TOILET ACCESSORIES</b>
<b>104413</b>	<b>FIRE EXTINGUISHER CABINETS</b>
<b>104416</b>	<b>FIRE EXTINGUISHERS</b>

**DIVISION 11 - EQUIPMENT**

<b>114000</b>	<b>KITCHEN EQUIPMENT</b>
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**DIVISION 12 - FURNISHINGS****NOT USED****DIVISION 13 - SPECIAL CONSTRUCTION****NOT USED****DIVISION 14 - CONVEYING SYSTEMS****NOT USED****DIVISION 20 - MECHANICAL GENERAL REQUIREMENTS**

<b>200500</b>	<b>MECHANICAL GENERAL REQUIREMENTS</b>
<b>200510</b>	<b>BASIC MECHANICAL MATERIALS AND METHODS</b>

200513	MOTORS
200516	PIPE FLEXIBLE CONNECTORS, EXPANSION FITTINGS AND LOOPS
200519	METERS AND GAGES
200529	HANGARS AND SUPPORTS
200533	MECHANICAL VIBRATION CONTROLS
200553	MECHANICAL IDENTIFICATION
200700	MECHANICAL INSULATION
202923	VARIABLE FREQUENCY CONTROLS

#### DIVISION 21 – FIRE SUPPRESSION

211100	FIRE SUPPRESSION SYSTEM
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#### DIVISION 22 – PLUMBING <AD3>

220523	GENERAL DUTY VALVES FOR PLUMBING
221116	DOMESTIC WATER PIPING
221119	DOMESTIC WATER PIPING SPECIALTIES
221316	SANITARY WASTE AND VENT PIPING
221319	DRAINAGE PIPING SPECIALTIES
221413	STORM DRAINAGE PIPING
224200	PLUMBING FIXTURES
224500	EMERGENCY PLUMBING FIXTURES

#### DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING <AD3>

230500	COMMON WORK RESULTS FOR HVAC
230523	GENERAL-DUTY VALVES FOR HVAC
230593	TESTING, ADJUSTING, AND BALANCING
230933	TEMPERATURE CONTROLS
231123	FUEL GAS PIPING
232113	HYDRONIC PIPING
232123	HYDRONIC PUMPS
232213	STEAM AND CONDENSATE PIPING
232510	PIPING SYSTEMS FLUSHING AND CHEMICAL CLEANING
232513	WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS
233113	METAL DUCTS
233300	DUCT ACCESSORIES
233423	POWER VENTILATORS
233600	AIR TERMINAL UNITS
233713	DIFFUSERS, REGISTERS, AND GRILLES
235100	BREECHING, CHIMNEYS, AND STACKS
235216	CONDENSING BOILERS
237413	MODULAR AND SEMI-CUSTOM CENTRAL-STATION AIR-HANDLING UNITS
238216	HEATING AND COOLING COILS
238229	ELECTRIC AND HYDRONIC RADIANT HEATING UNITS
238233	CONVECTION HEATING UNITS
238240	CENTRIFUGAL FAN CABINET UNIT HEATERS (HOT WATER)
238413	HUMIDIFIERS

#### DIVISION 26 – ELECTRICAL <AD3>

260010	ELECTRICAL GENERAL REQUIREMENTS
260519	CONDUCTORS AND CABLES
260526	GROUNDING AND BONDING
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
260533	RACEWAYS AND BOXES
260553	ELECTRICAL IDENTIFICATION
260573	OVERCURRENT DEVICE COORDINATION STUDY/ARC FLASH HAZARD ANALYSIS
260923	LIGHTING CONTROL DEVICES
260999	ELECTRICAL TESTING
262200	DRY-TYPE TRANSFORMERS (600 V AND LESS)
262413	SWITCHBOARDS
262416	PANELBOARDS
262726	WIRING DEVICES
262813	FUSES



262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS
262913	ENCLOSED CONTROLLERS
264113	<b>LIGHTING PROTECTION</b>
265119	LED INTERIOR LIGHTING
265600	EXTERIOR LIGHTING
265700	LUMINAIRE PRODUCT

#### DIVISION 27 – LOW-VOLTAGE RACEWAY/PATHWAY

NOT USED

#### DIVISION 28 – FIRE ALARM <AD3>

281000	<b>TECHNOLOGY OVERVIEW</b>
281100	<b>COMMUNICATIONS ROOM</b>
281600	<b>CAT-6 CABLING</b>
281700	<b>CLOCK SYSTEM</b>
281800	<b>PAGING SYSTEM</b>
283100	<b>FIRE ALARM</b>
283500	<b>ACCESS CONTROL</b>
283600	<b>SECURITY RECORDING</b>
283636	<b>STUN FENCE</b>
283700	<b>SECURITY CAMERAS</b>
287200	<b>TECHNOLOGY SUBMITTALS</b>
287600	<b>TECHNOLOGY LABELING</b>
287700	<b>TECHNOLOGY TESTING</b>
287750	<b>TECHNOLOGY TRAINING</b>
287800	<b>TECHNOLOGY WARRANTY</b>

#### DIVISION 31 – EARTHWORK

311001	CLEARING AND REMOVAL OF MISCELLANEOUS STRUCTURES
312301	EXCAVATION, FILLING AND GRADING
312500	SOIL EROSION AND SEDIMENT CONTROL

#### DIVISION 32 – EXTERIOR IMPROVEMENTS <AD3>

321116	GRANULAR SUBBASE
321123	AGGREGATE BASE
321216	HMA PAVING
321300	CONCRETE CURB GUTTER, SIDEWALK AND MISCELLANEOUS PAVEMENT
329200	TURF ESTABLISHMENT
329300	LANDSCAPING

#### DIVISION 33 – UTILITIES <AD3>

330500	ADJUSTING STRUCTURE
331100	<b>WATER MAIN</b>
333100	<b>SANITARY SEWER</b>
334400	STORM SEWERS

#### DRAWINGS - BOUND SEPARATELY

TS TITLE SHEET

#### CIVIL DRAWINGS

C1.01	CIVIL LEGEND
C1.02	CIVIL NOTES
C1.03	CIVIL DETAILS
C1.04	FENCE DETAILS
C2.01	SITE DEMOLITION PLAN
C2.02	SITE PLAN
C2.03	UTILITY PLAN
C2.04	GRADING PLAN

**ARCHITECTURAL DRAWINGS**

A0.01	PROJECT INFORMATION
A2.01	FIRST FLOOR MASTER CODE PLAN
A2.02	FIRST FLOOR PARTIAL CODE PLAN
A2.11	FIRST FLOOR DEMOLITION PLAN
A2.21	FIRST FLOOR CONSTRUCTION PLAN
A2.22	SECOND FLOOR CONSTRUCTION PLAN, ENLARGED PLAN, & INTERIOR ELEVATION
A2.23	FIRST AND SECOND FLOOR FLOORING PLANS
A2.31	PLAN DETAILS
A3.01	ROOM FINISH AND DOOR SCHEDULE, DOOR AND WINDOW TYPES, AND DOOR DETAILS
A4.01	VERTICAL CIRCULATION
A5.01	EXTERIOR ELEVATIONS
A5.11	BUILDING SECTIONS
A6.01	ROOF PLAN
A7.01	WALL SECTIONS & DETAILS
A7.02	WALL SECTIONS & DETAILS
A9.01	FIRST AND SECOND FLOOR REFLECTED CEILING PLAN

**KITCHEN EQUIPMENT DRAWINGS**

FS2.01	KITCHEN EQUIPMENT PLAN
FS2.02	KITCHEN ELECTRICAL PLAN
FS2.03	KITCHEN PLUMBING PLAN
FS2.04	KITCHEN VENTILATION PLAN
FS2.05	SPECIAL CONDITIONS PLAN

**STRUCTURAL DRAWINGS**

S2.01	FOUNDATION PLAN
S2.02	ROOF FRAMING PLAN
S3.01	NOTES AND SCHEDULES
S5.01	FOUNDATION DETAILS
S7.01	ROOF FRAMING DETAILS

**MECHANICAL DRAWINGS**

M0.01	MECHANICAL STANDARDS AND DRAWING INDEX
M1.01	FIRE PROTECTION ZONING PLAN
M2.00	UNDERGROUND PLUMBING PLAN
M2.01	FIRST FLOOR PLUMBING AND FIRE PROTECTION PLAN - UNIT H
M2.02	FIRST FLOOR PLUMBING AND FIRE PROTECTION PLAN - UNIT J
M2.03	PENTHOUSE PLUMBING PLAN
M3.01	FIRST FLOOR HVAC PIPING PLAN - UNIT H
M3.03	PENTHOUSE HVAC PIPING PLAN
M4.01	FIRST FLOOR SHEET METAL PLAN - UNIT H
M4.03	PENTHOUSE SHEET METAL PLAN
M4.04	MECHANICAL ROOF PLAN
M5.01	PLUMBING ENLARGED PLAN
M6.01	MECHANICAL DETAILS
M6.02	MECHANICAL DETAILS
M6.03	MECHANICAL DETAILS
M6.04	MECHANICAL DETAILS
M7.01	MECHANICAL SCHEDULES
M7.02	MECHANICAL SCHEDULES
M7.03	MECHANICAL SCHEDULES
M7.04	MECHANICAL SCHEDULES
M8.01	TEMPERATURE CONTROL STANDARDS AND GENERAL NOTES
M8.02	TEMPERATURE CONTROLS
M8.03	TEMPERATURE CONTROLS
M8.04	TEMPERATURE CONTROLS

**ELECTRICAL DRAWINGS**

E0.01	ELECTRICAL STANDARDS AND DRAWING INDEX
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E0.02	ELECTRICAL STANDARD SCHEDULES
E0.03	ELECTRICAL DEMOLITION SITE PLAN
E0.04	ELECTRICAL NEW WORK SITE PLAN
ED1.01	FIRST FLOOR ELECTRICAL DEMOLITION PLAN
E2.01	FIRST FLOOR LIGHTING PLAN - UNIT H
E3.00	BASEMENT FLOOR POWER PLAN - UNIT H
E3.01	FIRST FLOOR POWER PLAN - UNIT H
E4.01	FIRST FLOOR AUXILIARY SYSTEMS PLAN -UNIT H
E4.04	ELECTRICAL ROOF PLAN
E5.01	ONE LINE DIAGRAM - NEW WORK
E5.02	PANEL SCHEDULES
E6.01	ELECTRICAL ENLARGED PLAN
E6.02	ELECTRICAL ENLARGED PLAN
E7.00	ELECTRICAL DETAILS AND DIAGRAMS
E7.01	ELECTRICAL DETAILS AND DIAGRAMS

#### COMMUNICATIONS & IT DRAWINGS

TC1.01	CABLING LEGENDS, SCHEDULES, & DETAILS
TC1.02	CABLING CONNECTIVITY CODES
TC1.03	CABLING RACK LAYOUTS & DETAILS
TC1.04	FENCE DETECTION DETAILS
TC1.05	ACCESS CONTROL DETAILS
TC1.06	SECURITY ACCESS CONTROL DETAILS
TC1.07	VIDEO SECURITY SYSTEM DETAILS
TC2.00	TECHNOLOGY SITE PLAN
TC2.01	FIRST FLOOR TECHNOLOGY PLAN
TC2.01A	BASEMENT TECHNOLOGY PLAN AREA 100

## SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following: <AD3>
  - 1. Solid-surface counter-tops and sills.
  - 2. Miscellaneous framing and brackets.
- B. Related Sections include the following:
  - 1. Division 6 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.

#### 1.2 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

#### 1.3 SUBMITTALS

- A. Product Data: For particleboard, plywood, high-pressure decorative laminate, adhesive for bonding plastic laminate, fire-retardant-treated materials, cabinet hardware and accessories, and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
  - 1. Show details full size.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.
- C. Samples for each exposed product and for each color and texture specified.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining tem

perature and relative humidity at occupancy levels during the remainder of the construction period.

- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
  - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.6 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
  - 1. Hardboard: AHA A135.4.
  - 2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
  - 3. Softwood Plywood: DOC PS 1, Medium Density Overlay.
  - 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
  - 5. Trim: Premium grade in accordance with AWI Section 300; maximum moisture content of 6 percent; White Birch, vertical or flat grain, for a transparent finish.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
  - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
    - a. As indicated on Drawings.
- D. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
- E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2
  - 1. Manufacturers: As indicated on Drawings.

### 2.3 CABINET HARDWARE AND ACCESSORIES

- B. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8 Section "Door Hardware".
- C. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard.

- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.
  - 1. Provide minimum two hinges per door.
  - 2. Provide minimum three hinges for doors over 36 inches tall.
  - 3. Provide minimum four hinges for doors over 60 inches tall.
- D. Wire Pulls: Back mounted, 4 inches long, 5/16 inches in diameter, polished chrome finish.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081 and BHMA A156.9, B04102; with shelf brackets, B04112.
  - 1. 32 MM system is also acceptable.
- G. Shelf Rests: BHMA A156.9, B04013.
- H. Drawer Slides: Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following loads:
  - 1. Box Drawer Slides: 75 lbf.
- I. Door Locks: BHMA A156.11, E07121.
- J. Drawer Locks: BHMA A156.11, E07041.
- K. Grommets for Cable Passage through Countertops: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage. Color to match laminate color.
- L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

## 2.5 SOLID-SURFACING-MATERIAL COUNTERTOPS AND SILLS

- A. Solid-Surfacing-Material Thickness: minimum ½ inch or greater where shown on the drawings.
- B. Colors, Patterns, and Finishes: **Corian - Carbon Concrete <AD3>**
- C. Fabricate tops in one piece with shop-applied backsplashes. Comply with solid-surfacing-material manufacture's written recommendations for adhesives, sealers, fabrication, and finishing.

## 2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Glue: Aliphatic resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer. Do not use adhesives that contain urea formaldehyde.

## 2.7 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of openings in countertops with a coat of varnish.
- F. Fabricate to AWI premium standards.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing.

### 3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation.
- E. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches (2400 mm) long except where shorter single-length pieces are necessary.
  - 1. Scarf running joints and stagger in adjacent and related members.

2. Fill gaps, if any, between top of base and wall with [plastic wood filler; sand smooth; and finish same as wood base if finished] [latex sealant, painted to match wall].
  3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
  2. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
  3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Touch up finishing work specified in this Section after installation of interior architectural woodwork. Fill nail holes with matching filler where exposed
- D. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023



## SECTION 088000 - GLAZING

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section includes:

1. Glass for windows, doors, interior borrowed lites and storefront framing.
2. Glazing sealants and accessories.

#### 1.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Product Data: For sealants, indicating VOC content.
2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

#### 1.5 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.

Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
  2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
  3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.
- D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

#### 1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

#### 1.7 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Guardian Glass; SunGuard.
  2. Vitro.
  3. Insulgard Security Products

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.
1. Design Wind Pressures: As indicated on Drawings.
  2. Design Snow Loads: As indicated on Drawings.
  3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

## 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
  2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
  3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

## 2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

## 2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
1. Sealing System: Dual seals.
  2. Perimeter Spacer: Manufacturer's standard warm-edge spacer material and construction.

## 2.7 SECURITY GLAZING

- A. Glass Clad Polycarbonate: ANSI Z97.1.
1. Construction: symmetrical laminated glass clad polycarbonate with heat strengthened or chemically strengthened glass on both exposed surfaces.
  2. Shall be laminated glass clad polycarbonate, 7/16 inch  $\pm$  overall thickness, consisting of 1/8 inch chemically strengthened or tempered glass; 1/8 inch polycarbonate core; and 1/8 inch chemically strengthen or tempered glass with (2) layers of special interlayer material.

## 2.8 FIRE-PROTECTION-RATED GLAZING <AD3>

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 for window assemblies.
- B. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; 3/16-inch (5-mm) nominal thickness; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite NT.
    - b. Safti First; SuperLite C/SP.
    - c. Schott North America, Inc.; Filmed Pyran Platinum.
    - d. Vetrotech Saint-Gobain; SGG Keralite FR-F.

## 2.9 GLAZING SEALANTS

- A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel

- substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  3. Sealant shall have a VOC content of 250 g/L or less.
  4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Available Products:
    - a. GE Silicones; Silglaze II SCS2800
    - b. Tremco; Tremsil 600
    - c. Dow Corning Corporation; 795
- C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

## 2.10 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
  2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.11 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- F. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

### PART 3 - EXECUTION

#### 3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

#### 3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

- C. Cover vertical framing joints by applying tape to heads and sills first, then to jambs. Cover horizontal framing joints by applying tape to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Apply heel bead of elastomeric sealant.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.



### 3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
  - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

### 3.6 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Clear fully tempered float glass at all interior non-fire rated location in all non-patient areas.
  - 1. Minimum Thickness: 6 mm.
  - 2. Safety glazing required.

### 3.7 SECURITY MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-2: Clear Force Protect Sure-Gard ICGCP716 Glass Clad Polycarbonate at all interior non-fire rated locations in all patient areas, except as noted.
  - 1. Minimum Thickness: 6 mm.
  - 2. Safety glazing required.

### 3.8 INSULATING-LAMINATED-GLASS SCHEDULE

- A. Glass Type GL-3: Low-E-coated, clear insulating laminated glass at exterior doors and exterior windows in non-patient areas.
  - 1. Basis-of-Design Product, provide one of the following:
    - a. Guardian Glass; SunGuard SNX 62/27
    - b. Vitro (PPG); Solarban 70 XL
  - 2. Overall Unit Thickness: 1 inch (25 mm).
  - 3. Outdoor Lite: Clear laminated glass with two plies of tempered float glass.
    - a. Minimum Thickness of Each Glass Ply: 3 mm.
  - 4. Interspace Content: Argon.
  - 5. Indoor Lite: Fully tempered float glass.
  - 6. Minimum Thickness of Indoor Lite: 6 mm.
  - 7. Low-E Coating: Sputtered on third surface.
  - 8. Winter Nighttime U-Factor: .24 maximum.
  - 9. Summer Daytime U-Factor: .21 maximum.
  - 10. Visible Light Transmittance: 61 percent minimum.

11. Solar Heat Gain Coefficient: .27 maximum.
12. Safety glazing required.

### 3.9 SECURITY INSULATING-LAMINATED-GLASS SCHEDULE

- A. Glass Type GL-4: Low-E-coated, clear insulated security laminated glass at all exterior doors, and exterior windows in patient areas.
1. Overall Unit Thickness: 1 inch (25 mm).
  2. Outdoor Lite:
    - a. Basis-of-Design Product, provide one of the following:
      - 1) Guardian Glass; SunGuard SNX 62/27
      - 2) Vitro (PPG); Solarban 70 XL
  3. Interspace Content: Argon.
  4. Indoor Lite:
    - a. Force Protect Sure-Gard ICGCP716 Glass Clad Polycarbonate
  5. Minimum Thickness of Indoor Lite: 6 mm.
  6. Low-E Coating: Sputtered on third surface.
  7. Winter Nighttime U-Factor: .24 maximum.
  8. Summer Daytime U-Factor: .21 maximum.
  9. Visible Light Transmittance: 61 percent minimum.
  10. Solar Heat Gain Coefficient: .27 maximum.
  11. Safety glazing required.

### 3.10 SECURITY FIRE-PROTECTION-RATED GLASS SCHEDULE <AD3>

- A. Glass Type GL-5: fire-rated security glazing to be used at doors and sidelights with fire ratings in patient areas. Specific doors indicated on the drawings.
1. Basis of Design: SCHOTT PYRAN® Platinum Fire-Rated Glass
    - a. Fire Rating: up to 90 minutes
    - b. Thickness: 3/16"
    - c. Impact Safety Rated
  2. Safety glazing required.

### 3.11 FIRE-PROTECTION-RATED GLASS SCHEDULE <AD3>

- A. Glass Type GL-6: fire-rated glazing; film-faced ceramic glazing to be used at doors and sidelights with fire ratings in non-patient areas. Specific doors indicated on the drawings.
1. Safety glazing required.

END OF SECTION 088000

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL.....1  
1.1 RELATED DOCUMENTS .....1  
1.2 SUBMITTALS .....1  
PART 2 - PRODUCTS.....2  
2.1 COPPER TUBE AND FITTINGS.....2  
2.2 STEEL PIPE AND FITTINGS .....2  
2.3 SPECIALTY VALVES .....3  
2.4 AIR CONTROL DEVICES .....5  
2.5 HYDRONIC PIPING STRAINERS .....6  
PART 3 - EXECUTION .....6  
3.1 HANGERS AND SUPPORTS .....6  
3.2 FIELD QUALITY CONTROL .....7

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Division 20 Section "Mechanical General Requirements."
- B. Division 20 Section "Basic Mechanical Materials and Methods" for general piping materials and installation requirements.
- C. Division 20 Section "Hangers and Supports" for pipe supports, product descriptions, and installation requirements. Hanger and support spacing is specified in this Section.
- D. Division 20 Section "Pipe Flexible Connectors, Expansion Fittings and Loops."
- E. Division 20 Section "Meters and Gages" for thermometers, flow meters, flow measuring devices, and pressure gages.
- F. Division 20 Section "Mechanical Identification" for labeling and identifying hydronic piping.
- G. Division 23 Section "General-Duty Valves for HVAC" for general-duty gate, globe, ball, butterfly, and check valves.
- H. Division 23 Section "Temperature Controls" for temperature-control valves and sensors.
- I. Division 23 Section "Piping Systems Flushing and Chemical Cleaning."
- J. Division 23 Section "HVAC Water Treatment."

## 1.2 SUBMITTALS

- A. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
- B. Air control devices.
- C. Hydronic specialties.

## PART 2 - PRODUCTS

### 2.1 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. Annealed-Temper Copper Tubing: ASTM B 88, Type K.
- C. DWV Copper Tubing: ASTM B 306, Type DWV.
- D. Wrought-Copper Socket Fittings: ASME B16.22.
- E. Wrought-Copper Unions: ASME B16.22.

### 2.2 STEEL PIPE AND FITTINGS

- A. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe. Include ends matching joining method.
- B. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body, with ball-and-socket, metal-to-metal, bronze seating surface and female threaded ends.
- C. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- D. Cast-Iron Flanges: ASME B16.1, Class 125.
- E. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125.
- F. Fittings: ASTM A234 ANSI B16.9, steel butt weld to match pipe wall thickness, Class 300.
- G. Flanges: Class 300 forged steel welding neck to match pipe wall thickness and valve flanges, ANSI B16.5. Orifice plate flanges shall be raised face welding neck type with ring joint gaskets and flange taps. Coordinate orifice plate flanges with orifice plate flow elements.
- H. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 80, seamless steel pipe. Include ends matching joining method.
- I. Screwed Couplings: Extra heavy tapered threaded black carbon steel.

- J. Screwed Unions: 300 pound SWP female screwed malleable iron with ground joint and brass to iron seat.
- K. Screwed Fittings: 300 pound SWP banded malleable iron screwed, ASTM A 197 and ANSI B16.3.

## 2.3 SPECIALTY VALVES

- A. Balance Valves NPS 6 and Larger: Lug type butterfly valves with aluminum bronze disc, AISI 300 Series stainless steel stem, resilient replaceable seat for service at not less than 250 deg F and memory stops. Refer to Division 23 Section "General-Duty Valves for HVAC" for additional requirements.
  - 1. Provide lubricated enclosed screw or worm gear operator with handwheel for sizes 6 inches and larger.
  - 2. Pressure rating shall meet or exceed system minimum pressure rating.
- B. Flow Measuring: Use Flow Measuring Devices as specified in Division 20 Section "Meters and Gages."
- C. Balance Valves for Sizes Less than NPS 6 Combination balance valve and flow measuring device as specified in this Section.
- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Griswold Controls.
  - 2. Hydronic Components, Inc. (HCi).
  - 3. IMI Flow Design; IMI Hydronic Engineering Inc.
  - 4. Nexus Valve.
  - 5. PRO Hydronic Specialties, LLC.
- E. Manufacturers: Subject to compliance with requirements, use products by one of the following:
  - 1. Griswold Controls.
    - a. Hydronic Components, Inc. (HCi).
    - b. IMI Flow Design; IMI Hydronic Engineering Inc.
    - c. Nexus Valve.
    - d. PRO Hydronic Specialties, LLC.
  - 2. Griswold Controls.
    - a. Hydronic Components, Inc. (HCi).
    - b. IMI Flow Design; IMI Hydronic Engineering Inc.
    - c. Nexus Valve; Coil Pak.
    - d. PRO Hydronic Specialties, LLC.
  - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Amtrol, Inc.
    - b. Armstrong Pumps, Inc.
    - c. Bell & Gossett; Xylem Inc.

- d. Conbraco Industries, Inc.
  - e. Spence Engineering Company, Inc.
  - f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - 1) Body: Bronze or brass.
    - 2) Disc: Glass and carbon-filled PTFE.
    - 3) Seat: Brass.
    - 4) Stem Seals: EPDM O-rings.
    - 5) Diaphragm: EPT.
    - 6) Low inlet-pressure check valve.
    - 7) Valve Seat and Stem: Noncorrosive.
    - 8) Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
  - g. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Amtrol, Inc.
    - 2) Anderson Greenwood & Co.; Kunkle Valve Division.
    - 3) Armstrong Pumps, Inc.
    - 4) Bell & Gossett; Xylem Inc.; Models 790 and 1170.
    - 5) Conbraco Industries, Inc.; Apollo Valve.
    - 6) Spence Engineering Company, Inc.
    - 7) Watts Regulator Co.; a division of Watts Water Technologies, Inc.
      - a) Body: Bronze or brass.
      - b) Disc: Glass and carbon-filled PTFE.
      - c) Seat: EPDM.
      - d) Stem Seals: EPDM O-rings.
      - e) Diaphragm: EPDM.
      - f) Wetted, Internal Work Parts: Brass and rubber.
      - g) Valve Seat and Stem: Noncorrosive.
      - h) Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Amtrol, Inc.
  - b. Anderson Greenwood & Co.; Kunkle Valve Division.
  - c. Armstrong Pumps, Inc.
  - d. Bell & Gossett; Xylem Inc.; 3301 and 4100.
  - e. Conbraco Industries, Inc.; Apollo Valve.
  - f. Spence Engineering Company, Inc.
  - g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    - 1) Body: Cast iron.
    - 2) Disc: Glass and carbon-filled PTFE.
    - 3) Seat: EPDM.

- 4) Stem Seals: EPDM O-rings.
- 5) Diaphragm: EPDM.
- 6) Wetted, Internal Work Parts: Brass and rubber.
- 7) Valve Seat and Stem: Noncorrosive.
- 8) Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.

## 2.4 AIR CONTROL DEVICES

A. Manual Air Vents: Use ball-valve-type hose-end drain valves, refer to Division 23 Section "General-Duty Valves for HVAC."

B. Automatic Air Vents:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Amtrol, Inc.
  - b. Armstrong Pumps, Inc.
  - c. Bell & Gossett; Xylem Inc.
  - d. Spirotherm, Inc.
  - e. Taco, Inc.
2. Body: Bronze or cast iron.
3. Internal Parts: Nonferrous.
4. Operator: Noncorrosive metal float.
5. Inlet Connection: NPS 1/2.
6. Discharge Connection: NPS 1/4.
7. Maximum Operating Pressure: 150 psig.
8. Maximum Operating Temperature: 240 deg F.

C. Expansion Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Amtrol, Inc.
  - b. Armstrong Pumps, Inc.
  - c. Bell & Gossett; Xylem Inc.
  - d. Taco, Inc.
  - e. Wessels Co.
2. Tank: Welded steel, rated for 125-psig working pressure and 375 deg F maximum operating temperature, with taps in bottom of tank for tank fitting and taps in end of tank for gage glass. Tanks shall be factory tested with taps fabricated and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
3. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug, and stainless-steel ball check, 100-gal. unit only; sized for compression-tank diameter. Provide tank fittings for 125-psig working pressure and 250 deg F maximum operating temperature.

4. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig working pressure and 240 deg F maximum operating temperature; constructed to admit air to compression tank, drain water, and close off system.
5. Gage Glass: Full height with dual manual shutoff valves, **3/4-inch** diameter gage glass, and slotted-metal glass guard.

**D. Diaphragm -Type Expansion Tanks:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Amtrol, Inc.
  - b. Armstrong Pumps, Inc.
  - c. Bell & Gossett; Xylem Inc.
  - d. Taco, Inc.
  - e. Wessels Co.
2. Tank: Welded steel, rated for 125-psig working pressure and 240 deg F maximum operating temperature. Factory test with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
3. Diaphragm: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
4. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.

**E. Combination Air and Dirt Separators:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Spirotherm, Inc.; VDN Series.
2. Body: Fabricated steel; constructed for 150-psig maximum working pressure and 250 deg F maximum operating temperature. Separator shall have body extended below pipe connections for dirt separation and include removable lower head.
3. Air and Dirt Separation Mechanism: Internal copper core tube with continuous wound copper medium permanently attached followed by continuous wound copper wire permanently affixed.
4. Venting Chamber: With integral full port, float actuated brass venting mechanism. Include valved side tap to flush floating dirt or liquids and for quick bleeding of air during system fill.
5. Inlet and Outlet Connections: Threaded for NPS 2 and smaller; flanged connections for NPS 2-1/2 and larger.
6. Blowdown Connection: Threaded.
7. Size: Match system flow capacity.

**F. In-Line Air Separators:**

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Amtrol, Inc.
  - b. Armstrong Pumps, Inc.
  - c. Bell & Gossett; Xylem Inc.



d. Taco, Inc.

2. Tank: One-piece cast iron with an integral weir constructed to decelerate system flow to maximize air separation.
3. Maximum Working Pressure: Up to 175 psig.
4. Maximum Operating Temperature: Up to 300 deg F.

G. Air Purgers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Amtrol, Inc.
  - b. Armstrong Pumps, Inc.
  - c. Bell & Gossett; Xylem Inc.
  - d. Taco, Inc.
2. Body: Cast iron with internal baffles that slow the water velocity to separate the air from solution and divert it to the vent for quick removal.
3. Maximum Working Pressure: 150 psig.

H. Maximum Operating Temperature: 250 deg F.

2.5 HYDRONIC PIPING STRAINERS

1. Keckley.
2. Metraflex.
3. Mueller Steam Specialty.
4. Nibco, Inc.
5. Spence.
6. Sure Flow Equipment Inc.
7. Watts Water Technologies, Inc.
8. Yarway.
9. Anvil International, Inc.; Gruvlok Manufacturing (for grooved piping).
10. Tyco Fire & Building Products, Grinnell Mechanical Products (for grooved piping)
11. CWP: 200 psig minimum, unless otherwise indicated.
12. SWP: 125 psig minimum, unless otherwise indicated.
13. Body: Bronze for NPS 2 and smaller.
14. End Connections: Threaded or soldered.
15. Strainer Screen: Stainless steel, 40-mesh unless otherwise noted or scheduled.
16. Drain:
  - a. Pipe plug for sizes NPS 2 and smaller.
  - b. Factory-installed, hose-end drain valve for sizes NPS 2-1/2 and larger.

## PART 3 - EXECUTION

### 3.1 HANGERS AND SUPPORTS

- A. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
- B. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet or longer.
- C. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet or longer, supported on a trapeze.
- D. Spring hangers to support vertical runs.
- E. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
  - 1. NPS 3/4: Maximum span, 7 feet; minimum rod size, 1/4 inch.
  - 2. NPS 1: Maximum span, 7 feet; minimum rod size, 1/4 inch.
  - 3. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
  - 4. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.
  - 5. NPS 2-1/2: Maximum span, 11 feet; minimum rod size, 3/8 inch.
  - 6. NPS 3: Maximum span, 12 feet; minimum rod size, 3/8 inch.
  - 7. NPS 4: Maximum span, 14 feet; minimum rod size, 1/2 inch.
  - 8. NPS 6: Maximum span, 17 feet; minimum rod size, 1/2 inch.
  - 9. NPS 8: Maximum span, 19 feet; minimum rod size, 5/8 inch.
  - 10. NPS 10: Maximum span, 20 feet; minimum rod size, 3/4 inch.
  - 11. NPS 12: Maximum span, 23 feet; minimum rod size, 7/8 inch.
  - 12. NPS 14: Maximum span, 25 feet; minimum rod size, 1 inch.
  - 13. NPS 16: Maximum span, 27 feet; minimum rod size, 1 inch.
  - 14. NPS 18: Maximum span, 28 feet; minimum rod size, 1-1/4 inches.
  - 15. NPS 20: Maximum span, 30 feet; minimum rod size, 1-1/4 inches.
  - 16. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 17. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  - 18. NPS 1-1/2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 19. NPS 2: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 20. NPS 2-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
  - 21. NPS 3: Maximum span, 10 feet; minimum rod size, 3/8 inch.
  - 22. NPS 4 to NPS 5: Maximum span, 10 feet minimum rod size, 1/2-inch.
  - 23. NPS 6: Maximum span, 10 feet minimum rod size, 5/8-inch.
  - 24. NPS 8: Maximum span, 10 feet minimum rod size, 3/4-inch.

### 3.2 FIELD QUALITY CONTROL

- A. Leave joints, including welds, uninsulated and exposed for examination during test.
- B. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
- C. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.

- D. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
- E. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- F. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
- G. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
- H. Isolate expansion tanks and determine that hydronic system is full of water.
- I. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
- J. After hydrostatic test pressure has been applied for at least 2 hours, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
- K. Prepare written report of testing.
- L. Open manual valves fully.
- M. Inspect pumps for proper rotation.
- N. Remove disposal fine-mesh strainers in pump suction diffusers.
- O. Set makeup pressure-reducing valves for required system pressure.
- P. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
- Q. Set temperature controls so all coils are calling for full flow.
- R. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
- S. Verify lubrication of motors and bearings.

END OF SECTION 232113

## **SECTION 281000 – TECHNOLOGY OVERVIEW**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section provides a project overview and general project and Contractor requirements for technology work.
- B. The “Contractor” as referred to in these specifications, shall be the bidder whose bid is eventually chosen as the winner.
- C. The “Engineer” as referred to in these specifications, shall be Commtech Design and its representative on this project.
- D. The “Owner” as referred to in these specifications, shall be Commtech Design and its representatives.
- E. In the detailed specifications and on the contract drawings, the phrases “or equivalent,” “approved equivalent,” “approved equal,” “or equal” and “engineer approved equivalent” shall be used interchangeably and shall mean the same thing.
- F. All equals, equivalents, or alternates shall be approved by the Engineer prior to ordering or installation. Without approval, deviation from the products listed in the specifications and on the drawings, shall be presumed to be nonconforming and shall be removed and replaced at the direction of the Engineer and at the Contractor’s expense.

#### **1.02 DESCRIPTION OF PROJECT**

- A. Cabling and communications infrastructure.
  - 1. The communications portion of the project encompasses communications cabling and termination equipment. The work shall include but not be limited to:
    - a. Communications room racks and cabinets.
    - b. Communications Cabling and Termination Equipment:
      - a. User UTP Plenum rated CAT-6 and CAT-6A cabling
  - 2. All cables shall be labeled according to the drawings and the specifications.
  - 3. All cables shall be terminated and tested as per the specifications.
  - 4. Contractor shall provide personnel and equipment for full training and commissioning of the system.
  - 2. All cables shall be supported by J-hooks or cable tray/ladder.
  - 3. Label all cables
  - 4. Test all cables.
  - 5. The extent of the work shall be as shown on the drawing and detailed in these specifications
- B. Audio and Video Systems
  - 1. The audio and video systems in the building shall consist of but not be limited to:
    - a. Expansion of existing audio paging system.
    - b. Install all cabling, equipment and speakers.
    - c. Connect and test that existing audio paging system will route thru new speakers.
  - 2. Test all AV systems
  - 3. The extent of the work shall be as shown on the drawing and detailed in these specifications
- C. Access Control System
  - 1. New devices shall be an expansion of the Existing Syntinel PLC system and Informer/Gatekeeper LMS audio system.
  - 2. Install new access control and PLC Systems as required to match the existing system and control and monitor doors in the new building areas.
    - a. Provide and install all equipment and servers and software required.

3. Provide raceways as shown on the drawings.
  4. Install all cabling required connect each door to the PLC devices
    - a. PLC system is existing and shall be expanded to support new doors and devices at all doors
    - b. Provide all new PLC devices and cabling and devices at the doors noted on the drawings.
    - c. Provide software and programming to integrate the new doors and devices into the existing S. See drawings.
    - d. Wire from each power supply to the panels and to the devices at the doors
  5. Install intercoms.
    - a. Expand intercoms at locations noted.
    - b. Connect to a centralized intercom system
    - c. Integrate with the access control/PLC System and camera system
    - d. Intercom call shall "pull-up" the corresponding video security camera system.
    - e. Integrate the intercoms so that the security software shall allow door release
  6. Where the intercom is connected to the data network the contractor shall provide all patch cables and configure the network to support the intercoms
  7. Configure the system as per the owner's requirements. Meet with them to determine configuration parameters.
  8. The extent of the work shall be as shown on the drawing and detailed in these specifications.
- D. Video Security System
1. See drawings and specs for CAT-6 cable installation and who is responsible for installing cabling.
  2. Provide and install all cameras at all locations noted
  3. Provide and install servers and software for monitoring and recording all new security cameras plus any spare processing and space as detailed in the Security Recording specification.
  4. Fully configure all software and hardware required for recording of camera images
    - a. Integrate with access control Syntinel and Gatekeeper audio intercom system.
  5. Install viewing software on owner's computers and devices.
  6. The extent of the work shall be as shown on the drawing and detailed in these specifications
- E. Clock System
1. Work shall include but not be limited to:
    - a. Clocks
    - b. Cabling for clocks
    - c. Integration to internet time servers
  2. The extent of the work shall be as shown on the drawing and detailed in these specifications.
- F. Post installation documentation
1. Each contractor shall provide post installation documentation as per the specifications. Shall include but not be limited to:
    - a. Red-lined as-built drawings
    - b. As-built detailed connectivity of AV and Network Systems
    - c. As-built cable locations and cable labels at each location.
    - d. Mark all splice locations
    - e. Update of all access control locations and equipment at each door
    - f. Camera locations and camera numbers.
    - g. Spreadsheet (hard copy and Excel file) for all network, Wireless, telephones and cameras detailing:
      - A) Mfg. Part number
      - B) IP Address
      - C) MAC Address

D) Device number (Camera #, Telephone # etc)

1.03 STORAGE OF MATERIALS

- A. All materials shall be secured when not in use by the Contractor.
- B. It shall be the Contractor's responsibility to secure all equipment including all material to be installed as part of the contract. No changes shall be made to the contract due to loss or theft of equipment and materials not officially accepted by the Owner.

1.04 PERMITS

- A. The State of Michigan requires that the Contractor apply for and obtain permits for data telecommunication installation.
- B. This is required under State of Michigan Public Act 230. The inspector at the State of Michigan states that the code never exempted data telecommunications from permits and previous rules had overstepped their bounds. Only exemptions to the permit requirements are found in Public Act 230 MCL125.1528a.
  - 1. There is not a license required to apply for a permit per Public Act 407 MCL339.5737(3)(o).
- C. The Permit is required under Public Act 230. The permit is under 2017 Michigan Electrical Code rules Part 8.
- D. People who can obtain the permit include the Owner of the building or a company representing the owner. See Public Act 230 MCL125.1510.
  - 1. Contractor shall be required to apply for and obtain the permit
  - 2. Contractor shall be required to install the data telecommunications system to fully meet all code requirements and requirements of the Inspector and Authority Having Jurisdiction (AHJ)
- E. State inspector has noted that the inspection process for data telecommunications is the same as any other inspection.
  - 1. Do not cover or conceal any wiring without approval.
  - 2. Electrical Inspectors will be conducting the inspections.
  - 3. Contractor shall be responsible for scheduling the inspections and attending the inspections with the inspector
- F. State inspector has noted that the inspectors will be inspecting for code compliance including manufacture's installation instructions for the cables and terminations.
- G. An installation may not pass inspection if there is any Non-compliance with the code.

1.05 REFERENCE SPECIFICATIONS-CABLING

- A. All work applicable shall conform to the following standards:
- B. ANSI/TIA-568-C.0, "*Generic Telecommunications Cabling for Customer Premises*",
- C. ANSI/TIA-568-C.1, "*Commercial Building Telecommunications Cabling Standard*",
- D. ANSI/TIA-568-C.2, "*Balanced Twisted-Pair Telecommunication Cabling and Components Standard*", ANSI/TIA-568-C.3, "*Optical Fiber Cabling Components Standard*",
- E. ANSI/TIA-568-C.4, "*Broadband Coaxial Cabling and Components Standard*",
- F. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
- G. IA-606-B: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings including all Updates and Addenda.
- H. TIA-607-C: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
- I. EIA-472 General Specification for Fiber Optic Cable
- J. EIA-472A Sectional Specification for Fiber Optic Communication Cables for Outside Aerial
- K. EIA-472B Sectional Specification for Fiber Optic Communication Cables for Underground and Buried Use
- L. EIA-472C Sectional Specification for Fiber Optic Communication Cables for Indoor Use

- M. EIA-472D Sectional Specification for Fiber Optic Communication Cables for Outside Telephone Plant Use
- N. NEC, 2015, or latest edition available
- O. IEEE 802.3af PoE • Ratified in 2003 • 15.4W at the PSE, with min of 12.95W available to the PD
- P. IEEE 802.3at PoE+ • Ratified in 2009 • 34.2W at the PSE, with min of 25.5W available to the PD
- Q. IEEE 802.3bt-2018 - IEEE Standard for Ethernet Amendment 2: Physical Layer and Management Parameters for Power over Ethernet over 4 pairs

#### 1.06 CONTRACTOR-ALL

- A. Each contractor shall be responsible for inspecting their own work and ensuring it meets the project requirements.
- B. Contractor shall have a project manager who will be responsible for all work, workers, equipment, cabling and project management for their work. The project manager shall have the authority to make decisions for the contractor and schedule all workers.
- C. Contractor shall attend all project meetings throughout the project.
- D. All work on the project shall meet all applicable state, federal, local and industry codes and be installed according to the requirements of the Authority Having Jurisdiction (AHJ).

#### 1.07 CONTRACTOR -CABLING

- A. The Contractor shall show proof of an existing contractual relationship with the approved equipment manufacturer of the horizontal cabling system, and shall pass through the manufacturer's certification and warranty to purchaser.
- B. All faceplates and termination hardware shall be sourced from the certifying manufacturer to assure quality control and validity of the manufacturer's warranty.
- C. The Contractor shall accept complete responsibility for the installation, certification, and support of the cabling system. Contractor must show proof that he has the certifying manufacturer's support on all of these issues.
- D. All work shall be performed and supervised by Telecommunications Technicians and Project Managers who are qualified to install voice, data, and image cabling systems, and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
- E. The Telecommunications Technicians employed shall be fully trained and qualified by the manufacturer on the installation and testing of the equipment to be installed. Evidence that the vendor is a current Certified Installer of the manufacturer must be provided in writing prior to work commencing on the structured cabling for the building.
- F. The Contractor (including Subcontractor(s) if any) shall have a proven track record in cabling projects. This must be shown by the inclusion of details of at least 3 projects involving Category 6 or better cabling and optical fiber, which have been completed by the vendor in the last 2 years. Names, addresses, and phone numbers of references for the 3 projects shall be included.

#### 1.08 CONTRACTOR –AUDIO

- A. The Contractor shall accept complete responsibility for the installation, certification, and support of the system. Contractor shall show proof that they have the certifying manufacturer's support on all of these issues.
- B. All work shall be performed and supervised by Audio/Video Technicians and Project Managers who are qualified to install audio/video systems and cabling and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
- C. The Audio/Video Technicians employed shall be fully trained and qualified by the manufacturer on the installation and testing of the equipment to be installed.
- D. The vendor (including Subcontractor(s) if any) shall have a proven track record in audio/video system configuration and installation. This must be shown by the inclusion of details of at least 3 projects involving the installation of like sized audio/video systems that have been

completed by the vendor in the last 2 years. Names, addresses, and phone numbers of references for the three projects shall be included.

#### 1.09 CONTRACTOR –SECURITY

- A. The Contractor shall show proof of an existing contractual relationship with the approved equipment manufacturer of the video security system and access control system and shall pass through the manufacturer's certification to purchaser.
- B. All hardware shall be sourced from the certifying manufacturer to assure quality control and validity of the manufacturer's warranty.
- C. The Contractor shall accept complete responsibility for the installation, certification, and support of the security system. Contractor must show proof that he has the certifying manufacturer's support on all of these issues.
- D. All work shall be performed and supervised by security technicians and project managers who are qualified to install security systems, and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
- E. The security technicians employed shall be fully trained and qualified by the manufacturer on the installation and testing of the equipment to be installed. Evidence that the vendor is a current certified installer of the manufacturer must be provided in writing prior to work commencing on the video security system.
- F. The Contractor (including Subcontractor(s) if any) shall have a proven track record in security projects. This must be shown by the inclusion of details of at least 3 projects similar in scope and requirements which have been completed by the vendor in the last 2 years. Names, addresses, and phone numbers of references for the 3 projects shall be included.

## PART 2 - PRODUCTS

### 2.01 FIRESTOPPING

- A. Each contractor shall be responsible for firestopping around their cables and the raceways.
- B. Shall be completed inside and around all conduits after cable installation.
- C. Firestop for the area between the cable and the edge of the conduit shall be Nelson No. FSP, CLK or LBS+. Contractor shall install the best firestop for each individual installation.
  1. Firestop shall be installed with regard to local and national building codes.
  2. The firestop shall be a putty like substance that expands under heat and will not allow flame to pass for a designated period of time.
  3. Firestop shall conform to all NEC, NFPA, and UL requirements.
  4. Some wall pass-thru's are shown on the drawings. The Contractor shall utilize these where possible.
  5. Where the contractor must install cables through a wall where there is no pass-thru already provided, the Contractor shall be responsible for installing a fire-rated pass-thru and fire-stopping the conduit after cable installation.
- D. Firestopping is required at all riser conduits and all pass thru's.
  1. Each cable tray penetration of a wall shall be firestopped after cable installation. Use pillow type firestop to allow additional cables to be installed in the future.
  2. Where riser conduits pass through floors, the area between the concrete and the conduit shall be firestopped. This shall be completed with a putty or liquid firestop product. Fill in the space with mineral wool, and then install the firestop on top. All firestop shall be of sufficient thickness to secure the rating required by code.
  3. After final cable installation, install a putty firestop around all cables where they enter and exit conduit pass thru's and conduit risers.
  4. All firestop shall be installed to provide the fire rating as described by local fire code.
  5. It shall be the responsibility of the Contractor to verify that all conduits, walls, and raceways required to be firestopped have been firestopped.



- E. Contractor shall provide a label at each penetration and firestop location detailing the UL rated fireproofing solution that was used in the specific application.**
- 1. Apply sticker to the wall near the firestopped conduit.**
  - 2. Provide a sample of the label to the designer for review as part of the submittals.**

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Contractor shall be familiar with the location(s) where the work will be done. No additional compensation will be made for items the Contractor claims he was not aware of during bidding.
- B. Work Area:
1. All work areas shall be cleaned at the end of each day. All debris shall be cleaned and removed from the site and disposed of in the approved container for the site.
  2. All equipment shall be moved out of common areas and stored in the Contractor's lay down area, or in other approved storage locations on site.
  3. Any work that is low hanging, or may otherwise impede the general use of the space, and cannot be removed, shall be flagged and cordoned off by the Contractor.
- C. All equipment and parts shall be installed in a neat and workmanlike manner. Good installation principles shall be used throughout the project.
- D. All cables routed above the drop ceiling or in the ceiling area shall be installed square to the building. Diagonal cable runs are not permissible.
- E. All cut edges of conduits, boxes, raceway, etc., shall be trimmed and filed so that no burrs or rough edges will damage cable as it is installed.
- F. All surface raceways, including conduits in exposed areas shall be painted to match the existing colors of the surrounding area.
- G. If, in the course of the work, the Contractor damages, marks, or misplaces any ceiling tiles, the Contractor shall repair, and/or replace the ceiling tile to the original condition.
1. The Engineer shall decide if ceiling tiles have been damaged. Based on the Contractor's proposed fixes, the Engineer shall decide the best course of action to repair any damage done by the Contractor to the ceiling tiles.
- H. It shall be the responsibility of the Contractor to repair any damage done to the structure or finishes in the building by the Contractor. The building shall be returned to its original condition prior to final sign off of the project.
- I. Firestop shall be installed to meet national and local codes.

#### **3.02 DOCUMENTS**

- A. The Contractor shall fully read the contract documents including the detailed specifications, and the detailed drawings.
- B. No additional compensation shall be made for any portion of the project which the Contractor did not know of or understand prior to providing the bid response.
- C. In the case of any discrepancies between the detailed drawings and the detailed specifications, the Contractor shall provide the higher quality or more stringent requirement.

#### **3.03 WORK PLAN-POST BID (CHOSEN CONTRACTOR ONLY)**

- A. Along with the submittals the Contractor shall provide a work plan for the implementation of the system they are installing. The plan shall include scheduled dates for major milestones, and all phases required for completion prior to final cutover.
- B. The work plan shall list all items that must be completed by the Contractor or Owner to provide a smooth install of the system. The Contractor shall be responsible for all costs associated with the planning and cutover. The Owners only responsibility is to act as a liaison between the Contractor and the users.

- C. The work plans shall include a time-line and a cutover date for the systems within each building. Contractor shall be responsible for all aspects of scheduling the work, including notification of the users, the administration, and the telephone service provider.
- D. The work shall commence within 10 days of award of the contract. The Contractor shall be responsible for attending weekly project meetings at the Owner's site to report on progress and keep the project team informed of the work being done
- E. The work plan will be reviewed at each project meeting for compliance and updates.
- F. Work shall immediately begin on site surveys to determine the existing infrastructure, conduit and raceway placement and determining placement of new system equipment. The Contractor shall be responsible for moving, relocating, and reconnecting any and all existing equipment required for the installation of the new systems.
- G. After work plan and system approval by the Engineer the Contractor can begin work on infrastructure work that does not impede users.
- H. The Contractor shall be responsible for working with the Owner's Information Technology staff and administrators.

**END OF SECTION 281000**

## **SECTION 281100 – COMMUNICATIONS ROOM**

### **PART 1 - GENERAL**

#### 1.01 SECTION INCLUDES

- A. Parts and equipment required for equipment in the communications room (Comm Room)

#### 1.02 SYSTEM DESCRIPTION

- A. All equipment in the communications room shall be installed so that access is provided to all components, mechanical and electrical.
- B. All components of the communications room shall work together to form a cohesive and complete communications infrastructure.

#### 1.03 COORDINATION

- A. Coordinate rack/cabinet work with the Electrical Contractor for placement of electrical connections.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Approved Equals for cabinets:
  - 1. See drawings

#### 2.02 CABINETS

- A. Floor Mounted communications cabinet shall be equipped with:
  - 1. Black, powder coat finish cabinet 79"x24"Wx42"D
  - 2. Two sets of 19" mounting rails
  - 3. Adjustable feet for leveling
  - 4. Top gland plate. Install brush plate.
  - 5. lockable doors.
  - 6. Solid side panels
  - 7. Power strip.
  - 8. See drawings for manufacturer. Match existing cabinets in the comm rooms.
  - 9. Communications cabinet shall be Great Lakes Cabinets # GL790L-2442MSS or equal

#### 2.03 CABLE LADDER

- A. Equip communication racks with cable ladder system for cable support and routing. Refer to Figure 28 110-A below.
  - 1. All cable ladders shall be custom cut to fit.
  - 2. Install cable ladder vertically behind each vertical organizer.
  - 3. Center the cable ladder on the vertical organizer so that when additional racks are added, the cable ladder can be used to serve both racks, and will not interfere with the components mounted in the rack.
- B. Cable Ladder - Black and cut to length.
  - 1. 12" wide, 10' long cable ladder with channels. Hubbell #hsls1012B or equal.
  - 2. Equip with the following as required for a full installation as per the details and specifications:
    - a. Relay Rack Mounting Kit, Hubbell #HLMPK19 or equal
    - b. Wall support angle bracket, Hubbell #HLTSB12B or equal
    - c. Corner clamp for connecting horizontal ladder on the top to the cable ladder that attaches to the wall. Hubbell #HLTK or equal.

- d. Wall saddle for attaching horizontal cable ladder section to the wall. Equipped with "J" bolts. Hubbell #HLX0612 or equal
- e. Cable Radius Drop for dropping cables down to vertical cable ladder between and to the side of each rack, Hubbell #HLCD12 or equal
- f. Foot Kit for Cable ladder at back of rack, Hubbell #HLRF or equal
- g. Butt Splice Kit, Hubbell #HSBSK or equal
- h. Swivel Splice kit, Hubbell #HLSSK or equal
- i. When mounting cable ladder along the wall, install supports to the wall, Hubbell #HLVWBK or equal
- j. Attach all cable ladders to the rack with unistrut and unistruts "L" and "T" connectors.
- k. Approved equals, Newton and Hubbell.

## 2.04 COMMUNICATIONS ROOM EQUIPMENT

- A. Patch Cord Organizers:
  1. Patch cords organizers shall be steel and shall allow routing of patch cables from electronics to the patch panels.
  2. Single rack unit organizer shall be Hubbell #HS13C with cover. Refer to PCO-1 on detailed drawings.
  3. Approved equals, Ortronics and Great Lakes Case and Cabinet.
- B. Tie Wraps:
  1. Tie wraps shall be used on exterior cables only.
  2. Tie wraps should not be used above the drop ceiling or in cable tray. The pathway shall support the cables without the use of extra tie wraps.
  3. Tie wraps shall never be used to support cables from building structure, electrical conduits, or lighting systems.
  4. Panduit No. PLT2S-C or equal standard tie wrap. For use in general locations that are not plenum rated.
  5. Panduit No. PLT2S-C702 or equal plenum rated tie wrap. Use only this type of tie wrap in plenum rated areas.
  6. Panduit No. PLT2H-L00 or equal ultraviolet rated outside plant tie wrap. Use only this type of tie wrap for outside uses.
- C. Hook and Loop Wraps:
  1. Hook and Loop wraps shall be used on the cable ladder of the rack systems to bundle the cables as they pass along the cable ladder. Cables shall be bundled in groups of no more than 24 cables.
  2. Hook and Loop wraps should not be used above the drop ceiling or in cable tray except in limited circumstances. The pathway shall support the cables without the use of extra tie wraps.
  3. Wraps shall never be used to support cables from building structure, electrical conduits, or lighting systems.
  4. Panduit HLT2I or equal.
- D. Grounding and bonding of racks and cable ladder
  1. Bond each rack and all parts of the cable ladder as 1 ground system.
  2. Use Erico Eriflex woven copper grounding braids to attach racks and ladder.
  3. Erico # 556700 or other lengths as required.
- E. Rack Mounted shelf
  1. Install shelves where equipment needs to be installed but is not rack mountable.
  2. Identify equipment and depth of equipment and order shelf to match
  3. Cantilevered shelves:
    - a. 3.5" high, 14" depth with weight up to 50 lbs. Hubbell #MCCCS1
    - b. 7" High, 20" depth with weight up to 200 lbs. Hubbell #MCCCWS19HD

## 2.05 WALLFIELD EQUIPMENT

- A. Plywood for Wallfields:
  - 1. Plywood shall be American Plywood Association (APA), Grade A-C at minimum. Meaning that the "A" side is smooth and paintable, neat repairs are permissible. "C" side allows knotholes to 1 inch and limited splits are permitted. "A" side is used for mounting; "C" side is installed towards the wall.
  - 2. Plywood shall be 3/4-inch-thick and shall come in 4 foot x 8 foot sheets with a quantity of sheets installed as per the detailed drawings.
  - 3. All plywood used for wallfields shall be fire-retardant plywood and shall be stamped as such.
    - a. Shall have a Flame-spread rating of 25 or less,
  - 4. Each piece of plywood with one coat of white paint. Paint all edges.
    - a. Do not paint over one of the Fireproof stamps on the plywood. Leave this so that the owner can identify that the plywood installed is fire-retardant.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Location of the communications infrastructure shall be finalized in the communications room prior to installation.
- B. Locate all equipment to be installed, and make certain that space is available for maintenance and service during the life of the system.
- C. If any changes from the drawings are required, the Contractor shall submit a proposed layout of the communications room to the Engineer for approval prior to installation.

#### **3.02 PREPARATION**

- A. Clean floor prior to installation of the communications racks.
- B. Coordinate with all other Contractors and ensure that the locations of all cable tray and conduits are correct and will feed the rack system adequately.

#### **3.03 INSTALLATION OF RACKS**

#### **3.04 INSTALLATION OF FLOOR MOUNTED CABINETS**

- A. The communications cabinet shall be located near the wall to allow connection of the power and communications cables.
  - 1. The cabinet shall be located so that the front and back doors will open and are not directly facing a wall.
  - 2. Obtain prior to approval by the engineer of the final placement of the cabinets. The contractor shall locate the cabinets to provide sufficient space for technicians and the owner to install and maintain the equipment in the racks.
  - 3. Contact the Engineer prior to final placement of the cabinets.
  - 4. Remove paint from cabinet where ground braid is attached to the rack or cable ladder. Use star washers for all ground connections.
  - 5. Where multiple cabinets are to be located beside one another, do not install side panels where the cabinets are joined.

#### **3.05 INSTALLATION OF COMM ROOM EQUIPMENT**

- A. Patch cord organizers shall be installed between all patch panels and electronics.
  - 1. Horizontal organizers shall be used for routing fiber and copper patch cords between patch panels and electronics.
  - 2. Refer to Rack layouts on detailed drawings for quantity of organizers to provide.
  - 3. Organizers shall be installed side by side where multiple racks are installed.
  - 4. If changes in the rack layout are required, contact the Engineer and get changes approved prior to installation.
- B. Tie wraps shall be used sparingly in the overall installation.

1. Tie wraps shall not be used in the cable tray or above the drop ceiling for support of cables. All cables shall utilize J-hooks, conduits, cable ladder, or cable tray for support in the ceiling area.
  2. Tie wraps can be used to group cables on the cable ladder of the rack systems. Group cables in bundles of no more than 24 cables.
  3. Trim all tie wraps so that the cut edge is smooth.
  - C. Hook and Loop shall be used sparingly in the overall installation.
    1. Hook and Loop should not be used in the cable tray or above the drop ceiling for support of cables. All cables shall utilize J-hooks, conduits, cable ladder, or cable tray for support in the ceiling area.
    2. Hook and Loop can be used to group cables on the cable ladder of the rack systems. Group cables in bundles of no more than 24 cables.
  - D. Power strips shall be installed so that they do not interfere with the cable routing, or the installation of components into the rack.
    1. Modular plug for the outlet strip shall be installed at the bottom of the outlet strip.
    2. The outlet strip shall plug into 1 of 2 duplex receptacles installed at the bottom of the rack. Refer to the detailed drawings for receptacle locations.
    3. Coil any extra cord from the outlet strip and tie wrap it to the bottom of the vertical cable ladder.
    4. Securely attach the outlet strips to the back edge of the vertical cable ladder.
    5. Electrical outlets are installed by others. Communications Contractor shall be responsible for connecting power strip to the outlets.
  - E. Shelves and blank panels
    1. Install in the rack where required and/or where shown on the drawings.
- 3.06 WALLFIELD EQUIPMENT
- A. Paint plywood with prior to installation on the wall.
    1. Plywood shall be installed from 12 inches AFF to 7 feet above the floor or as noted on the drawings.
    2. Mount plywood to the wall with screws attached to studs in the wall. Contractor is responsible for securely mounting the plywood to the wall.
    3. Grade "A" side of the plywood shall be used for mounting all communications components.
    4. If the plywood will cover an electrical receptacle, the Contractor shall cut the plywood to allow access to the receptacle.

**END OF SECTION 281100**

## SECTION 281600 – CAT-6 CABLING

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. This section includes parts and equipment required for installation, termination, and testing of user communications cables.

#### 1.02 SYSTEM DESCRIPTION

- A. The horizontal cabling consists of all systems from the user faceplate, to the patch panel in the communications room, and all connections in between.
- B. Products and installation detailed in this section shall comply with all applicable requirements.
  - 1. ANSI/TIA-568-C.0, "*Generic Telecommunications Cabling for Customer Premises*",
  - 2. ANSI/TIA-568-C.1, "*Commercial Building Telecommunications Cabling Standard*",
  - 3. ANSI/TIA-568-C.2, "*Balanced Twisted-Pair Telecommunication Cabling and Components Standard*", ANSI/TIA-568-C.3, "*Optical Fiber Cabling Components Standard*",
  - 4. ANSI/TIA-568-C.4, "*Broadband Coaxial Cabling and Components Standard*",
  - 5. ANSI/TIA/EIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces
  - 6. IA-606-B: Administration Standard for the Telecommunications Infrastructure of Commercial Buildings including all Updates and Addenda.
  - 7. TIA-607-C: Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
  - 8. IEEE 802.3af PoE • Ratified in 2003 • 15.4W at the PSE, with min of 12.95W available to the PD
  - 9. IEEE 802.3at PoE+ • Ratified in 2009 • 34.2W at the PSE, with min of 25.5W available to the PD
  - 10. IEEE 802.3af PoE • Ratified in 2003 • 15.4W at the PSE, with min of 12.95W available to the PD
  - 11. IEEE 802.3at PoE+ • Ratified in 2009 • 34.2W at the PSE, with min of 25.5W available to the PD
  - 12. IEEE 802.3bt -Amendment 2. Ratified in 2018 PoE standards powering all 4 pairs:

#### 1.03 COORDINATION

- A. All cables shall be coordinated with the installation of the telecommunications raceways.
- B. Coordinate all user cables with the furniture to be installed in the building. Make any adjustments prior to cable being installed.
- C. Contractor shall walk the site during construction and shall verify all raceways are being installed as required to install the user data cables. Walk the site prior to drywall being installed or floors being installed when Floor boxes are being installed.

#### 1.04 STANDARDS

- A. Cabling shall be installed in accordance with NEC code for grouping/bundling of cables in relation to Type 3 and Type 4 PoE
- B. Install as per NEC 840.160 in reference to bundling cables:

AWG	Number of 4-Pair Cables in a Bundle																				
	1			2-7			8-19			20-37			38-61			62-91			92-192		
	Temp Rating			Temp Rating			Temp Rating			Temp Rating			Temp Rating			Temp Rating					
	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C	60°C	75°C	90°C
26	1.0	1.0	1.0	1.0	1.0	1.0	0.7	0.8	1.0	0.5	0.6	0.7	0.4	0.5	0.6	0.4	0.5	0.6	NA	NA	NA
24	2.0	2.0	2.0	1.0	1.4	1.6	0.8	1.0	1.1	0.6	0.7	0.9	0.5	0.6	0.7	0.4	0.5	0.6	0.3	0.4	0.5
23	2.5	2.5	2.5	1.2	1.5	1.7	0.8	1.1	1.2	0.6	0.8	0.9	0.5	0.7	0.8	0.5	0.7	0.8	0.4	0.5	0.6
22	3.0	3.0	3.0	1.4	1.8	2.1	1.0	1.2	1.4	0.7	0.9	1.1	0.6	0.8	0.9	0.6	0.7	0.8	0.5	0.6	0.7

- C. Cables shall be installed with no more than 24 cables in a single J-hook. Install additional J-hooks as required.
- D. If cables are to be bundled/grouped in larger bundles then the cable shall be LP listed per UL.
- E. All cables shall be no smaller than 23 AWG.

**PART 2 - PRODUCTS**

**2.01 MANUFACTURERS**

- A. Approved vendors for copper user cables are:
  1. Panduit
  2. Hubbell
  3. Belden
  4. CommScope
  5. Mohawk
  6. Superior Essex
- B. Approved vendors for CAT-6 termination equipment are:
  1. Hubbell.
  2. Panduit (Net Key not allowed)
  3. Belden
  4. CommScope

**2.02 CAT-6 CABLING**

- A. All UTP user/cabling installed shall be CAT-6 rated or above.
  1. Category 6 cabling shall consist of 4 pairs of unshielded twisted pair, 23 AWG cables.
  2. All CAT-6 cables shall be installed in cable tray or supported by J-Hooks.
  3. Individual pair shall be marked in the standard 4 pair color code of blue/blue-white, orange/orange-white, green/green-white, and brown/brown-white.
  4. Each cable shall be marked sequentially with the footage of the cable. Each cable shall also be marked with the manufacturer of the cable and the type of cable installed or the cable part number.
  5. Cable and all connectors and patch panels shall meet or exceed the following electrical and physical requirements:

DC RESISTANCE (max)	23 AWG
Ohms/100m @ 20°C	9.38ohms
DC RESISTANCE UNBALANCED (max)	
Individual Pair %	5%

CHARACTERISTIC IMPEDANCE	
Frequency (f)	Ohms
1-500 Mhz	100 ±15



DELAY SKEW (max)	
ns/100m	45

NOMINAL VELOCITY OF PROPAGATION (NVP)	
% Speed of light	72

INPUT IMPEDANCE	
Frequency (f)	Ohms
1.0-100 Mhz	100 ±15
100-350 Mhz	100 ±20
350-500 Mhz	100 ±25

**REFERENCE ELECTRICAL CHARACTERISTICS**

FREQ (MHz)	INSERTION LOSS (dB/100m)		NEXT (dB/100m)		ACR (dB/100m)	PS-NEXT (dB/100m)		PS-ACR (dB/100m)	ELFEXT (dB/100m)	PS-ELFEXT (dB/100m)	RL (dB)
	avg	max	avg	min	min	avg	min	min	min	min	min
.772	1.7	1.8	82	76.0	74.2	77	74.0	72.2	—	—	—
1.0	1.9	2.0	80	74.3	72.3	75	72.3	70.3	67.8	64.8	20.0
4.0	3.6	3.8	71	65.3	61.5	66	63.3	59.5	55.8	52.8	23.0
8.0	5.1	5.3	67	60.8	55.5	62	58.8	53.5	49.7	46.7	24.5
10.0	5.7	6.0	65	59.3	53.3	60	57.3	51.3	47.8	44.8	25.0
16.0	7.3	7.6	62	56.2	48.6	57	54.2	46.6	43.7	40.7	25.0
20.0	8.1	8.5	61	54.8	46.3	56	52.8	44.3	41.8	38.8	25.0
25.0	9.1	9.5	59	53.3	43.8	54	51.3	41.8	39.8	36.8	24.3
31.25	10.2	10.7	58	51.9	41.2	53	49.9	39.2	37.9	34.9	23.6
62.5	14.8	15.4	53	47.4	32.0	48	45.4	30.0	31.9	28.9	21.5
100.0	19.0	19.8	50	44.3	24.5	45	42.3	22.5	27.8	24.8	20.1
155.0	24.2	25.2	47	41.4	16.3	42	39.4	14.3	24.0	21.0	18.8
200.0	27.8	29.0	46	39.8	10.8	41	37.8	8.8	21.8	18.8	18.0
250.0	31.5	32.8	44	38.3	5.5	39	36.3	3.5	19.8	16.8	17.3
300.0	35.0	36.4	43	37.1	0.7	38	35.1	—	18.3	15.3	16.8
350.0	38.2	39.8	42	36.1	—	37	34.1	—	16.9	13.9	16.3
400.0	41.3	43.0	41	35.3	—	36	33.3	—	15.8	12.8	15.9
500.0	47.0	48.9	40	33.8	—	35	31.8	—	13.8	10.8	15.2
550.0	49.7	51.8	39	33.2	—	34	31.2	—	13.0	10.0	14.9

6. All cables installed above a drop ceiling or fixed ceiling shall be Plenum Rated
7. CAT-6, 4 pair cabling shall be plenum rated unless specifically noted.

Cable Use	Manufacturer	Color	Part number	Rating
Data Cabling	Mohawk	Blue	M58281	Plenum
Security Camera	Mohawk	Green	M58286	Plenum
Wireless AP	Mohawk	Yellow	M58283	Plenum
Clock	Mohawk	Orange	M58288	Plenum

8. Ensure that cable passes all CAT-6 tests after installation.

**2.03 UTP JACKS**

- A. 8-position modular jacks for termination at user and at the patch panel. Match cable color except where noted on drawings.
  1. Each jack shall be an individually constructed unit and shall snap mount in an industry standard keystone opening (.760 inches x .580 inches).
  2. Jack housings shall be high impact 94 V-0 rated thermoplastic.
  3. Jack housings shall fully encase and protect printed circuit boards and IDC fields.
  4. Modular jack contacts shall accept a minimum of 1000 mating cycles with 5.0 milliohm (maximum) increase over initial with the use of an FCC compliant plug.

5. Modular jack contact wires shall be formed flat for increased surface contact with mated plugs.
6. Modular jack contacts shall be constructed of beryllium copper for maximum spring force and resilience.
7. Contact plating shall be a minimum of 50 micro inches of hard gold in the contact area over 50 micro inches of nickel.
8. Jack termination shall follow the industry standard 110 IDC.
9. Jacks shall have a designation indicating CAT-6 or CAT-6A as required.
10. Jacks shall utilize a paired punch down sequence. Cable pair twist shall be maintained up to the IDC, terminating all conductors adjacent to its pair mate to better maintain pair characteristics designed by the cable manufacturer.
11. Jacks shall terminate 22-26 AWG stranded or solid conductors.
12. Jacks shall terminate insulated conductors with outside diameters up to .050 inches.
13. Jacks shall be compatible with single conductor, 110 impact termination tools.
14. Jacks shall include translucent wire retention stuffer cap that holds terminated wires in place and allows the conductors to be visually inspected in the IDC housing.
15. Jacks shall be compatible with EIA/TIA 606A color code labeling.
16. Jacks shall accept snap on icons for identification or designation of applications.
17. Jacks shall be marked for T568A and T568B wiring schemes. TIA 568B wiring shall be used in all terminations throughout the communications system.
18. All CAT-6 modular jacks and panels shall meet or exceed the following transmission characteristics:
  - a. Jacks shall be designed for 100 Ohm UTP cable termination.
  - b. Jacks shall be UL verified for TIA/EIA Category 6 electrical performance.
  - c. Jacks shall be UL listed 1863 and CSA certified.
  - d. Jacks shall be manufactured by an ISO 9002 registered manufacturer.
19. CAT-6, 8-pin modular jacks shall be:
  - a. Data Jacks shall be Hubbell # HXJ6OW or equal. Office White.
  - b. Data Jacks for Security Cameras shall be Hubbell #HXJ6GN-Green
  - c. Data jacks for Wireless Access Points shall be Hubbell #HXJ6Y-Yellow
  - d. Data jacks for backbone connectivity shall be Hubbell #HXJ6P-Purple
  - e. Data Jacks for IP/POE locks at doors shall be Hubbell #HXJ6W -White
  - f. Data Jacks for Audio and Video connections shall be:
    - 1) Hubbell #HXJ6BK-Black
  - g. Data Jacks for IP Clock connections shall be Hubbell #HXJ6OR-Orange
  - h. Data Jacks for Paging Systems shall be Hubbell #HXJ6BN-Brown

## 2.04 FACEPLATES

- A. Integrated furniture outlets, GFI style inserts and plates, and standard 106 style inserts and plates.
  1. These may be required at some surface raceway location. Field verify prior to ordering.
  2. The Contractors shall identify which type of outlet or frame is required at each location throughout the system.
  3. Match the outlet with the faceplate required.
  4. GFI, more commonly referred to as style line inserts, are rectangular and fit in a rectangular plate used for GFI receptacles.
  5. 106 style inserts are configured to fit in a common duplex electrical receptacle faceplate. The inserts hold 2 or 4 modular jacks.
  6. Each type of modular furniture has certain requirements for its voice and data modules. The Contractor shall coordinate with the furniture installer and provide the correct faceplate and outlets to match the color and style of the furniture.

7. For all connections that do not have a faceplate with a location for a laser printed paper label, the Contractor shall provide an engraved lamacoid label detailing the location number of each cable.
8. GFI/Style line Stainless Steel Plates shall be:
  - a. Single Gang, Hubbell #SS26
  - b. Double Gang, Hubbell #SS262
9. GFI/Style Line Inserts shall be:
  - a. Provide an insert to support all Modular jacks that are to be installed.
  - b. One Port Hubbell #NS611W
  - c. Two port, Hubbell # NS612W
  - d. Three port, Hubbell # NS613W,
  - e. Four port, Hubbell # NS614W
  - f. Six port, Hubbell # NS616W.
  - g. Blank, Hubbell #NS620W
10. 106 style inserts shall be:
  - a. Two port, Hubbell #BR106W
  - b. Four Port, Hubbell #Q106W
11. Examples



a. 106 Style      GFI/Style-Line

- B. Wall mount phone plates shall be stainless steel.
  1. Each plate shall be equipped with a CAT-6, 8 port modular jack.
  2. Each plate shall be equipped with stainless steel studs for mounting a wall mount telephone to the plate.
  3. Single gang wall mount phone plate shall be Hubbell #SP6F or #SP6R base on telephone type. Coordinate with owner prior to ordering.

## 2.05 SURFACE MOUNT BOXES

- A. Provide surface mount boxes for termination of cables as shown on the drawings.
  1. Install a surface mount box at location for termination of the modular jacks.
  2. One port surface box shall be Hubbell #HSB1OW.
  3. Two port surface box shall be Hubbell #HSB2OW
  4. Four Port Surface box shall be Hubbell #HSB4OW
  5. For all plenum rated ceilings and areas the contract shall provide plenum rated surface mount boxes. For Hubbell products. Add a "P" to the end of the part number.

## 2.06 CABLE SUPPORTS

- A. All cables shall be supported in the ceiling a minimum of every 5 feet. Support can be provided by installing cable inside cable tray or conduit, or by installing J-hooks every 5 feet.
  1. J-hooks shall provide a smooth steel or plenum rated plastic, support for cables as they route through the ceiling.
  2. Steel supports shall have a galvanized finish.
  3. Steel, UL listed, ultimate static load limit 50 pounds rated to support Category 5e and higher cables, and optical fiber cables.
  4. If required, assemble to manufacturer recommended specialty fasteners, including beam clips and flange clips.
  5. Acceptable products shall be:

- a. CADDY #CAT HP series with retainer hooks.
- b. CADDY #CAT-CM SERIES
6. Provide with interfaces and clamps required to support J-Hooks from the building structure.
7. Provide threaded rod and associated hardware required to support all J-Hooks
8. No more than 24 voice/data cables in each J-hook. Provide additional hooks as required.

#### 2.07 RACK MOUNTED PATCH PANELS

- A. Patch panels for termination of UTP cabling shall be provided to terminate all cables installed in the building.
- B. All patch panels shall be installed into 19" racks and/or cabinets as shown on the drawings.
- C. Provide panels to terminate all cables even if the panels are not specifically shown on the rack layout drawings.
  1. Provide the quantity and color of Modular jacks to match the color and quantity of all cables installed.
- D. Panels shall be steel and shall allow mounting of all CAT-6 and CAT-6A jacks. Panels shall be blank panels that accept all modular jacks.
- E. CAT-6 patch panels for mounting in a 19-inch rack or cabinet. Shall be;
  1. Panels shall be made of black anodized aluminum, in 24 and 48 port configurations.
  2. Panels shall accommodate 24 ports for each rack mount space or "U" (1U = 44.5 mm [1.75 inch]).
  3. Panels shall be manufactured with a rolled edge at the top and bottom for stiffness.
- F. 24 port empty patch panels shall be Hubbell #HPJ24 or equal
  1. Panels shall have rear cable support bar for strain relief which shall clip to the rear of the patch panel or to the rear of the rack rail.
  2. Each 24-port patch panel shall be equipped with one (1) rear cable organizer. Organizer shall be Hubbell #HPRCMB or equal.
  3. Ports shall be marked 1-24 on top of the openings by factory.
  4. Label all Panels for the panel, communications room and rack with a large laser-printed label.

#### 2.08 PASS THRU'S

- A. Where no pass-thru is provided by others the contractor shall install conduit or UL listed wall pass thru's sized as required to route all cables through all walls.
- B. Pass thru's shall be EMT conduit or another UL listed rated device.
- C. Install thru all drywall, block, concrete walls and through any floors required to be penetrated
- D. Conduit shall be supported mechanically from the wall or floor structure. After installation, the raceway shall be firestopped to meet the requirements of the wall or floor.
- E. Install a sticker on the wall, next to the pass thru, listing the UL approved method that was used to firestop the pass thru or conduit.

#### 2.09 PATCH CORDS

- A. Contractor shall provide one patch cord for each data cable installed. Patch cords shall be at the communications room.
  1. Provide a patch cord for each CAT-6 or CAT-6A cable installed
- B. Patch cords shall match the type of cables installed. Provide CAT-6 patches for CAT-6 cables.
- C. Patch cords shall be 8" or 12" long and shall match the color of the cable/jack they are being plugged into.
  1. Provide Yellow Patch Cords for Wireless Access Points
  2. Provide Green Patch Cords for Security Cameras
  3. Provide Blue Patch Cords for all other data cable connections.

### PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine all pathways prior to installation of all cables.
- B. Identify locations of all user conduits and backboxes prior to cable installation.
  - 1. Walk the site during conduit installation and ensure that all boxes are installed where required for termination of all cables.
  - 2. If any missing locations are not noted during electrical raceway installation the contractor shall be required to fish the wall or install surface raceway to support the cable terminations
- C. The Engineer or the Owner has the right to make adjustments to the location of any outlet to a new location within 7 wall-feet of the original location. If the change is made prior to final cable termination, and prior to any raceway being installed, then the changes shall be a no cost change to the contract.
- D. Identify all locations where cable will route through furniture raceway or other nonstandard conduit or raceway installation. Make arrangements to install and terminate all cables in accordance with TIA/EIA 568 standards.

### 3.02 PREPARATION

- A. Locate main path for all cables and install J-hooks where cable tray or raceway is not provided.
- B. Coordinate with other trades to install a clear, straight path down major corridors for the routing of user cables back to the communications closet.
- C. Plan installation of cables along cable ladder of rack system in communications room. All cable shall be neatly routed in groups of no more than 24 cables.

### 3.03 INSTALLATION

- A. CAT-6 cabling shall be installed according to TIA/EIA 568 standards, including all updates and addenda.
  - 1. When installing CAT-X cables, care shall be taken to avoid crimping or bending the cable past the manufacturer's recommended bend radius.
  - 2. During installation, the cables shall not be pulled across the ceiling tiles or the structure of the building. This may cause damage to the cable jacket.
  - 3. Adhere to all pulling tensions and bend radii during installation. Excessive pulling or bending can cause the cable to fail tests after installation. Any cable that does not pass the certification tests after installation shall be fixed or replaced at the Contractor's expense.
  - 4. All cables shall route neatly in the ceiling. Whether they route in cable tray or J-hooks, the cables shall be neat and orderly.
  - 5. Cables shall not be laying on or against the building structure. Cables shall not be laying on or against electrical or HVAC pipes.
  - 6. Cables shall not be installed between the building structure and corrugated steel of the roof deck.
  - 7. There shall be no more than 24 cables in each J-hook. Provide additional J-hooks as required.
  - 8. Support all cables at a minimum of every 5 feet.
  - 9. Provide a short coil of extra cable where the cable enters the vertical conduit. The coil shall consist of no less than 1-1/2 feet.
  - 10. Provide enough slack in the backbox to fully remove the faceplate and jack and allow work to be done on the cable.
  - 11. When installing cables in the communications room, all cable shall route neatly through the cable tray and cable ladder.
  - 12. When transitioning from the ceiling area to the cable ladder of the rack system, all cable shall route through conduits or be attached to vertical section of cable ladder.

- The Contractor shall provide the conduits shown and any additional conduits or cable ladder required to neatly transition cables from the ceiling to the rack.
13. Bundle cables in groups of no more than 24 cables as it routes along the cable ladder.
  14. Cables shall route down each side of a rack for termination. Split each panel into 2 sides. The first 12 positions on a panel are on the left, and positions 13 through 24 are on the right. Route the cables for panel positions 1 through 12 down the left cable ladder and route the cables for positions 13 through 24 down the right cable ladder.
  15. Each patch panel shall utilize a rear organizer for holding the cables as they route to the punchdown field.
  16. Cables shall be bundled in groups of 4 as they route through the rear cable organizer.
  17. When terminating cables, ensure that the smallest amount of jacket is removed from the final termination point of the cables.
  18. Pair twists shall be maintained up to the IDC jack for all the cables.
  19. Provide a service loop of the cables on the vertical cable ladder. The loop shall extend no less than 1 foot below the termination point on the patch panel. Route the cables 1 foot below the patch panel, and then back up to the panel. This will provide room for future moves and additions to the rack.
  20. Each cable shall have a self adhesive, self laminating, laser printed label at each end. The label shall show the location identifier of that cable. Labels shall be installed no more than 4 inches from the termination point of the cable.
- B. All work on the project shall meet all applicable state, federal, local and industry codes and be installed according to the requirements of the Authority Having Jurisdiction (AHJ).



**Detail 01.** Proper routing and support of cables on rear organizer. Where possible route 12 cables from right side and 12 cables from left side. This rack in picture did not have right side organizer.

- C. CAT-6 data jacks shall be installed at the user end of each UTP cable installed in the system.
  1. Jacks shall be installed to provide minimal signal impairment by preserving wire pair twists as close as possible to the point of mechanical termination.
  2. Jacks shall be installed per manufacturer's instructions and properly mounted in plates, frames, housings, or other appropriate mounting devices.
  3. Jacks shall be installed such that cables terminated to the jacks maintain minimum bend radius of at least 4 times the cable diameter into the workstation outlet. Cables

- shall be terminated on jacks such that there is no tension on the conductors in the termination contacts.
4. See drawings for the color requirements of all modular jacks.
- D. Faceplates shall be mounted straight and level with the floor and walls of the building.
1. Jacks and/or connectors shall be terminated to the appropriate cable and inserted in the correct orientation into the faceplate prior to the mounting of the faceplate.
  2. Jacks shall be inserted into the faceplate left to right, then top to bottom. 2 gang plates shall be labeled left to right, then top to bottom for each gang.
  3. Cable slack shall be stored behind the faceplate in such a way that allows the minimum bend radius of the cables to be maintained as per the following:
  4. Care shall be taken when mounting the faceplate to avoid crimping or kinking the cables.
  5. Faceplates shall be securely mounted to a surface mounted housing, a recessed box, or box eliminator bracket.
  6. Each faceplate shall be labeled with laser printed paper inserted behind the clear plastic label strips.
  7. The label shall show the location identifier of the faceplate and the letter designation for each cable. The label shall be as large a font as possible and easily readable.
  8. Each faceplate comes with a label strip at the top and the bottom.
- E. Wall mount phone plates shall be mounted to a backbox or a drywall ring securely installed to the wall.
1. Terminate the cable to the 8-position jack on the wall mount faceplate.
  2. Ensure that the faceplate is at the correct height for all ADA requirements.
  3. Provide an adhesive label on the faceplate identifying the cable with its location identifier number.
- F. When utilizing 106 style or GFI/Style-Line brackets, the Contractor shall provide self adhesive labels detailing which cable is at each position.
1. 106 plates and GFI plates will primarily be located in floorboxes or surface raceway.
  2. The contractor shall coordinate the faceplates required with the actual floorboxes installed by the electrical contractor.
  3. Provide the quantity of GFI and 106 style plates required.
- G. Surface Mount boxes
1. Modular Jacks and/or connectors shall be terminated to the appropriate cable and inserted in the correct orientation into the surface mount box.
  2. When the surface mount jack is mounted above the ceiling the cable shall be coiled and the cable and surface mount box shall be kept off of the ceiling grid
  3. Attach the coil to the building structure with a plenum rated tie-wrap.
  4. Label each surface mount box for the cable number. Also, install a wrap-around label on each cable.
  5. When attaching a surface mount box to a piece of furniture or to a power pole the contractor shall drill a hole in the furniture/pole that is larger than the hole on the back of the surface box.
  6. Screw the surface box to the furniture or to the pole. Adhesive only solutions are not adequate.
- H. Proper support of cables is of paramount importance when installing a cable infrastructure. All cables not in conduit or cable tray shall be supported via J-hooks a minimum of every 5 feet.
1. Routes of cables shall be parallel or perpendicular to the walls of the building.
  2. Install the J-hooks to minimize changes in the level of the cables as they route through the J-hooks.
  3. Do not install more than 50 cables in any 1 J-hook. Provide additional hooks where more than 50 cables route along a main route.
  4. All communications shall route as high in the ceiling as possible while still being accessible and staying away from other utilities.

5. When installing the cable through the J-hooks, they shall all have relatively the same droop between hooks. All cables shall be installed neatly and squarely.
  6. Secure the J-hooks to the building structure with beam clamps and threaded rod as required to support the cables.
  7. J-hooks shall never be attached to drop ceiling support wires. Cables shall never be supported by drop ceiling wires.
- I. CAT-6 patch panels shall be installed in the racks.
1. Panels shall be installed to provide minimal signal impairment by preserving wire pair twists as closely as possible to the point of mechanical termination. The amount of untwisting in a pair as a result of termination to the modular jack at the patch panel shall be no greater than a 1/2 inch (13 mm).
  2. Panels shall be installed per manufacturer's instructions and properly mounted to a rack, cabinet, bracket, or other appropriate mounting device.
  3. Panels shall be installed such that cables terminated to the panel can maintain minimum bend radius of at least 4 times the cable diameter into the IDC contacts. Cables shall be terminated on the panels such that there is no tension on the conductors in the termination contacts.
  4. Each patch panel shall have a rear cable organizer for routing cable from the vertical cable ladder to the patch panel. 1 organizer for each row of 24 cables.
  5. The label for each outlet on the panel shall be the same as the wraparound label on each end of the cable.
  6. Each label shall line up directly below or above the outlet on the panel. Misaligned labels will not be permitted.
- J. Patch Cords
1. Provide patch cords into the communications room where they are to be installed
  2. Mark the box with the date they are placed in the room and quantity of each type of patch cable.
  3. Send picture of the box to the designer and owner

**END OF SECTION 281600**



## **SECTION 28 1700 – CLOCK SYSTEM -IP-Poe**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section provides a project overview and general project and Contractor requirements for the Internet Protocol (IP) Power over Ethernet (PoE) clock system

#### **1.02 DESCRIPTION OF PROJECT**

- A. The building shall receive an entirely controlled master clock system and associated IP clocks. CAT-6 cables shall be used from the clock to the comm room for connectivity. See drawing and specs for contractor that is to install the cables
  - 1. The system shall consist of, but not be limited to clocks and antenna systems that transmit the time to the clocks.

#### **1.03 CONTRACTOR**

- A. The Contractor shall accept complete responsibility for the installation, certification, and support of the system. Contractor must show proof that they have the certifying manufacturer's support on all of these issues.
- B. All work shall be performed and supervised by technicians and project managers who are qualified to install the clock system and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. The manufacturer of the wireless master clock system shall have been designing, manufacturing, and installing systems for a period of no less than 3 years.
- B. Approved manufacturers for the paging bell system are:
  - 1. Sapling
  - 2. Others as equal.

#### **2.02 MATERIALS**

- A. Master Clock System:
  - 1. The Contractor shall provide a fully functional, IP based controlled master clock system.
  - 2. The clock system shall consist of all software and electronics required to provide accurate time at each clock. This shall include, but not be limited to, software, configuration, wiring, and all clocks located throughout the building.
  - 3. All clocks shall be connected to the Ethernet network and controlled through a network attached NTP server.
- B. Digital IP Clocks:
  - 1. All clocks shall be digital clocks with Red Digits.
  - 2. Clocks shall have integral receivers that attach to the Ethernet network and derive power from the PoE on the Ethernet cable.
  - 3. Provide custom backbox for flush mounting in new walls.
    - a. Provide backbox to electrical contractor or cabling contractor who is installing raceway.
  - 4. Provide custom backbox for surface mounting in existing walls. Provide raceway to accessible ceiling from the backbox.
  - 5. Clocks shall be self-correcting at a minimum of each hour.
  - 6. Clocks shall have the following specifications or better:
    - a. Power over Ethernet (802.3af protocol)

- b. Power and synchronize clocks through one Ethernet cable using RJ45 connector
  - c. Control all of your settings like Daylight Saving Time and countdown functions through an easy-to use web interface
  - d. Scheduled dimming schedules for digital clocks
  - e. Edit a specific clock's settings or apply settings to the entire clock system through one location
  - f. Available in different sizes
    - A) 2.5" (6.35 cm) display
    - B) 4" (10.16 cm) display
    - C) 4-digit display
    - D) 6-digit display
  - g. Automatic bi-annual Daylight Savings Time
  - h. Alternating time/date in both U.S and International formats
  - i. 12 or 24-hour display
  - j. Four levels of adjustable brightness
7. Digital PoE, IP clocks shall be Sapling SBP-3100 series, includes surface mount housing:
- a. Sapling Digital, IP, 3100 Model, 2.5", 4 Digits, PoE, Red Display, Surface Mount #SBP-31S-254-0R

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Contractor shall be familiar with the location(s) where the work will be done. No additional compensation will be made for items the Contractor claims he was not aware of during bidding.
- B. Work Area:
  1. All work areas shall be cleaned at the end of each day. All debris shall be cleaned and removed from the site and disposed of in the approved container for the site.
  2. All equipment shall be moved out of common areas and stored in the Contractor's lay down area, or in other approved storage locations on site.
  3. Any work that is low hanging, or may otherwise impede the general use of the space, and cannot be removed shall be flagged and cordoned off by the Contractor.
- C. All equipment and parts shall be installed in a neat and workman like manner. Good installation principles shall be used throughout the project.

#### **3.02 INSTALLATION**

- A. Clock Configuration.
  1. Configure each clock to point to the same NTP servers.
  2. Configure for each clock.
    - a. Configure each clock with an IP address
    - b. Name all clocks in the system
    - c. Configure dimming schedules of each clock.
  3. All clocks shall be set to exactly the same time. The Contractor shall verify the correctness of the clocks.
  4. The clock system shall run for a minimum of 2 weeks prior to being turned over to the Owner. During that time, the Contractor shall keep a daily log of the time and ensure that the system is keeping the correct time each day. Any variations from the accepted standard time shall be noted and shall be corrected by the Contractor. The system

shall not be turned over to the Owner until 2 straight weeks have passed during which the system has been shown to keep the correct time.

- B. Clock Connectivity
  - 1. Confirm with the cabling contractor (if cables are being installed by another contractor) how the cables shall be installed and terminated.
  - 2. Provide with all patch cables required at each end. At clock and at comm room
  - 3. Plug in each clock and confirm power and network connectivity
- C. Surface Mount Clocks
  - 1. Identify location of backboxes with electrician prior to installation.
  - 2. Install surface mount boxes to the backboxes in the wall.
  - 3. Connect network cables
- D. All clocks shall be installed straight and level.

**END OF SECTION 281700**

## **SECTION 281800 – PAGING SYSTEM**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section provides detailed specifications for the expansion of the existing audio paging system in the building.

#### **1.02 DESCRIPTION OF PROJECT**

- A. The building shall have an expanded audio paging system into the new areas of the building.
  - 1. Connect the new paging amplifier to the existing system. New system shall extend the existing audio into the new kitchen areas.
  - 2. Speakers shall be installed where shown on the drawings. The different paging zones shall be wired individually for occupied spaces.

#### **1.03 SHOP DRAWINGS**

- A. Shop drawings shall be submitted by the Contractor for approval prior to installation of the work. The shop drawings shall show all data relating to the structural, electrical, wiring diagrams, etc.
- B. The wiring and connectivity to be added to any racks and wallfields shall further be shown. Changes shall be reflected on existing layouts where applicable. For all new racks or wallfields required, the Contractor shall show a total elevation view of the layout.
- C. Shop drawing shall specifically detail speaker zones and their associated zone designations.

#### **1.04 CONTRACTOR**

- A. The Contractor shall accept complete responsibility for the installation, certification, and support of the system.
- B. All work shall be performed and supervised by technicians and project managers who are qualified to install Integrated paging systems and cabling and to perform related tests as required by the manufacturer in accordance with the manufacturer's methods.
- C. The vendor (including Subcontractor(s) if any) shall have a proven track record in paging system configuration and installation. This must be shown by the inclusion of details of at least 3 projects involving the installation of like sized systems that have been completed by the vendor in the last 2 years.

### **PART 2 - PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. The manufacturer of the paging system shall have been designing, manufacturing, and installing systems for a period of no less than 5 years.
- B. Approved manufacturers,
  - 1. Biamp
  - 2. Valcom
  - 3. AtlasIED
  - 4. Bogen
  - 5. Others as approved.

#### **2.02 MATERIALS**

- A. General Audio Amplifier
  - 1. All amplifiers shall be rack mounted.
  - 2. Amplifier shall employ a safety system to protect itself and speakers from line shorts, thermal overload, power surges, signal degradation, and signal overload.

3. Inputs shall be 3.5mm or direct wired connectors
4. Amplifier shall be capable of mono or stereo output and processing.
5. Input sensitivity of .05 percent at 8 ohms, 1 kHz or better
6. Amplifier shall have LED's showing that the input is connected, that 1 or more of the protections for the unit have been activated, and that the unit has activated its output limiters.
7. Frequency response of 20HZ to 20KHz
8. Audio amplifier shall be QSC SPA series or equal.
9. See table for different amplifier types
10. Channels 2 4 2 4
11. Stereo Mode (all channels driven)
12. 8Ω 60 W 60 W 200 W 100 W
13. 4Ω 60 W 60 W 200 W 100 W
14. Bridged Outputs (per bridged output pair)
15. 8Ω & 4Ω 200 W 200 W 400 W 200W
16. 70V 250 W 250 W 350 W 350 W\*
17. 100V 250 W 250 W 350 W 350 W\*

QSC Part #	SPA2-60 2-channel	SPA4-60 4-channel	SPA2-200 2-channel	SPA4-100 4-channel
Stereo mode @4&8 OHM	60W	60W	200W	100W
Bridged @4&* OHM	200W	200W	400W	200W
70/100 volt bridged	250W	250W	350W	350W

- B. The actual system electronics shall be capable of being mounted in a standard 19-inch relay rack or being mounted on a communications wallfield.
1. Power shall be from a standard 110V AC outlet or UPS system.
  2. System shall have a ground connection that can be attached directly to a telecommunications ground bar.
  3. If the system is to be installed in a 19" communications rack or cabinet, the contractor shall provide that cabinet.
- C. Speakers for all drop-ceiling areas, unless otherwise noted shall be 8 inch speakers that fit directly into the drop ceiling tile.
1. Speaker shall be an 8-inch loudspeaker with a painted white baffle.
  2. Each speaker shall have a 6oz. magnet.
  3. Sensitivity shall be 95dB at 4ft/1W.
  4. Speaker voltage shall be 25 or 70 volt.
  5. Provide a tile bridge with each speaker for installation in a standard drop ceiling.
  6. Provide a back can for each speaker.
  7. Speaker shall have taps at 1/8W, 1/4W, 1/2W, 1, 2 and 4 watts.
  8. Each speaker shall have an individual volume control on the speaker.
  9. Paging system speakers for drop ceilings shall be Atlas Sound # SD72WV or equal.
  10. Where the speaker shall be mounted flush into the drywall the contractor shall provide a backbox for the speaker.
- D. Cables:
1. The contractor shall install all cables required for connectivity of each speaker zone throughout the building. All cabling routed above the drop ceiling shall be plenum rated.
  2. Install cabling required for connection of the paging system to a control PC in the administration office.
  3. All cabling required for complete system functionality and control and interface with the telephone system shall be installed, labeled and terminated by the contractor.
  4. Label the cables with a wrap-around label at each speaker and at the paging system. Label it for the zone to which it is connected.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL INSTALLATION**

- A. Contractor shall be familiar with the location(s) where the work will be done. No additional compensation will be made for items the Contractor claims he was not aware of during bidding.
- B. Work Area:
  - 1. All work areas shall be cleaned at the end of each day. All debris shall be cleaned and removed from the site and disposed of in the approved container for the site.
  - 2. All equipment shall be moved out of common areas and stored in the Contractor's lay down area, or in other approved storage locations on site.
  - 3. Any work that is low hanging, or may otherwise impede the general use of the space, and cannot be removed shall be flagged and cordoned off by the Contractor.
- C. All equipment and parts shall be installed in a neat and workman like manner. Good installation principles shall be used throughout the project.
- D. All cables routed above the drop ceiling or in the ceiling area shall be installed square to the building. Diagonal cable runs are not permissible.
- E. All cut edges of conduits, boxes, raceway, etc., shall be trimmed and filed so that no burrs or rough edges will damage cable as it is installed.
- F. If in the course of the work, the Contractor damages, marks, or misplaces any ceiling tiles the Contractor shall repair, and or replace the ceiling tile to the original condition.
  - 1. the Engineer shall decide if ceiling tiles have been damaged, and based on the Contractor's proposed fixes, shall decide the best course of action to repair any damage done by the Contractor to the ceiling tiles.
- G. It shall be the responsibility of the Contractor to repair any damage done to the structure or finishes in the building by the Contractor. The building shall be returned to its original condition prior to final sign off of the project.
- H. The Contractor shall be responsible for locating the speakers of the audio systems in each room. The speakers shall be installed to provide complete coverage with no "dead" spots. Approximate locations are shown on the drawings, the Contractor shall review these and advise the Engineer of any proposed changes prior to installing speakers.

#### **3.02 NEW PAGING SYSTEM INSTALLATION**

- A. The electronics and components of the paging system shall be located in the communications room or where directed by the owner.
  - 1. All components shall be mounted in a 19" rack or cabinet or mounted on the wall.
  - 2. Locate the components as required for connections to power and the ground bar. Insure that the components are securely mounted to the wall.
  - 3. The Contractor shall install all cables required for connection of the components to the speakers and the administration PC.
  - 4. All connectivity cables shall be labeled with laser-printed, wrap around labels detailing what they connect to.

#### **3.03 CABLING INSTALLATION**

- A. All cabling for connection of the speaker shall be routed above the drop ceiling or in other raceways as required. No speaker cabling shall be visible other than in the communications room.
  - 1. Paging speaker cabling shall be terminated on terminal blocks on the communications wallfield.
  - 2. All speaker cabling shall be labeled at each end and at each interconnection point for those cables that serve multiple speakers. The labels shall display the extension number of the group of speakers that are connected. Along with the extension number, the label shall reflect the room if it is a specialized use room, such as ART, GYM, CAF, etc.

3. Speaker cables shall be routed through the ceiling and supported the same as voice and data UTP cabling is supported. Cables shall route through cable tray or J-hooks.
4. All speaker cables shall be supported a minimum of every 5 feet. No cables shall be supported directly by the building structure, conduit, or mechanical piping.
5. Cables shall be terminated in sequence on the terminal blocks according to extension/room number.
6. Speaker cables shall not be in the same J-hooks as data or telephone cables. Provide additional J-hooks as required.

#### 3.04 SPEAKER INSTALLATION

- A. Speakers mounted in the drop ceiling shall be fit into the ceiling supports. Where additional support is required, the Contractor shall work with the Ceiling Contractor to see that the support is installed.
  1. Speakers shall be located to provide maximum coverage possible in each room or each area. Changes from the drawings in the location of speakers are acceptable, but must first be approved by the Engineer.
  2. Contractor shall work with the ceiling installer and others prior to and during installation of the speakers. The Contractor shall identify the ceiling tiles that will not need to be installed because a speaker will be installed in those spaces.
  3. The cable connecting to the speaker shall be supported directly over the speaker from a J-hook. The Contractor shall provide extra cable so that the speaker can be lifted from the tile and moved without causing a disconnection of the cable. Provide a minimum of 5 feet of spare cable above the speaker.

#### 3.05 MISCELLANEOUS SYSTEM INSTALLATION

- A. The Contractor shall identify where the volume controls are to be located, and install the cable required to connect the speaker or group of speakers to that volume control.
  1. Where volume controls are centrally located at the headend of the paging system, the Contractor shall design the layout of the controls on the wallfield and submit that design to the Engineer for approval.
  2. Each volume control on the wallfield shall be marked with an engraved phenolic label that details the extension of the speakers the volume serves as well as the common name of the room, such as ART, GYM, etc.
  3. Phenolic labels shall be adhesive and shall be attached to the plate of the volume control.
- B. The Contractor shall be responsible for all aspects of the sound of the system once installed.
  1. The sound of the system is of utmost importance to the Owner. The Owner requires a system that is intelligible when the space is occupied or unoccupied.
  2. Each room shall be tuned and the tap value of each speaker shall be set to provide the best sound possible.
  3. The Contractor shall go into each room and conduct a listening test to determine that the sound is intelligible and that the gain is not set too high. This shall be done in each room and each area.
  4. Prior to acceptance of the system, the Contractor shall conduct a system walk-thru with the Owner and the Engineer.
  5. The walk-thru shall consist of entering each room, making a call from a telephone and making an announcement into that room through the paging system.
  6. The Owner and Engineer will be checking for complete coverage in each room and correct volume setting of the speakers and the associated volume controls. Any changes required shall be the responsibility of the Contractor.

**END OF SECTION 281800**

## **SECTION 283500 – ACCESS CONTROL SYSTEM FOR PLC SYSTEM**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section includes parts and equipment required for installation and termination of an expansion of the existing access control system.
- B. The existing system is a Syntinel Physical Access Control System (PACS). This system shall be referred to as the “security system”, “system” or PACS throughout these specifications.

#### **1.02 SYSTEM DESCRIPTION**

- A. There is an existing Syntinel Security system in place for the existing building. This shall be expanded to support new doors and cameras and intercoms.
- B. The security system shall be supplied and installed by a Contractor able to show examples of similar projects and installations within the last 3 years.
- C. The security system shall serve the building but shall be able to be expanded to serve additional buildings in the future.
- D. The Security System shall provide a solution for access control and alarm monitoring. This shall be through a central server with PC attached workstations for monitoring and control. Shall include:
  - 1. Access Control
  - 2. Audio intercoms
- E. Contractor shall provide all software required for connection of the security system to the in-house data network and associated control PC's.
- F. The security system client-server architecture shall communicate with native TCP/IP over an existing Ethernet TCP/IP enterprise network.

#### **1.03 COORDINATION**

- A. All cables shall be coordinated with the door hardware and security devices being installed as part of this project.
- B. PACS cable shall be a unique color from the Telecommunications cable, fire alarm cable and lighting control cable. Coordinate this with the Electrical Contractor prior to ordering the equipment and installation of the cables.

#### **1.04 PROJECT PLAN**

- A. Prior to ordering equipment and installation, the contractor shall provide a project plan to the owner and contractor that describes the system and its capabilities and the possible configurations.
- B. Provide a project approach which describes the installation and implementation plan and schedule and all sequencing.
- C. Meet with the owner numerous times to determine how the system should work and how it should be monitored.
  - 1. Configure the system prior to installation to meet these requirements. Demonstrate the system use to the owner prior to installation and obtain approval to move forward with the installation.
- D. Generate a testing plan and have that plan approved by the owner and engineer prior to installing the system.
- E. The system shall be installed and tested prior to cutting over any doors to the system. Provide and install temporary card readers, door contacts etc to the system for testing. Demonstrate that this works prior to cutover.
- F. Conduct all testing of the system



- G. Conduct user training on the system
- H. Provide as-built documentation of the installed system

#### 1.05 RELATED STANDARDS

- A. The security system shall conform to the following international and national standards:
  - 1. FCC Rules and Regulations
  - 2. UL 294 Access Control Systems
  - 3. UL 1076 Line Supervision
  - 4. 21 CFR part 11
  - 5. Part 15, Radio Frequency Devices
  - 6. National Electrical Manufacturers Association (NEMA.)
  - 7. Applicable Federal, State and Local laws, regulations, codes
  - 8. National Electrical Code (NEC)
  - 9. NFPA 80 National Fire Protection Agency - Fire Doors & Windows (edition is jurisdiction dependent).
  - 10. NFPA 101 National Fire Protection Agency - Life Safety Code (edition is jurisdiction dependent).
  - 11. NFPA 105 National Fire Protection Agency - Smoke Control Door Assembly (edition is jurisdiction dependent)
  - 12. ANSI 117.1 1992 Edition Providing Accessibility and Usability for Physically handicapped People.
  - 13. A.D.A.A.G Americans with Disabilities Act Accessibility Guidelines.

## **PART 2 - PRODUCTS**

### 2.01 MANUFACTURERS

- A. Approved vendors for security cables are:
  - 1. General Cable.
  - 2. Belden.
  - 3. West Penn Wire and Cable.
  - 4. Equivalent manufacturers.
- B. Approved software are:
  - 1. Access control system Syntinel from Securus
  - 2. Approved software for audio intercoms is Gatekeeper
- C. Approved vendor for Physical Access Control System (PACS) equipment is:
  - 1. Allen Bradley
  - 2. Harding
  - 3. Other manufacturers as approved PRIOR TO BID. Submit pre-bid RFI requests for other products.
    - a. Systems submitted as part of the base bid that were not pre-approved in writing during bidding will not be reviewed.
- D. As part of the bid the contractor shall explicitly detail the software package that is provided and shall provide a document showing all software available from the manufacturer.
  - 1. The document shall explicitly state which software is provided as part of the bid and shall detail other software available but not provided as part of the bid.
  - 2. We require this to be able to determine the level of software available and will allow us to fully review the system as a whole.

### 2.02 DESCRIPTION OF PROJECT

- A. The system shall include all equipment, software, cabling, data collection points, card readers and hardware to monitor and control the specified areas and provide reports to a security station as required by the owner.
- B. The system shall keep records of all access control card presentations.
- C. The system shall connect to and interoperate with all the door hardware that which is existing and being added as part of this project.
- D. The Owner shall be able to change and monitor all settings for access to all the buildings through the control PC.

## 2.03 MATERIALS

- A. All security and control cables shall be plenum rated.
  - 1. Contractor shall provide all appropriate cable from the door security hardware to the security system. All cabling shall be plenum rated.
  - 2. Some locations require outdoor rated cabling. The contractor shall provide the cabling to match the required area.
  - 3. There will be requirements for many different types of cabling and the contractor shall provide for each.
  - 4. Provide a coil of cable at each location for moves and maintenance.
- B. The system shall be fully configurable and compartmentalized so that any user can be assigned and they will only see the status of doors at one building.
  - 1. Based on a user's login, the system shall be configurable to restrict persons from seeing or controlling doors and lock schedules at building that they do not have permission to see or control.

## 2.04 SECURITY SYSTEM SERVER

- A. Management Server:
  - 1. Management servers is existing.
  - 2. Base system software is existing
  - 3. Existing software is Syntinel. Match and expand existing
  - 4. Existing intercom system is Hammond. Match and expand system.
  - 5. Add new licensing and expansion of the software to support all new devices and doors.

## 2.05 SECURITY ENCLOSURE

- A. Shall be provided to hold power supplies, controllers, access control panels, card reader panels, input/output cards (now to be referred to as security panels) and any other components required for a complete access control system.
- B. Security enclosures are the physical boxes and cabinets that support the intelligent controllers, I/O boards, power supplies and power distribution equipment.
- C. Security panels shall be wall mounted and large enough to hold power equipment and access control system controllers and cards.
- D. Security panel shall be:
  - 1. UL: Listed: UL 294 approved
  - 2. Enclosure shall accommodate power supply and sub-assemblies such as controllers and security cards to be provided as part of the project.
  - 3. Primary power input shall be 115VAC
  - 4. Physical
    - a. Size enclosure as required to hold power supplies and security panels. Provide multiple enclosures where required.
    - b. Made of 16 AWG sheet metal
    - c. Shall have conduit knockouts or custom cut holes for access to the panels for cabling.
    - d. Be equipped with an internal cam lock

- e. Be equipped with a tamper switch that shall be wired to the I/O for software alarm when the panel is opened.
- f. Shall have space for batteries to support the access control system.
5. Equip with a backplate that shall support direct mounting of the security panels and power devices
6. Equip with magnetic cable supports that attach to the backplate to support cables.

## 2.06 POWER SUPPLIES AND POWER DISTRIBUTION

- A. Power supplies and power equipment shall be provided that support the entire access control system, security panels/controllers, door locks and all other field equipment of the access control system.
- B. All power supplies shall be connected to 120VAC power with a hardwired connection. Install cable and connect to power.
  1. Provide and install conduit, wiring and connections required for 120-volt power connectivity.
- C. Power supply shall be mounted to the enclosure. Shall include:
  1. Shall provide power to the panels in the enclosure and field devices.
  2. Shall include multiple 12 or 24 volt outputs. Shall be settable on the panel
  3. Input voltage of 120VAC with a fuse
  4. Classified as a Power-Limited stand-alone power supply with stand-by battery and suitable to power sensors and electro-mechanical devices (e.g. electric door strikes), as defined in the National Electrical Code/NFPA70/NFPA72
  5. Shall be sized for outputs of 1 thru 16 unique outputs.
  6. Battery connection for charging on-board batteries.
  7. Fire alarm disconnect
    - a. Shall support Normally Open or Normally Closed trigger
    - b. Shall be set to latching or non-latching
  8. LED indicators for:
    - a. AC input
    - b. DC output
    - c. Battery discharged or no battery
  9. Over Voltage protection
  10. Short Circuit protection
- D. Access Power Controllers
  1. The Power Controller shall have the following characteristics:
    - a. Powered by 12 VDC or 24 VDC from the power supply/charger board or via 8-Pin connector to stack with Voltage Regulator for dual voltage (12VDC & 24VDC) outputs from a single 24VDC input, up to 6 Amps
    - b. Spade lug connectors to facilitate the transfer or sharing of 12VDC and/or 24VDC power between Access Power Controllers or Power Distribution Modules
    - c. 8 trigger inputs to correspond with similarly numbered triggered controlled outputs, with each trigger input being in one of the following forms:
      - 1) Normally open (NO) contact
      - 2) Open collector
    - d. 8 independently trigger-controlled outputs with the following output options:
      - 1) Fail-Safe filtered and electronically regulated power outputs
      - 2) Fail-Secure filtered and electronically regulated power outputs
      - 3) Form "C" relay outputs, rated 5 amps @ 28 VDC/VAC.
      - 4) For each triggered output, LED indication of an active output.
      - 5) Bi-colored LEDs for visual verification of voltage (12VDC or 24VDC) per output
      - 6) An unswitched auxiliary power output, rated at 2.5 amps (fused) or 2 amps (PTC), used in lieu of a trigger-controlled output.

- 7) Fuse protected
  - E. Power Distribution board with voltage regulator.
    1. The Power Distribution Module shall be a UL Listed Sub-Assembly board level product comprised of fused protected outputs to furnish 12 VDC, 24 VDC or 24 VAC power to surveillance, security, access control systems and components, and other security-related equipment.
    2. Power distribution module shall include:
      - a. The Power Distribution Module shall employ a single distribution board.
      - b. The Power Distribution Module shall output 5VDC to 24VDC up to 10A each or 16VAC to 28VAC up to 14A each.
      - c. Fused protected outputs.
      - d. Individual voltage LEDs indicate 12VDC (Green) or 24VDC (Red and Green)
    3. Modules shall provide for:
      - a. Dual Power Supply Inputs.
      - b. Outputs shall be switch selectable as to route power via Input 1 or Input 2.
      - c. Shall be stacked with a voltage regulator and connected via eight (8) pin connector.
      - d. Individual voltage LEDs indicate 12VDC (Green) or 24VDC (Red and Green).
      - e. individually fused device protected outputs.
  - F. Battery Backup
    1. The enclosure shall have battery backup UPS circuit with built-in battery charger that shall provide automatic battery backup UPS power in event of AC line failure.
    2. Each controller enclosure panel shall have a battery for power failure. Battery shall be fully enclosed in a metal cabinet.
    3. The battery shall provide for full UPS operation for a minimum of 30 minutes
- 2.07 ETHERNET ADAPTER AND ETHERNET PROCESSOR
- A. The Contractor shall provide intelligent controller modules / cards for the security system that utilize a true distributed processing technology with local processing at each controller.
    1. Shall provide for an open architecture.
  - B. One module per communications room or immediate adjacent enclosures shall provide for communications with the server/software via on-board 10BaseT/100BaseTX Ethernet port and support encryption as a minimum security implementation.
  - C. In the event system communications is lost or the server fails, all networked intelligent controller, (controllers or security panels or modules, terms will be used interchangeably) shall provide complete control, operation, and supervision of all monitoring and control points based on the latest database information.
  - D. See drawings for part required for the PLC system.
  - E. I/O Cards/Modules shall be installed in the enclosures and attached to the controller to allow input and output to the field devices throughout the building(s).
    1. Provide additional modules or boards to support all control, access and security points shown on the drawings and described in the specifications.
      - a. I/O boards shall pop in and pop out. Replacing a board for a certain point shall not require shutting the entire controller down.
    2. Modules shall be installed to connect to the field devices, including but not limited to:
      - a. Door contacts,
      - b. Request to exit devices,
      - c. Push buttons/Panic buttons
      - d. Toggle Switches
      - e. Assisted door opener devices and door opener buttons
      - f. Motion sensors.
      - g. Strobe lights
      - h. Embarrassment alarms / exit alarms
      - i. Lockdown buttons with Lockdown Status Light

- j. Other field devices noted
- k. All other security devices required and shown on the drawings.
- 3. Modules shall translate information from the field devices to the controller and thus the server for records and access control.
- 4. I/O Card shall be provided that serve access control devices such as door contacts and garage contacts. These cards shall provide alarms when the contact is "open". The time before alarm shall be fully configurable by the owner.
- 5. Output types shall be digital/analog for control of doors. In addition to the door output, the control module shall contain auxiliary outputs for ON/OFF control of other devices.
- 6. Shall provide inputs and outputs to monitor and control non-reader-based system points, such as door contacts, motion sensors, gate actuators, ADA Buttons and ADA openers etc.

## 2.08 CREDENTIALS

- A. All credentials are existing.

## 2.09 DOOR LOCKING DEVICES

- A. Electric Latch "EL" on drawings
  - 1. The door hardware installer will install an Electric Latch device at each door equipped with a card reader or as shown on the drawings. The security contractor shall wire from the EL device to a power supply in the communications room and then to the door controller in the communications room.
  - 2. Provide cards in the controller panel and equipment to allow the security system to interface with the EL.
  - 3. The EL shall be able to be held open based upon a time schedule put forth in the security system. It shall also be able to be retracted upon presentation of a valid card or fob to the card reader.
  - 4. Wire to the Electric Latch and full integrate it into the security system.
  - 5. Wire from the EL to the controller in the comm room to allow control of each individual door.
- B. Latch Retraction device: "LR" on drawings
  - 1. The door hardware installer will install a Latch Retraction device as shown on the drawings.
  - 2. Provide and install a power supply in the communications room to power the LR device. Review the door hardware and match the power supply to the Latching Retraction devices. Provide quantity as required to power all LR devices
  - 3. The security contractor shall wire from the LR device to a power supply in the communications room and then to the controller panel in the communications room.
  - 4. Provide cards in the controller panel and equipment to allow the security system to interface with the LR.
  - 5. The LR shall be able to be held open based upon a time schedule put forth in the security system. It shall also be able to be retracted upon presentation of a valid card or fob to the card reader.
  - 6. See door hardware specifications for transfer hinge and wiring harness provision plans.
    - a. If wiring harness is provided as part of door hardware:
      - 1) Wire from door harness, through raceway and back to the power supply in the comm room. Wire to security panel for control of the door.
      - 2) Provide custom wiring and connectors to connect to the wiring harness
    - b. If no wiring harness is provided as part of the door hardware.
      - 1) Wire from the LR, through the hinge and back to the Power Supply in the comm room. Wire to security panel for control of the door.
    - c. Provide manufacturers recommended cabling type and wire gauge.

## 2.10 READER DEVICES

- A. Card Readers: "CR" on drawings
  - 1. See drawings for card readers to be installed

## 2.11 DEVICES AT THE DOOR

- A. Door Contacts; "DC" on drawings
  - 1. Contractor shall install magnetic door contacts in the top of each door required to be monitored. See drawings for door contact "DC" locations.
  - 2. Install industry standard magnetic door contacts into the top of the door and the matching contact into the header of the door.
  - 3. Contacts shall be compatible with the security/access system provided. Each contact point shall be defined in the software and shall be given an alphanumeric designation.
  - 4. Contacts shall connect back to the controller via wire installed by the Contractor.
  - 5. In locations where there are double doors, two contacts shall be installed and the connections shall be made so that the opening of each door is detected.
  - 6. When the contact is installed in the recessed part of a metal doorframe, an appropriate, solidly attached metal support shall be used. The tolerance "gap" shall be adjusted to the frame and the door.
  - 7. Wire door contacts back directly to an I/O card in the controller panel. DC's shall not be wired through Request to Exit devices.
  - 8. Door contacts shall be 1" diameter.
  - 9. Door Contacts shall be GRI 184/12 or equal



- B. Door Position Switch. "DP" on drawings
  - 1. Door position switch is in the door hardware, provided as part of the lock.
  - 2. Wire from this device to the security system to inform the system to the status of a lock.
  - 3. Configure to allow other functions to happen or not happen. Talk with owner regarding requirements.

## 2.12 INTERCOM –IP BASED

- A. Intercom (Audio/Video) at doors; "IC" on drawings
  - 1. At locations shown on the drawings, the Contractor shall install audio/video (IC) Intercom devices to allow visitors to contact the office to announce themselves and to gain entry into the building.
    - a. Connectivity of the components shall be via manufacturer recommended cables to the security system. This shall be from the exterior interfaces, throughout the system and to the Ethernet network inside the building.
    - b. Shall connect to standard SIP devices for audio and video connectivity.
    - c. Shall interface with standard video security software to allow recording of camera on each intercom.
    - d. Power and data shall be via the Ethernet network and CAT-6 cabling.
  - 2. Audio/video intercoms "IC" at the door shall have the following characteristics:
    - a. Device shall have a single, 1-touch, push-button for calling into the interior base station. This shall open a 2-way communications path between devices.

- b. Include the backbox for custom mounting. Provide weather-proof equipment outdoors.
    - c. See drawings for intercom devices at doors.
  - B. IP Adapter for control of doors
    - 1. Provide an adapter in the comm room near the access control panel to interface between the intercom system and the access control system
    - 2. See drawings for panels to be required to connect intercoms and access control system.
    - 3. Integrate all systems to allow an intercom call to pull up an associated cameras
  - C. Cabling for the audio/video interfaces at the doors and other components shall be plenum rated.
    - 1. Provide the type and quantity of cables required for connectivity. Review manufacturer's requirements and provide adequate cabling.
    - 2. Install a wrap-around cable at each termination point of the interconnection cables. The label shall detail which device the cable connects to.
    - 3. Install cabling to allow the office device to release the lock on the door where the exterior intercom is located.
    - 4. Install cabling and configure the system to support integration between the intercom and the push button that is installed at ADA height.

## 2.13 WIRES AND CABLES

- A. The contractor shall be responsible for supplying and installing all cabling to make the system operational.
  - 1. Size conductors as required to transmit all power and signal to all devices.
  - 2. All cabling shall be Plenum rated
  - 3. All cabling shall be installed in raceways and in accessible ceiling spaces through cable supports.
  - 4. Provide manufacturer specified cabling based on use and length of signal transmission from panel to device.
  - 5. Generate drawings showing the cables required and get those reviewed by the designer prior to installation.
  - 6. All cabling shall be labeled at each end with laser printed wrap-around labels
- B. Install individual cables where required or where individual devices are to be installed. Identify cable type required by the device and provide and install the appropriate cable.
  - 1. Install Plenum rated cable in all plenum rated areas.
  - 2. Plenum-Type, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
    - a. NFPA 70, Type CMP.
    - b. Flame Resistance: NFPA 262 Flame Test.
  - 3. Plenum Rated, PVC-Jacketed, RS-485 Cable: Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.
  - 4. Plenum-Type, RS-485 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket.
    - a. NFPA 70, Type CMP.
    - b. Flame Resistance: NFPA 262 Flame Test.
  - 5. Multi-conductor, Readers and Wiegand Keypads Cables: No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semirigid PVC insulation, overall aluminum foil-polyester tape shield with 100 percent shield

- coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
- a. NFPA 70, Type CMG.
  - b. Flame Resistance: UL 1581 Vertical Tray.
  - c. For TIA/EIA-RS-232 applications.
6. Paired Readers and Wiegand Keypads Cables: Paired, 3 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
    - a. NFPA 70, Type CM.
    - b. Flame Resistance: UL 1581 Vertical Tray.
  7. Paired Readers and Wiegand Keypads Cable: Paired, 3 pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
    - a. NFPA 70, Type CM.
    - b. Flame Resistance: UL 1581 Vertical Tray.
  8. Plenum-Type, Paired, Readers and Wiegand Keypads Cable: Paired, 3 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum foil-polypropylene tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
    - a. NFPA 70, Type CMP.
    - b. Flame Resistance: NFPA 262 Flame Test.
  9. Plenum-Type, Multiconductor, Readers and Keypads Cable: 6 conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
    - a. NFPA 70, Type CMP.
    - b. Flame Resistance: NFPA 262 Flame Test.
  10. Paired Lock Cable: 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
    - a. NFPA 70, Type CMG.
    - b. Flame Resistance: UL 1581 Vertical Tray.
  11. Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
    - a. NFPA 70, Type CMP.
    - b. Flame Resistance: NFPA 262 Flame Test.
  12. Paired Lock Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
    - a. NFPA 70, Type CMG.
    - b. Flame Resistance: UL 1581 Vertical Tray.
  13. Plenum-Type, Paired Lock Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
    - a. NFPA 70, Type CMP.
    - b. Flame Resistance: NFPA 262 Flame Test.
  14. Paired Input Cable: 1 pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, overall aluminum foil-polyester tape shield with No. 22 AWG, stranded (7x30) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
    - a. NFPA 70, Type CMR.
    - b. Flame Resistance: UL 1666 Riser Flame Test.



15. Plenum-Type, Paired Input Cable: 1 pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, aluminum foil-polyester tape shield (foil side out), with No. 22 AWG drain wire, 100 percent shield coverage, and plastic jacket.
  - a. NFPA 70, Type CMP.
  - b. Flame Resistance: NFPA 262 Flame Test.
16. Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (7x26) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
  - a. NFPA 70, Type CMG.
17. Plenum-Type, Paired AC Transformer Cable: 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
  - a. NFPA 70, Type CMP.
  - b. Flame Resistance: NFPA 262 Flame Test.
18. Elevator Travel Cable: Steel center core, with shielded, twisted pairs, No. 20 AWG conductor size.
  - a. Steel Center Core Support: Preformed, flexible, low-torsion, zinc-coated, steel wire rope; insulated with 60 deg C flame-resistant PVC and covered with a nylon or cotton braid.  
Shielded Pairs: Insulated copper conductors; color-coded, insulated with 60 deg C flame-resistant PVC; each pair shielded with bare copper braid for 85 percent coverage.
    - 1) Jute Filler: Electrical grade, dry.
    - 2) Binder: Helically wound synthetic fiber.
    - 3) Braid: Rayon or cotton braid applied with 95 percent coverage.
    - 4) Jacket: 60 deg C PVC specifically compounded for flexibility and abrasion resistance. UL VW-1 and CSA FT1 flame rated.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine all pathways prior to installation of all cables and raceways.

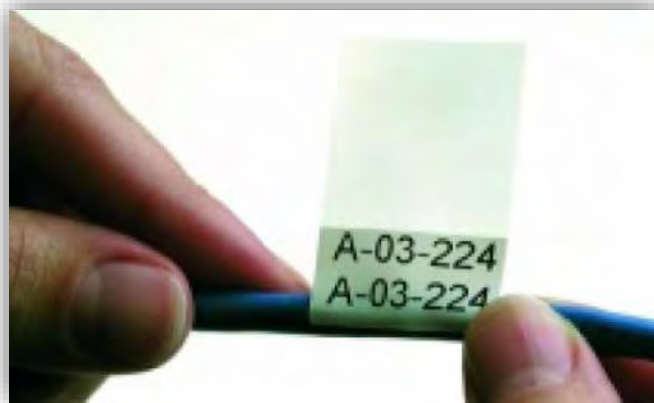
#### **3.02 PREPARATION**

- A. Locate main path for all cables and install J-hooks where cable tray is not provided.
- B. Coordinate with other trades to install a clear, straight path down major corridors for the routing of security/access cables back to the communications closet.
- C. Plan installation of cables along wallfield in communications room. Provide finger-duct and D-rings for support of cables. See drawings

#### **3.03 INSTALLATION-GENERAL**

- A. Security/access cable shall be installed per industry standards.
  1. Install all cabling required for complete system connectivity. Cabling shall be plenum rated.
  2. Care shall be taken to avoid crimping or bending the cable past the manufacturer's recommended bend radius.
  3. During installation, the cables shall not be pulled across the ceiling tiles or the structure of the building. This may cause damage to the cable jacket.
  4. Adhere to all pulling tensions and bend radii during installation.
  5. All cables shall route neatly in the ceiling. Whether they route in cable tray or J-hooks, the cables shall be neat and orderly.
  6. Support cables at a minimum of every 5 feet.

7. When routing security/access cables parallel to electrical conduits and lighting ballasts, the cable shall maintain a clearance of at least 12 inches. When running perpendicular to electrical conduits and lighting ballasts the cable shall maintain 6 inches of clearance.
8. Provide a short coil of extra cable where the cable enters the vertical conduit. The coil shall consist of no less than 1-1/2 feet.
9. When installing cables in the communications room, all cable shall route neatly through the cable tray and cable ladder.
10. Provide a service loop of the cables on the wallfield.
11. Each cable shall have a self adhesive, self laminating, laser printed label at each end. The label shall show the location identifier of that cable. Labels shall be installed no more than 4 inches from the termination point of the cable.



12. Firestopping is required at all riser conduits, and all pass thru's.
  1. Each cable tray penetration of a wall shall be firestopped after cable installation. Use pillow type firestop to allow additional cables to be installed in the future.
  2. Where riser conduits pass through floors, the area between the concrete and the conduit shall be firestopped. This shall be completed with a putty or liquid firestop product. Fill in the space with mineral wool, and then install the firestop on top. All firestop shall be of sufficient thickness to secure the rating required by code.
  3. After final cable installation, install a putty firestop around all cables where they enter and exit conduit pass thru's and conduit risers.
  4. Firestop as per AHJ requirements.
- B. Cabling at the Panel.
  1. Contractor shall coil all spare cable from the door devices outside the security panel and shall neatly coil the cable on the wall. Provide 5' minimum in the coil for future movement of the panel.
  2. Cables shall route into the panels through a grommeted hole that is sized for the cables entering.
  3. All cables shall be installed in a neat and workmanlike manner.
  4. Cables shall be terminated and shall allow for removal of a card without un-terminating the cables.
  5. All cables shall be neatly distributed to the card in the panel.
  6. All labels shall be visible inside the panel near the termination point. Label cables equidistant from their termination point.
- C. Cabling at the Panel.
  1. Contractor shall coil all spare cable from the door devices outside the security panel and shall neatly coil the cable on the wall. Provide 5' minimum in the coil for future movement of the panel.
  2. Cables shall route into the panels through a grommeted hole that is sized for the cables entering.
  3. All cables shall be installed in a neat and workmanlike manner.
  4. Cables shall be terminated and shall allow for removal of a card without un-terminating the cables.
  5. All cables shall be neatly distributed to the card in the panel.
  6. All labels shall be visible inside the panel near the termination point. Label cables equidistant from their termination point.
- D. Proper support of cables is of paramount importance when installing a cable infrastructure. All cables not in conduit or cable tray shall be supported via J-hooks a minimum of every 5 feet.
  1. Routes of cables shall be parallel or perpendicular to the walls of the building.

2. Install the J-hooks to minimize changes in the level of the cables as they route through the J-hooks.
3. All communications shall route as high in the ceiling as possible while still being accessible and staying away from other utilities.
4. When installing the cable through the J-hooks, they shall all have relatively the same droop between hooks. All cables shall be installed neatly and squarely.
5. Secure the J-hooks to the building structure with beam clamps and threaded rod as required to support the cables.
6. J-hooks shall never be attached to drop ceiling support wires. Cables shall never be supported by drop ceiling wires.

### 3.04 SERVER AND SOFTWARE INSTALLATION

#### A. Management Server:

1. Load all new software and licensing required for addition of the new doors and intercoms
2. Verify software version installed.

#### B. Control Software:

1. Contractor shall provide all software required for a fully functional security/access system.
2. Software shall be installed and fully configured by the Contractor.
3. Contractor shall schedule meetings with the Owner prior to installation to determine the working of the security/access system.
4. Install control software on the management PC in the communications room.
5. Configuration of the security software shall include but not be limited to the following:
  - a. Number each door and any input and outputs associated with that door and associate it with a standard door name for easy review.
  - b. Meet with the owner to determine how they will use the system. Take information from them that will allow all custom settings of the software system. This shall include but not be limited to:
    - 1) User groups based on building and administrative group
    - 2) Access levels based on groups and times.
    - 3) Door Groups for access and locking and unlocking schedules.
    - 4) Building locking and unlocking schedules for each building
    - 5) Administrative levels and super administrators
    - 6) Build database and interconnections between:
      - A) Intercom system and access control system
      - B) Intercom system and video security system
      - C) When an intercom call is generated the
  - c. Generate customized maps for each door and camera.
    - 1) Create maps from the owner that detail the added areas and doors that are part of this project.
    - 2) The maps shall show icons for each door. The icons shall be green or red based on open or closed door.
    - 3) Setup all icons to allow the owner to click on a door and then have direct access to lock or unlock or pulse the lock on a door.
  - d. Setup all user accounts and install the user software on the owner's pc's.
    - 1) Setup the user accounts based on the doors or buildings they will be allowed to control.
    - 2) Work with the owner to determine which panels, doors, maps or buildings the user will be able to see and control.

### 3.05 CONTROL PANEL INSTALLATION

#### A. Enclosure and power

1. Contractor shall mount devices within a new cabinet in the security room.
2. Provide mounting panels for all PLC and PLC devices.

3. Provide support of cabling as it routes to the PLC and termination panels. See drawings and install much the same as shown but utilizing new, specified equipment.
  4. Locate the 120 volt power outlet and install enclosure in relation to power
  5. Size the enclosure to support all PACS devices noted on the drawings and in the specifications.
  6. Power.
    - a. Install cabling and raceway to connect the power supply in the enclosure to the 120 volt power outlet.
    - b. Shall be hard-wired power. Plug-in power is not allowed
    - c. Provide an electrician for connection of the power supplies if required by AHJ.
  7. Battery backup
    - a. Provide and connect the batteries to the power supply for the enclosure
    - b. Test the battery supports the panel by removing 120 volt power after the system is fully up and operational.
  8. Network connectivity
    - a. Provide and install CAT-6 cable from the enclosure for the power supply to the communications rack. Connect to the Ethernet switch
  9. Other Controllers and I/O Board connectivity.
    - a. Provide and install cabling to connect the Ethernet controller to the other controllers and I/O boards via RS-485.
    - b. Do not install RS-485 between communications rooms. Each comm room shall have an Ethernet attached Controller.
- B. Controller:
1. Controller(s). shall be mounted in the enclosure as shown on the drawings.
  2. Controller shall be sized for all security, access, control, and monitoring points existing on the drawings and shall be expandable.
  3. Controller shall be able to be linked to additional controllers in other communications rooms/buildings via the Ethernet network.
  4. Each port in the controller that is connected to a security point shall be labeled inside the controller box.
  5. Label the outside of the panel with the door numbers and list of devices that are connected in that panel. Shall be laser printed adhesive labels.
  6. Label the inside of the panel door with the layout of the panel and which controllers attach to which devices. Include door numbers on the diagram.
  7. Depending on the type of panel the contractor shall provide cable routing hardware and equipment to neatly install cabling.
    - a. Route cable to allow easy change and replacement of the individual control cards in the panel.
    - b. Cabling shall be neatly bundled. See example below of adequate cabling being routed into a panel.
  8. Network connectivity
    - a. Provide and install CAT-6 cable from the controller to the communications rack. Connect to the Ethernet switch
    - b. Connect on the Ethernet to the Switch.
- 3.06 DOOR LOCKING CONNECTIVITY
- A. Electric Latch "EL", on drawings
1. The note devices shall be installed by the door hardware contractor.
  2. Power supplies shall be located in the comm room. Provide and install power supplies. Connect power supplies to the controller panel.
  3. Install all cables required to be connected this device to the security system
  4. Review door hardware specifications to determine if a wiring harness is being provided by the door hardware supplier.

- a. Install cables from the controller panel and power supply in the comm room to the wiring harness. Connect to harness
  - b. For EL devices, install harness from door hardware EL to the hinge, through the hinge and to the connection point for cables from the controller.
  - c. For ES devices, install cabling from security panel to the Electric strike in the latch side of the frame.
  - d. Wire from device, through frame and back to controller/power supply in the comm room.
- B. Latch Retraction device. "LR" on drawings
1. The Latch Retraction devices shall be provided by the door hardware supplier.
  2. Power supplies shall be located in the comm room. Provide and install power supplies. Connect power supplies to the controller panel.
  3. Install all cables required to be connect this power supply to the security system and to the actual Latch Retraction lock at the door.
  4. Review door hardware specifications to determine if a wiring harness is being provide by the door hardware supplier.
    - a. Install cables from the controller panel and power supply to the wiring harness. Connect to harness
    - b. Install harness from door hardware LR to the hinge, through the hinge and to the connection point above the door.
    - c. Wire from connection point above door to the power supply and then to the security panel.
    - d. If no harness is provided, then wire from LR device, thru the hinge, to the power supply controller and finally to the security panel.

### 3.07 READER INSTALLATION

- A. Card Readers "CR" on drawings
1. Card readers shall be installed at locations shown on the drawings.
  2. Review site and drawings and coordinate the wall mounted readers and frame mounted readers. Order the correct reader for each location.
    - a. Conduct a site visit prior to ordering card readers.
    - b. If the wrong reader is ordered then the contractor shall provide the correct reader.
  3. Coordinate installation of all card readers with the doors and walls.
  4. Where the reader is mounted on the door, coordinate the installation with the installation of the door to allow all cable for security/access.
  5. Locate all card readers at ADA compliant heights and locations.
  6. Wire and configure the card readers so that when the lock is engaged the light on the reader is red and when the door is unlocked the light is green.
  7. Garage Doors and Pedestals: At the garage doors and at pedestals the card readers shall be installed with a box that has a cover for the top of the card reader.

### 3.08 DEVICES AT THE DOOR

- A. Door Contacts "DC"
1. Install contacts where shown on the drawings. For door contacts, install them at the top of the door.
  2. Work with door provider and installer on timing of door contact installation.
  3. Install raceways to allow installation of the door contacts if no raceway is provided inside the wall.
  4. Drill into the door frame and door to allow installation of the door contact and the associated cable. No cable shall be visible after installation.
  5. Where door frames are filled, they shall be drilled out to allow installation of the door contact. Surface mount contacts are not allowed unless specifically noted on the drawings.
- B. Door Position switch. "DP"

1. Wire back to the access control system.
2. Configure the system to note and use the position of the door to allow or disallow different events
3. Work with the owner on configuring the system to act, alarm or not allow something based on the door position switch state.

### 3.09 INTERCOMS AT THE DOORS

#### A. IP Intercoms

1. Intercom at the door shall be installed based on the type chosen and specified in specs and drawings.
2. Where the Intercom is surface mounted.
  - a. Surface mounted units shall be connected to the interior of the building with a conduit and steel backbox.
  - b. Where possible route the cables through the door or wall framing and extend to the intercom.
  - c. Install raceway from bottom of intercom to lower pushbutton.
  - d. Ensure installation of lower button to meet ADA requirements
3. Flush-mounted intercoms
  - a. Provide and install the custom backbox at the intercom location.
  - b. Provide notice to electrician to allow them to install conduits to accessible ceiling.
  - c. Review and ensure raceway from bottom of intercom to lower pushbutton is installed.
  - d. Ensure installation of lower button to meet ADA requirements
4. The intercom device shall be located at a place where it is accessible and where it can be mounted to see the person calling.
  - a. Camera shall be positioned to cover the maximum area possible.
  - b. Install a connection cable from the exterior interface to the interior unit and door lock.
  - c. Install any baluns, adapters, or other devices required to send the signal from the exterior intercom to the network.
  - d. Provide CAT-6 patch cables
5. IP Programmable Relay.
  - a. This device shall be mounted in the main communications room.
  - b. Connect to the Ethernet network with appropriate CAT-6 cabling
  - c. Connect to the controllers to allow the base station to unlock the associated door.
  - d. Integrate so that the base station only controls the door that the call was initiated from.

**END OF SECTION 283500**

## **SECTION 283600 – SECURITY RECORDING**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section includes parts and equipment required for installation and configuration of a video security system. This system shall be referred to as the “security system” throughout these specifications.

#### **1.02 SYSTEM DESCRIPTION**

- A. The security system shall be supplied and installed by a Contractor able to show examples of similar projects and installations within the last 3 years.
- B. The video security system shall serve the building(s) shown and be able to be expanded to support other buildings attached to the data network
- C. New cameras shall be IP cameras with direct connection to Ethernet Switches.
- D. Software and hardware shall allow for monitoring from any PC attached to the data network.

#### **1.03 COORDINATION**

- A. Coordinate with the network contractor. Provide IP addresses and ports the cameras are connected to in an excel spreadsheet to the network contractor for VLAN configuration
- B. Coordinate with data cabling contractor. Walk the site and identify all camera locations and make the cabling contractor aware of all camera locations.

#### **1.04 PROJECT PLAN**

- A. The contractor shall provide a project plan to the owner and contractor that describes the system and its capabilities and the possible configurations.
- B. Provide a project approach which describes the installation and implementation plan and schedule and all sequencing.
- C. Meet with the owner numerous times to determine how the system should work and how it should be monitored. Configure the system prior to installation to meet these requirements. Demonstrate the system use to the owner prior to installation and obtain approval to move forward with the installation.
- D. Provide shop drawings showing all configuration and connectivity of the system.
- E. Generate a testing plan and have that plan approved by the owner and engineer prior to installing the system.

#### **1.05 RELATED STANDARDS**

- A. The security system shall conform to the following international and national standards:
  - 1. FCC Rules and Regulations
  - 2. UL 294 Access Control Systems
  - 3. UL 1076 Line Supervision
  - 4. 21 CFR part 11
  - 5. Part 15, Radio Frequency Devices
  - 6. National Electrical Manufacturers Association (NEMA)
  - 7. Applicable Federal, State and Local laws, regulations, codes
  - 8. Americans with Disabilities Act (ADA)
  - 9. National Electrical Code (NEC)

### **PART 2 - PRODUCTS**

## 2.01 MANUFACTURERS

- A. Approved vendor for video security camera recording software is:
1. Bosch VMS Professional Edition

## 2.02 VIDEO SECURITY HARDWARE

- A. Network Video Recorder (NVR):
1. The Contractor shall provide an NVR that connects to all the new video cameras. Size the system to accept additional cameras to be installed in the future. See drawings and/or specs for quantity
    - a. The NVR shall be a central control and storage system that allows the Owner to view and review images from any or all cameras.
  2. NVR and associated storage shall be of the latest manufacture and software release available.
  3. Shall supply multiple simultaneous playback streams.
    - a. The system shall allow all PC's attached to the wired Ethernet network to view cameras at full resolution on their PC.
    - b. Size the processor of the NVR and Monitoring PC to allow viewing of up to 32 cameras at the monitoring PC without any slowness or loss of signal.
    - c. The network video recorder shall have outputs viewable on up to 8 individual workstations, shall record video, audio, and data streams for every channel, and shall have storage locking.
  4. The NVR shall be capable of continuous, schedule, alarm/event, and motion recording, shall have pre- and post-alarm recording and shall be fully programmable on a per-channel basis.
    - a. Any motion sensing shall be assumed to be done at the server. Use this for servers sizing.
    - b. See specifications below for recording parameters.
  5. The NVR shall have expandable storage capacity to allow additional storage of video. The expandable storage shall be easily added and integrated into the system.
  6. The network video recorder shall offer plug-and-play configuration for cameras.
  7. The network video recorder shall provide performance enhancement and fault tolerance by employing RAID-5 style redundancy across multiple disk drives and shall feature a hot drive swap that automatically configures the drives when installed.
    - a. Where the Video Management Software (VMS) requires, the Immediate recording shall be to High-Speed drives.
    - b. Images can then be moved to slower, long-term storage devices.
    - c. Provide these drives based on the VMS being installed.
  8. The network video recorder shall meet or exceed the following design and performance specifications:
    - a. Processor:
      - A) No less than Two, Quad-core processors, Intel® Xeon 5600 series® 4, 2.8 GHz or equal.
      - B) 64 Bit
      - C) Provide calculations from the software manufacturer and camera manufacturer to prove processing and storage submitted will meet system requirements
      - D) Provide the actual throughput and quantity of storage being provided and note how it meets calculations from the software manufacturer and the camera manufacturer.
    - b. Internal Memory:
      - A) 16 GB minimum.
    - c. Operating System:
      - A) Linux or Microsoft. (provide any operating system software)



- d. User Interface:
    - A) Remote operation from standard Windows 11 PC's.
    - B) Shall be equipped with web interface to allow viewing of live and recorded video through a standard web browser.
  - e. NVR throughput:
    - A) Server throughput shall be the capacity of the server to process incoming live and recorded video. This shall be a function of the processing power of the NVR/server.
    - B) It shall provide for processing, live viewing, remote viewing and recording capacity to record on all cameras at:
      - 1) 15 frames per second.
      - 2) Constant recording of all cameras
      - 3) Compression shall be no higher than 30%. Thus if full bandwidth of the camera is 100 then configuration shall be no less than 70 on a 1 to 100 scale.
      - 4) 8 users viewing 16 cameras each
    - C) Throughput shall be calculated at maximum camera resolution of the specified cameras. Include spare throughput to double the cameras that are shown as part of this project. Calculate throughput as though the owner will double the number and type of cameras that are part of this bid.
    - D) Throughput shall include processing of the cameras shown plus future additional cameras as noted on the detailed drawings.
    - E) Assume that the owner will be viewing live video on 10% of the installed cameras. This shall be taken into account if the server does any processing of the live images.
  - f. Video image storage: This shall include the amount of disk storage space required to store all the images from the cameras. Storage space shall be calculated based on:
    - A) Recording images on all cameras at 15 frames per second,
    - B) Assume recording on movement rates of 50%.
    - C) Additionally, each camera shall record 1 frame per second when there is no motion.
    - D) Storage for 30 days.
    - E) Storing images at maximum camera resolution of the specified cameras. Include spare storage space to double the cameras that are shown as part of this project. Calculate throughput as though the owner will double the number and type of cameras that are part of this bid.
  - g. Total Capacity shall be calculated by Contractor. Provide calculations if you are asked to present your solution or if you are the chosen bidder.
  - h. Hard drives shall be internal or part of an external storage array. All discs shall be configured in a RAID 5 redundant style array such that losing any single drive will not mean a loss of recorded images.
9. Each NVR Shall have dual power supplies.
10. The NVR shall have One (1) 10 Gigabit Ethernet connection(s) via an RJ-45 copper or Fiber Optic type interface.
- a. If the interface is a fiber Optic connection then provide the equal SFP module for the Ethernet switch that is being used to connect the Ethernet Switch
11. The NVR shall be 19 inches rack mountable.
12. Servers shall be from the following manufacturers
- a. Hewlett Packard
  - b. Dell
  - c. Bosch

## 2.03 VIDEO MANAGEMENT SOFTWARE (VMS)

- A. The VMS shall be Bosch VMS Professional
  - 1. Provide and apply new camera licenses as required for support of the new cameras being installed as part of this project
- B. MAPS
  - 1. The software shall provide maps within the software that can be used to provide hot keys/buttons to switch a viewing monitor to a camera identified on the maps.
    - a. The contractor shall take existing AutoCAD or PDF files and shall input the maps into the video control software.
    - b. Provide buttons on the maps so that the user can click on the camera button on the map and the user will be able to view the camera associated with that button.
    - c. Load and populate each map with the cameras for each building where cameras are located.
    - d. Provide a drill-down map control software that allows the user to click on the site plan, then the individual building and then the floor or portion of the floor on that building and finally the camera on that floor.
  - 2. Software and hardware shall allow for remote input of alarm signals and contact closure signals at remote buildings.
  - 3. Software shall allow and control audio recording on individual cameras.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Review site and note locations of cameras, conduits and cables prior to installation.
- B. Review all ceiling styles on the reflected ceiling plans. Provide mounts as required based on the ceiling style.

### 3.02 INSTALLATION

- A. The Network Video Recorder (NVR) shall be mounted in the Security room in the basement. Locate with other servers.
  - 1. Mount the NVR in a cabinet/rack. Connect to the local area network as required for complete system connectivity.
  - 2. Connect the NVR and all cameras to the Ethernet network.
    - a. No less than two Gigabit Ethernet Connections
  - 3. After full configuration of the system the contractor shall copy the complete configuration to another of the owner's servers and shall provide a CD or USB drive copy of the configuration.
    - a. Contractor shall keep a copy of the original configuration of the server and all cameras at their site.
    - b. Provide the information to the owner on a CD or USB Drive.
    - c. The backup of the configuration shall provide the owner an easy way to reconfigure the system in case of a total system failure or a new server installation is required.
- B. Fully configure the Video Recording and Control Software.
  - 1. The Contractor shall meet with the Owner prior to installation of the system to discuss all aspects and abilities of the NVR and VMS and the attached cameras.
  - 2. The Contractor shall present all configuration options to the Owner to get their input and let them choose how the system is to be used and configured.
  - 3. The Contractor shall take information from the meeting and record that in meeting minutes. Provide copies of these minutes to the Owner and Designer
  - 4. The Contractor shall configure and install the system as requested by the Owner and as shown on the drawings and specifications.

5. The servers and storage shall be configured based on the manufacturer's recommendations.
  - a. Discuss drive array and recording processes with the owner and manufacturer prior to installation of the system
  - b. Discuss recording block size with the manufacturer prior to installation.
  - c. Meet with the owner and discuss the server(s) setup and present a document from the NVR software and server manufacturer to demonstrate how the system will be configured.
  - d. Evenly distribute cameras and recordings across all servers.
6. Configuration of the system shall include but not be limited to the following.
  - a. Labeling of all cameras in the system to match the owner approved labeling scheme as well as their chosen specific descriptive name.
  - b. Video blanking of any areas on each camera if there are areas that are not to be seen or recorded by the NVR system.
  - c. Passwords and logins for users and administrators. Include in this a list of all the users and their access levels.
  - d. Recording Frames per second, resolution and long term recording resolution.
  - e. Generation and configuration of any presets for PTZ cameras including tours and timing.
  - f. Specialized recording times for each camera including additional FPS or resolution at times of the day.
  - g. Backup times and all data to be backed up. Configure scheduled backups
  - h. Aiming, focusing and framing of all camera images.
    - A) Sit with the owner and review each camera's view and custom set the aiming, framing and focus of each camera.
    - B) Have someone at the camera while reviewing that is able to move and aim and focus the camera.
    - C) Download an image from the camera as the owner wishes it to be aimed
    - D) Create a spreadsheet with each camera and have the owner sign off on the aiming of each camera.
  - i. Generation of custom views for all user software. Meet with each person that is allowed to view the cameras and help them generate a custom view of the cameras they wish to see.
7. Contractor shall fully load and match all maps to the video security system. Install all maps and load all camera locations and hot buttons to the maps to allow quick connect to the cameras based on clicking on the camera location on the map.
  - a. Each camera button shall show the camera number.
8. Recorded images and offloaded images shall be able to be time-stamped with the date, camera number and exact time down to the second when the video was recorded.
  - a. This shall be able to be seen on the viewing station and shall be attached to the video when it is offloaded and viewed on an outside player.
  - b. Setup the server and software to obtain time from the national standard time.
- C. Connect the storage to the new NVR servers and the rest of the servers.
  1. Configure the storage to provide service to all users and all storage requirements.
  2. Meet with the owner prior to installation and present all options to the owner in regards to the configuration options. Assist the owner in deciding which options best meet their needs.
  3. Publish a plan and configuration parameters of the storage and ensure that everyone agrees with the plan.
  4. Install the storage and connect to all servers.

**END OF SECTION 283600**

## **SECTION 283636 – STUN FENCE**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section includes parts and equipment required for installation and termination of a reconfigured stun fence system
- B. This work shall include all hardware for a complete system.
- C. The work shall include:
  - 1. Removal of existing Stun Fence wiring and equipment.
  - 2. Installation of new Stun fence wiring and equipment.
  - 3. Grounding and lighting arrestor equipment
  - 4. See site plan for removal area and where new stun fence wiring shall be installed.
  - 5. Match installation style
- D. The stun fence energizer and power supplies are existing and shall be reconnected to new stun fence wiring.

#### **1.02 SYSTEM DESCRIPTION**

- A. There is an existing stun fence system at the facility. This system shall remain,
- B. At the location noted reconfigure the stun fence to match the relocated fence.
- C. The system shall be supplied and installed by a Contractor able to show examples of similar projects and installations within the last 3 years.

### **PART 2 - PRODUCTS**

#### **2.01 CONTROLLER/ENERGIZER**

- A. Controller is existing.
- B. Connect new cabling to the existing controller

#### **2.02 STUN WIRE AND SUPPORTS**

- A. For new fence the contractor shall provide new fence wiring and fence wiring supports
- B. Provide new insulators.

#### **2.03 STUN FENCE SPRINGS**

- A. Provide new tension springs for the stun fence that is being installed
- B. Provide new tensioner springs at each new stun fence wire termination point.
- C. Springs shall match existing spring type and tension
- D. Verify spring with owner prior to ordering.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Review site and note locations of all cables and inputs prior to beginning the work.
- B. Note connectivity of controller/energizer to the existing fence.
- C. Diagram existing connectivity to each wire.
- D. Diagram looping and connectivity of all wires on the fence
- E. Note connectivity of grounding and lightning arrestors.

#### **3.02 REMOVE EXISTING STUN FENCE**

- A. Where the woven wire fence is being removed the contractor shall remove the existing stun fence and all equipment.
- B. provide all springs and insulators to the owner for spare.

- C. Remove existing lightning arrestors and grounding.
- D. Remove fence wire and connections

3.03 INSTALL NEW STUN FENCE

- A. Install new stun fence on top of the new woven wire fence.
- B. Install to match existing stun fence cabling
- C. Re-install lightning arrestors and connect to ground
- D. Properly ground fence wiring as it was existing. Provide new ground bar at fence.
- E. Install new cabling from the fence, underground through a conduit to the controller cabinet.
- F. Reconnect fence controller to the new stun fence cabling.
- G. Test connectivity and test stun fence activity. Verify that it is working as required by the owner.
  - 1. Provide all new insulators and supports for the fence wire

3.04 SPRING TENSIONER

- A. Provide and install new spring tensioners on the new stun fence

**END OF SECTION 283625**

## **SECTION 283700 – SECURITY CAMERAS**

### **PART 1 - GENERAL**

#### 1.01 SECTION INCLUDES

- A. This section includes parts, equipment and cabling required for installation of the video surveillance cameras.
- B. This shall include new IP video cameras and their cabling/termination equipment as shown on the drawings and detailed in the specifications.

#### 1.02 COORDINATION

- A. All cameras shall be installed as shown on the drawings and as per the specifications.

#### 1.03 DESCRIPTON

- A. Provide new IP cameras for video surveillance. See the detailed security drawings for location and quantities.
- B. Cameras shall be pure IP cameras
- C. Power for interior and exterior cameras shall be provided via the POE switch.
- D. PTZ cameras that require additional power above that provided from a Type 3 PoE connections shall be provided with a power supply.
  - 1. Provide any and all camera, power and control cables required for complete system connectivity and functionality.
- E. It shall be the Contractor's responsibility to provide all power to cameras based on the above methods. Take into account the Manufacturers recommendations.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Approved Manufacturers for IP cameras:
  - 1. Bosch
  - 2. No others are allowed.

#### 2.02 GENERAL CAMERA REQUIREMENTS

- A. Cameras shall provide full color images and some shall change to black and white in low light.
- B. Cameras shall support text overlay of image in viewing to allow naming/numbering of each camera on the screen and when video is offloaded.
- C. The Contractor shall review the site with the Owner prior to ordering the lens for each camera.
  - 1. Finalize the needs of the Owner with the camera position to ensure that the correct lens is purchased for the camera.
- D. All cameras installed inside buildings and to buildings shall be Vandal Resistant and meet IK10 vandal resistant standards.
- E. Where cameras require more power than PoE 802.af then the contractor shall provide power to the camera from a centralized power supply in the comm. room.
- F. Camera Mounts:
  - 1. The Contractor shall provide all appropriate camera mounts. Refer to the drawings and conduct a site survey to determine each camera mounting type required.
- G. Exterior mounting
  - 1. Exterior cameras shall be equipped with a wall type mount that allows the camera to be mounted perpendicular to the ground.
  - 2. Each exterior camera shall be equipped with a heater/blower or other device to keep camera functional and keep lens/casing from fogging or condensation from forming.

3. Pole Mounted cameras
  - a. Where mounted to a pole the mount shall allow easy transition from the pole to the camera of the cables.
  - b. Fixed cameras shall be mounted 2' above the razor wire at perimeter cameras
  - c. PTZ Cameras shall be installed 5' above the razor wire at the perimeter cameras
  - d. Pole mount cameras shall be completely secured to the pole with manufacturer's specified mounts.
    - 1) Shall attach to the pole with straps based on the type of pole installed.
    - 2) Mount shall keep the cable as it routes from the pole to the camera totally enclosed and shall not subject the cable to the weather.
    - 3) When mounting the camera, the cable shall route through the pole. Drill a hole into the pole. Install oxidizing gel around the steel. Then install a rubber grommet.
    - 4) Terminate CAT-6 cable into a jack at each pole camera. Install waterproof boxes. Box shall be accessible from the ground at no more than 6' AFG
    - 5) Include a surge suppressor for the camera in this box and attach to ground signal. See drawings for details.
4. Building Mounted cameras
  - a. Shall be mounted to building structure where shown on the drawings.
  - b. If the cameras are aimed along the building then they shall be equipped with a mount that allows the camera to be mounted perpendicular to the ground.
  - c. Where the camera looks directly out from the building it can be mounted directly to the building.
  - d. Contractor shall provide a mount that best corresponds to the structure and can be securely mounted.
  - e. Mount the camera at a height as shown on the drawings or at the optimum height to allow the best field of view and future service via extension ladder.
    - 1) Unless specified the cameras on the exterior of a building should not be installed more than 15' above grade.
  - f. When mounting the cameras, take into account the light and mount the camera so that it does not block light.
  - g. The camera mount shall provide a route for cables extending from the raceway to the camera. Cables shall not be installed outside the camera dome or camera mount.
  - h. For wall mount cameras the Contractor shall install a conduit thru the wall to allow cable installation to the camera.
  - i. No cable shall be visible after camera installation.
  - j. Parapet mounts are to be installed where noted.
    - 1) Install so that the camera is able to extend above the roofline where possible.
    - 2) When directed to use the existing parapet mount the contractor shall provide additional hardware as required to adapt the new camera to the existing mount.
    - 3) When installing a parapet mount, extend a conduit and install a weather proof box on the outside of the building. Install seal-tite conduit out the bottom of the box to the parapet mount. Include a drip loop. Seal-tite (flexible all weather conduit) shall not extend thru the wall.
5. Seal all exterior cameras and mounts with clear silicone to ensure water will not enter the pole or the wall.
  - a. Seal around conduits that route through the wall

- b. Seal around the cameras attached directly to the wall and the mounts attached to the wall.
- H. Interior Camera Mounting
  - 1. Standard cameras shall be mounted to the ceiling or to the building structure.
    - a. Cable shall be terminated above the ceiling or in a surface mount backbox and the cameras shall be mounted to the ceiling or to the building structure. Provide the mounting hardware required
      - 1) Install backboxes when mounting a fixed camera to a hard ceiling and installing a conduit to the camera.
    - b. Where there is a drop ceiling then the cameras shall be recessed into the drop ceiling. Provide the ceiling tile bridge for all drop ceiling installations.
  - 2. Where the camera is surface mounted to a ceiling in an inmate accessible area the cameras shall be mounted to a secure backbox with tamper proof screws. The backbox shall be attached to the building structure
  - 3. The cable shall route to the camera through a secure conduit. In accessible areas no cable shall be visible.
  - 4. In cells the cameras shall be mounted inside a secure, vandal-proof camera mount.
    - a. Unless noted the vandal proof mount is existing.
    - b. Equip with a custom angle bracket mount to support the camera inside the mount.
  - 5. Prior to installation the contractor shall walk the site with the owner and identify each proposed camera installation location.
    - a. Show the owner what they will see thru the camera
    - b. Allow the owner to make changes in locations of cameras.
    - c. Identify new locations of cameras on the as-builts.
- I. Camera and Power Cable:
  - 1. Contractor shall install all patch cables between the termination of the user CAT-6 cable and the camera as well as the patch cable from the patch panel to the Ethernet switch in the comm. room.
- J. Power Supplies:
  - 1. For PTZ cameras and external cameras (where PoE or PoE+ Power is insufficient) the power supply shall be centrally located in a communications room.
  - 2. Provide all power supplies and cabling for connection to the electrical circuit.

### 2.03 CAMERAS IN GENERAL

- A. All cameras shall have the following:
  - 1. IP camera with 10/100 megabit Ethernet connection
  - 2. Power through PoE 802.af or 802.3at or additional power injector for PTZ cams
  - 3. Network interface via an 8-pin RJ-45 connector.
  - 4. Compatible with the Video Recording System
  - 5. Minimum frame rate capability shall be 30 FPS at all other camera resolutions. (except 5 MP high resolution camera)
  - 6. Day/Night Function – Color in standard light and Black/White in low light
  - 7. Shall be ONVIF Compliant
  - 8. Dual streaming capability – Shall be able to stream at different resolutions for viewing and storage.
  - 9. H.264 Compression and JPEG Compression
  - 10. Variable Bit Rate or Constant Bit Rate
  - 11. IK10 vandal resistant where noted
  - 12. IP66 Weatherproof where noted
  - 13. Space for no less than 20 character camera naming
  - 14. Exterior cameras shall have a built in heater



## 2.04 CAMERAS

- A. See drawings for camera part numbers.
- B. Provide all mounting hardware as required to mount camera as shown in the details.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Identify locations of all user conduits and backboxes prior to cable installation.
- B. Review site and note locations of cameras and conduits prior to installation.

### 3.02 PREPARATION

- A. Visit each camera installation location to verify the type of mount prior to ordering the cameras.

### 3.03 INSTALLATION

- A. Each camera shall be installed to provide maximum field of view and security.
- B. Exterior cameras shall be mounted securely to the structure and shall be sealed to prevent water or any other environmental condition to enter the camera.
  - 1. Provide the correct mount for the location of each camera.
  - 2. Where the mount is to the outside of a building then the contractor shall install a conduit from the exterior camera to the inside of the building for the camera cable(s).
  - 3. Review mounting location to determine optimum height of camera to cover all areas and provide the clearest pictures. Mount at appropriate height.
  - 4. Work with the Owner to focus and align all cameras for maximum coverage.
  - 5. Contractor shall change lenses for different focal lengths based on the actual installation location of the cameras and the requirements of the Owner.
  - 6. Seal around all conduit openings and the camera mount to seal from water and air infiltration.
  - 7. Install patch cable through the conduit and connect to the CAT-6 cable on the interior of the building.
  - 8. The Contractor shall work with the Owner to determine the location of all the cameras.
  - 9. Work with the Owner to determine the direction of the lens and its focal length.
  - 10. Attach exterior pole mounted cameras to the surge suppressor at the pole. Connect this to ground.
- C. Camera naming
  - 1. The contractor shall work with the owner and engineer to determine the naming and numbering convention for the cameras.
    - a. The contractor shall provide a spreadsheet that details the different fields for the naming
    - b. Fill in the spreadsheet and provide to the owner for confirmation. Get their signature on the document.
  - 2. Determine the naming and then apply that to each camera. Enter the designation of the camera into the video security system.
  - 3. On all cameras the contractor shall affix a label with the camera number to the exterior case of the camera. This shall be visible when standing near the camera.
    - a. Provide exterior rated and sunlight rated labels for exterior cameras.
  - 4. Label all maps in the system with the camera names
- D. "Blue Tape" Walk thru
  - 1. Meet with the owner and walk the site and verify the location of all cameras.
  - 2. Where possible place tape on the ceiling in the location of the camera.

3. The owner is allowed to make changes in the location within the same room at no cost to the contract.
  4. The tape walk thru is to work as a team to get all cameras installed correctly and make any variations based on current field conditions
  5. After the walk thru the owner and contractor shall understand where all cameras will be installed.
  6. Scheduling the walk thru and installing the tape is the contractor's responsibility.
- E. Contractor shall focus and aim all cameras
1. Camera aiming and focusing shall be a process where the owner has input at each stage.
  2. The process for aiming and focusing shall be as follows:
    - a. Meet with the owner and determine the desired view of each camera. Determine where images shall overlap and what they are focusing etc.
      - 1) Add this information to the camera naming spreadsheet.
    - b. Install the cameras and aim as per the meeting notes.
    - c. Meet with the owner and review each camera view on the monitor. Make notes of any changes required.
    - d. Schedule a time to make all changes.
      - 1) Changes shall be made while the owner is reviewing the live image through the VMS Software. The contractor shall have a person at the camera that can aim and focus the camera.
      - 2) Once the owner agrees on the image aim and focus generate a still picture of that image and keep it in a file.
      - 3) Print the aimed view and provide as part of the submittal at project substantial completion.
- F. Generation of custom views for 360 degree cameras
1. Meet with the owner to determine viewing capabilities and those available for 360 degree cameras
  2. Install one camera prior to installing all other 360 cameras and camera cables.
  3. Review the possibilities for viewing through Genetec and settle on locations and viewing parameters for the 360 cameras.
  4. Do this for each type of location that a 360-degree camera is to be installed. On example, hallways, classrooms, dayrooms, lobbies etc.

**END OF SECTION 283700**

## **SECTION 287200 – TECHNOLOGY SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section provides the Contractor with requirements regarding Product Data Sheets, Shop Drawings and Product Samples collectively referred to as “Submittals”.
- B. This section provides the Contractor requirements regarding As-Built Documentation after installation and prior to Final Completion and Final Payment
- C. The requirements of this section deal only with those submittals that are required to be provided by the chosen contractor after bid award. No submittals in this section are required to be provided with the Bid Response.
- D. The requirements contained herein should be considered bound and apply to all technology and security specification sections per this contract.

#### **1.02 PRE-INSTALLATION SUBMITTALS**

- A. The contractor shall provide material submittals to the Construction Manager or directly to the designer, whichever is managing the project.
- B. Prior to beginning work, the chosen Contractor shall provide PDF files of all material submittals.
  - 1. Highlight the part number of each item specifically. Submittals that are not highlighted will be rejected and sent back immediately.
  - 2. Match camera submittals with the camera type on the drawings. see Security Equipment Schedule on TC501. Provide marking on the PDF File detailing which camera type is being submitted.
  - 3. Provide the PDF with the following file names
    - a. Site - Spec Section - Description
    - b. In Example: **Kent City 28 1600: Data Cabling submittal**

#### **1.03 AS-BUILT DOCUMENTATION**

- A. The contractor shall provide As-Built documentation to the Construction Manager or directly to the designer, whichever is managing the project.
- B. Provide the As-Built in hard and soft copy
  - 1. Hard Copy shall include all Red-lined Drawings showing what was actually installed and where it was installed.
  - 2. Soft copy on USB Drives (PDF or Microsoft Word or Excel) shall include all documents provided in the hard copy plus any configuration or data files. Include XLS files for all spreadsheets.

### **PART 2 - PRE-INSTALLATION SUBMITTALS**

#### **2.01 PRODUCT DATA SHEETS**

- A. Product data sheets shall consist of the manufacturers detailed specification sheets or “cut-sheets” for each product that is to be installed by the contractor or any subcontractors.
- B. Product data sheets shall minimally include, but shall not be limited to:
  - 1. Part Number
  - 2. Manufacturer
  - 3. Description of the product
  - 4. Physical dimensions and characteristics of the product
  - 5. Picture or manufacturers drawing of the item, where applicable
  - 6. Electrical characteristics of the product including heat-load for active electronics.
  - 7. Optical characteristics of the product for Fiber-Optic equipment and cable.

- C. Provide product data sheets for all equipment and cabling that is to be installed by the contractor
- D. Provide a PDF of all the Equipment being submitted. Each actual part number shall be highlighted on the PDF in yellow.
  - 1. Group Product Data Sheets by:
    - a. Data Cabling
    - b. Access Control
    - c. Video Security
    - d. Paging Systems

## 2.02 SHOP DRAWINGS

- A. Shop Drawings shall consist of detailed drawings showing actual connectivity, equipment to be installed and cable types for the systems noted below:
  - 1. Access Control system connectivity
  - 2. Stun Fence system
- B. Shop drawings shall also be provided for systems that the contractor intends to connect differently than what is shown on the contract drawings or where no connectivity is shown.

## 2.03 PRODUCT SAMPLES

- A. Product Samples shall consist of a sample of the actual product that is to be installed.
- B. Samples shall be tagged with the part number and specification section to which it pertains.
- C. Product Samples shall be provided for the following:
  - 1. None at this time.

## 2.04 SUBMITTAL DOCUMENTS

- A. The Contractor shall provide all Submittals to the Construction Manager or the designer
- B. The Contractor shall provide PDF Files for all Product Data Sheets.
  - 1. All Product Data sheets shall be PDF files grouped as shown in 2.01/D
  - 2. The Contractor shall highlight the actual part number on the sheet of the component that they are submitting.
  - 3. If no part number is highlighted or marked with an arrow, then the entire submittal package will be rejected and sent back for re-submission.
- C. The Contractor shall provide 1 set of PDF of Shop Drawings.
  - 1. Shop drawings shall be marked for the specification section of the bid documents to which they pertain. Mark the Detail (TCXXX/Y) to which the Shop Drawing refers.
  - 2. All shop drawings that are required to be drawn on the building background shall be provided on full-size drawings the same scale as those in the bid documents.
  - 3. All lines on the shop drawings shall be highlighted or completed in ink that is not the same color as that provided in the bid documents.
  - 4. The contractor shall provide a drawing legend detailing all symbols used in creation of the shop drawings.
- D. The Contractor shall provide one of each product sample required to be submitted.
  - 1. Provide a cutsheet with each product sample detailing the specifics of the product and what it is proposed to be used for.

## 2.05 SUBMITTAL REQUIREMENTS

- A. Submittals shall be provided for approval prior to installation of the work.
- B. Any equipment installed that does not have an approved submittal associated with it can and will be removed from the project and replaced with other equipment as defined by the Designer. All replacement costs shall be the responsibility of the Contractor.
- C. It shall be the responsibility of the Contractor to provide the submittals for review in sufficient time to not delay the installation. Work with the Construction manager on the schedule.

- D. It shall be the responsibility of the contractor to ensure they have provided and have on hand "Reviewed" or "Furnish as Corrected" submittals for all equipment they install.
- E. When reviewing submittals marked "Furnish as Corrected" take into account the comments and incorporate the comments into the products and installation of the systems.

### **PART 3 - AS-BUILT DOCUMENTATION**

#### **3.01 MATERIALS**

- A. The Contractor shall provide the following to the Designer prior to the issuance of the final payment.
  - 1. Approved submittals and equipment user manuals.
  - 2. As-Built Documentation as detailed below.
  - 3. All spare parts and cover plates for all components of the systems
  - 4. Manufacturer warranty cards for all components.

#### **3.02 AS-BUILT PROCESS**

- A. The Contractor shall provide all project as-builts to the designer at substantial completion.
  - 1. Provide them to the designer for review
  - 2. Make any required changes the designer requests
  - 3. Re-submit at the time of Final Completion / final payment. Final Payment is not possible without a complete post installation deliverable package

#### **3.03 PREPARATION**

- A. All documents for As-Builts and test results shall be neat and clearly labeled with listing of the project and documents included in each binder.
- B. Quantity:
  - 1. Submit Red Lined, As-Built floorplans for the Systems detailed in 3.04/D.
    - a. Provide one set of physical documents, full size,
    - b. Provide PDF Scans of the As Built Floorplans.
  - 2. Submit Electronic files for As-Built Documentation
    - a. Provide PDF Files. Provide a Coversheet that details:
      - A) Client name.
      - B) Project name.
      - C) Manual title (e.g., "Project Close-out Manual for security system upgrade").
      - D) Date; date format: <month> <day>, <year> (e.g., "January 1, 20xx").
      - E) Installer and General Contractor names and contact information
      - F) Warranty contacts for all systems.
    - b. Submit Electronic files to Owner, Designer and Construction Manager via email or dropbox or directly through USB Drives.
  - 3. Submit (2) USB Drives with all As-Built documentation and software configurations.
    - a. Software configurations shall be provided for:
      - A) Video security NVR and camera/user database
      - B) Access control system configuration and database

#### **3.04 PROJECT DELIVERABLES**

- A. Provide a copy of all submittals and manuals and pamphlets.
- B. Provide a copy of all Warranty documents and contact numbers for Warranty requests.
- C. The contractor shall provide one set of full sized as-built prints. Provide a PDF of the as-built prints on the USB drives or via Email or Dropbox.
  - 1. Provide a clean set of the latest drawings with red lines marked for all field changes or bulletins. See above for systems to be included on the As-Built prints

- D. The As-Built drawings shall include:
1. Changes to be reflected on the drawings for Video Security Systems shall include:
    - a. Camera locations
    - b. Cabling Paths
    - c. Camera numbers
    - d. Comm room where camera connects to.
  2. Changes to be reflected on the drawings for Access Control/Alarm Systems shall include:
    - a. Changes to hardware installed at each door. Update each door for all devices installed and connected
    - b. Changes to the panel locations
    - c. Door numbers
    - d. Changes to the schematic connectivity of any system shown on the drawings.
  3. Changes to be reflected on the drawings for Paging Systems shall include:
    - a. Rack/cabinet locations.
    - b. Rack layout of all components in each rack.
    - c. Changes to the schematic connectivity of any system shown on the drawings.
    - d. Ceiling/wall mounted projector locations
    - e. Label designation of all cables, including system interconnection cables.
  4. Changes to be reflected on the drawings for Cabling Systems shall include:
    - a. Route of exterior conduits and exterior cabling
    - b. Route of backbone cabling, fiber and copper
    - c. Route of major cable paths from outlet to comm room.
    - d. Rack/cabinet locations.
    - e. Faceplate locations
    - f. Rack layout of all components in each rack.
    - g. Changes to the schematic connectivity of any system shown on the drawings.
    - h. Cable numbering for each faceplate.
- E. Documentation for the specific systems shall include. Provide the following for each system:
1. Contractor warranty dates based on Substantial completion date and contact information for warranty work.
  2. Data cabling
    - a. Testing Documentation for copper and fiber cabling
      - A) Include software to read the test results.
      - B) Testing Documentation; This shall include actual cable test results. Tabbed Sections in the binder:
        - 1) Telecommunication Horizontal Cabling Detailed cable test reports
        - 2) Telecommunications Fiber backbone cabling
        - 3) Summary report
    - b. Signed Cabling Warranty from manufacturer
  3. Video Security
    - a. Picture of focused and approved camera image labeled with the camera number and IP address
    - b. Master user password list
    - c. Spreadsheet of each camera that shall include:
      - A) Camera Part number
      - B) Firmware revision
      - C) IP address
      - D) MAC Address
      - E) Camera Name
      - F) Building where it is located
    - d. Training "Cheat Sheet"
    - e. Manufacturers Camera Warranty
    - f. Server/NVR Warranty

- g. Manufacturer contact information for warranty work
- h. Software Upgrade Protection (SUP) warranty including end date
- i. Warranty certificate for all PC's
- 4. Access Control
  - a. Part list/diagram for each access control panel. To include
    - A) Panel name and IP address (if applicable)
    - B) Doors which are connected to this panel
    - C) Panel location. Building and room number
  - b. Diagram showing which devices and doors that are attached to each panel
  - c. Training "Cheat Sheet"
  - d. Server Warranty
  - e. Software Upgrade Protection (SUP) warranty including end date
  - f. Warranty certificate for all PC's
- F. Training sign-in sheets detailing what was trained, who was trained and their time in training.

**END OF SECTION 287200**

## **SECTION 287600 – TECHNOLOGY LABELING**

### **PART 1 - GENERAL**

#### **1.01 WORK INCLUDED**

- A. This section provides direction on labeling of cables and devices.

### **PART 2 - PRODUCTS**

#### **2.01 CABLE LABELING PRODUCTS INTERIOR**

- A. CAT- 6, access control and audio / video cabling
1. Laser-printed, self-adhesive wrap around shall be Brady LAT-18-361 or equivalent.
  2. Label shall be 1.00-inch width x 1.33 inch high.
  3. Labels shall come on a sheet with 7 labels per row with a white and transparent matte finish.
  4. Sheet size shall be 8-1/2 inch x 11 inch.
  5. Printable area shall be a minimum of 1.00-inch width x 0.50 inch high.
  6. All labels shall be printed through a laser printer using labeling software.
  7. The Contractor shall submit a proposal for the labeling scheme for all audio and video wiring. The Engineer shall approve of the scheme prior to all labeling.
- B. Audio Components in a cabinet or rack.
1. Each of the audio and video components shall be labeled.
  2. The labels shall have a white background with black, laser printed letters.
  3. Each label shall be large enough for 2 lines of text and wide enough to detail what each dial and component is for.
  4. Each input and output control point on the amplifiers and other equipment shall be labeled for the device to which it connects.
  5. Mark each volume or level control for the optimum setting.
    - a. Put a mark at the nominal input and output level for each control. This shall be useful for a new person to reset the system to work as designed if someone else has changed the settings.
- C. Faceplate Labels
1. Laser-printed, paper labels shall be used to label user faceplates.
  2. Individual paper labels shall be installed behind the clear plastic strips of all user faceplates and surface mount housings.
    - a. The labels shall show the location identifier number and letter of each individual cable.
  3. Where a faceplate or surface mount box does not have a clear plastic strip the contractor shall install an adhesive label on the plate or surface mount box showing the cable number of each cable in the plate.
- D. CAT-6 patch panels in comm rooms
1. Laser-printed, labels shall be used to label Cat-6 Patch panels
  2. Label the side of the patch panel for the panel number in the comm room. "Panel A" etc. label on two spot on each panel
  3. The panels shall be labeled 1-24. Use factory numbering or paper numbering if no factory numbering is provided.
- E. Rack and Cabinet labels
1. Provide and install Engraved, lamacoid labels at the top of each rack or cabinet installed. Shall be black label with white engraved letters
  2. Shall be 1" high minimum.
  3. Coordinate rack number and comm room number prior to ordering
- F. Custom Faceplates



1. Engraved labels shall be installed at locations including but not limited to:
  - a. Audio and Video special input plates. Detail each input and output
2. Size the phenolic labels for their individual uses. Provide a sample to the Engineer for approval prior to ordering or installation.

#### 2.02 SECURITY CAMERA LABELING

- A. Laser-printed, labels shall be used to label all Security Cameras
  1. Label the camera with a White or Clear label with black lettering.
  2. Label shall include the camera number.
  3. May include the IP address. Consult with owner to determine if this is required
  4. Label shall be a minimum of 3/4 inch tall and legible when standing beneath or near the camera as long as camera is not above 15; AFF

#### 2.03 ACCESS CONTROL PANEL LABELING

- A. Label the front of each access control panel to detail the doors that are connected to the panel.
  1. Label the front panel and detail each door number
  2. Label shall include the panel name and IP address
  3. Text shall be a minimum of 3/8 inch tall
  4. White label with black numbers

### **PART 3 - EXECUTION**

#### 3.01 PREPARATION

- A. Terminate all cables in proper color code sequence.
- B. Clean any surfaces where an adhesive label is to be installed.
- C. Prior to beginning the work, the contractor shall submit to the engineer a plan for labeling all the cables. This shall take into account to what components each cable is connected.

#### 3.02 GENERAL LABELING

- A. Everything shall be labeled as per the specs and drawings.
- B. All labels shall be installed to more easily identify the cables and ports on all panels. If there are any questions regarding labeling, contact the Engineer prior to installation.
- C. Engraved lamacoid labels shall be provided and installed whenever there is no location for paper inserts on faceplates, power poles, poke thru's, floor boxes, modular furniture and surface raceway.
  1. Engraved lamacoid labels shall provide the same labeling as the paper inserts, but they shall be self-adhesive.
  2. These labels shall be adhered to the location closest to the modular jack.
  3. Individual letters shall be provided for each cable. An overall location identifier can be provided for all the cables at that faceplate or floor box.
  4. Engraved labels for rack shall be at least 1-1/2 inch high with letters 1 inch high.
  5. These labels shall be affixed to the top and front of each rack or cabinet. Verify that the label will fit the rack or cabinet prior to purchasing.

#### 3.03 DATA CABLING LABELING EXECUTION



A. Cable labels for CAT-6 user cables from the faceplate to the patch panel shall be installed within 4 inches of the end of the cable sheath.

1. The location identifier is made up of 3 fields, and a sample might look like this:

AA-XXX

The AA stands for the communications room where the cables are terminated.  
The XXX Represents the cables number in that comm room. Start at 001 and extend to 999

This system of identification provides the Owner with an easy way to keep track of cables, and where they are located or terminated.

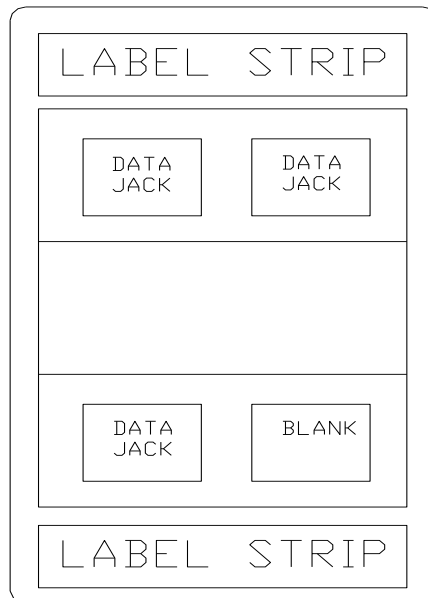
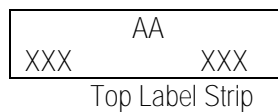
2. The cable label shall be similar to the label below:

AA-XXX
AA-XXX
AA-XXX

3. Provide a sample label to the Engineer for approval prior to installation of all labels.
4. Labels shall be **installed at each end of each cable. Shall be within 4” of the termination.**
5. Shall be at a uniform distance from termination on the patch panels. See pic below:



- B. Paper inserts shall be supplied for all faceplates and patch panels labels.
1. Paper inserts for the faceplate shall detail the exact location identifier for each cable.
  2. They shall fully cover the background of the insert space on the faceplate, but all numbers and letters of the identifier shall be visible after installation of the plastic cover plate.
  3. The paper insert for a standard faceplate will look like this:



4. Provide a sample label to the Engineer for approval prior to installation of all labels.

- C. CAT-6 Patch panels shall be labeled for the panel they are numbered in the comm room and for the cameras (1-24 or 1-48)
1. See below diagram:
    - a. Install labels at each end detailing the panel number.

	001	002	003	004	005	006	007	008	009	010	011	

- D. CAT-6 Patch panels for Wireless Access Points shall be labeled for the WAP number
1. See below diagram:
    - a. Install labels below each outlet on the patch panel detailing the WAP number
    - b. Meet with the owner and obtain the WAP number and label the panel with that WAP number. Install .laser printed label
    - c. Example below shows WAP number of BU (for Butler building)-0XX etc.

Panel A	001	002	003	004	005	006	007	008	009	010	011	Panel A
	BU-021	BU-022	BU-023	BU-024	BU-025	BU-026	BU-027	BU-028	BU-029	BU-030	BU-031	

**TYPICAL PANEL LABELING**



**3.04 VIDEO SECURITY LABELING**

- A. Cameras shall be labeled with the camera number in a visible location.
1. Affix a label to the camera housing that details the camera number
  2. Shall be in a location that is visible from a standing position.
  3. Shall be laser printed.

4. Label the camera cable patch panel to include the number of each camera connected to that cable. This camera cable label at the patch panel shall be by video security contractor
  - a. Install an adhesive sticker below the cable in the patch panel as the factory number (1-24) is most likely on top of the panel.
- B. Label the CAT-6 Patch Panel for security Cameras in each comm room
  1. Install an adhesive label on each port on the patch panel that attached so the security camera cable.

DDD = the camera number within that building

- C. CAT-6 Patch panels for security cameras shall be labeled for the camera number
  1. See below diagram:
    - a. Install labels at each end detailing the panel number.

Panel A	01	02	03	04	05	06	07	08	09	10	11	Panel A
	101	102	107	108	201	105	208	145	146	147	174	

- D. All labels shall be installed to more easily identify the cables and ports on all panels. If there are any questions regarding labeling, contact the Engineer prior to installation.

### 3.05 ACCESS CONTROL SECURITY LABELING

- A. Security Panels shall be labeled on the outside to indicate panel number and communications room number

Security panel	IP address 111.111.10.112
Panel 04	Comm room XXX

1. Install a label on the inside of the panel that details:
  - a. Door numbers that are connected to this panel
  - b. Diagram of panel showing where each door is connected to the panel.
  - c. Panel name as shown in the access control system
  - d. IP address of the panel
- B. Access Control cables shall be labeled.
  1. The cables at the door devices shall be labeled where they connect to the device at the door
  2. The cables at the panels in the communications rooms shall be labeled with the door number
  3. Cable labels shall be installed within 3 inches of the end of the cable sheath.
    - a. The cable label shall be similar to the label below:

<b>125A-DC</b>
<b>125A-DC</b>
<b>125A-DC</b>

- b. Provide a sample label to the Engineer for approval prior to installation of all labels.

125A-DC

The 125A stands for the Door Number.

The DC stands for Door Contact. This could be any of the field devices:  
RX,ES, EL, MX, KP etc.

### 3.06 AUDIO/VIDEO LABELING

- A. The Contractor shall make up a spreadsheet listing each audio and video cable that extends from the cabinet/rack to a location within the building.
1. The spreadsheet shall detail the number of the cable, the room it is located in, and the cabinet to which it routes.
  2. One line on the sheet shall show the results of the test. After being tested for continuity, and being tested that the cable delivers the required signal, the Contractor shall enter "PASS" into the result column.
  3. There shall be spaces for the name of the person doing the test, the date, and the company name.
  4. All information on the sheet shall be printed by a printer except the name of the person performing the tests, the date, and the "PASS" column.
  5. This spreadsheet shall be submitted to the Engineer and Owner prior to project completion.
- B. Each control, audio, video, speaker, and microphone cable shall be labeled with a self-laminating, laser printed label at each end. This includes all interconnection cables.
1. The cables shall be labeled for the equipment that the cable connects. Consult with the Engineer prior to labeling.
  2. All speaker cables shall be marked according to their location in each room. Consult with the Engineer prior to labeling.
  3. Each video cable shall be labeled according to the equipment it connects to.
  4. The cable label shall be similar to the label below:

SPKR-1
SPKR-1

- a. The above label details that this cable is the first speaker cable for the audio system. The same rationale will be used for speakers, video cables, etc. The Contractor shall mark all as-built drawings to show the microphone location or speaker that the label refers to. There shall be continuity between all labels and as-built prints.
  - b. Provide a sample label to the Engineer for approval prior to installation of all labels.
- C. Once the system is set up and running, many different people will be using the system. The Contractor shall label each audio and video component for what it does.
1. In example, the mixers shall detail what microphones they mix. Do this by labeling each gain control dial on the mixer. The mixer would be labeled as "Microphone-Mixer in Incident room" or other similar label.
  2. For the description of all the components, consult with the Engineer. All labels shall be laser printed.
  3. The Contractor shall identify each item on the as-built connectivity drawings. Use the same identification as you do on the labels.

**END OF SECTION 287600**

## **SECTION 287700 – TECHNOLOGY TESTING**

### **PART 1 - GENERAL**

#### 1.01 WORK INCLUDED

- A. This section provides direction on
  - 1. Testing of copper and fiber cable,
  - 2. Testing and commissioning of the technology systems

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Approved vendors for cable testers are:
  - 1. Fluke or equal

#### 2.02 TESTING PRODUCTS

- A. Category 6 cable shall be tested.
  - 1. Cable tester shall support Cat 6 channel and permanent link certification.
  - 2. Tester shall provide accuracy beyond TIA level III requirements traceable to laboratory reference standards.
  - 3. Through add on fiber optic probes, the tester shall be able to test multimode and single mode fiber cable.
  - 4. Test results shall be able to be stored on internal or removable compact flash memory cards.
  - 5. Tester shall have optional talk set for discussions over the cable being tested.
  - 6. Tester shall support a frequency range of 1-350 MHz with accuracy to the current proposed TIA Level III.
  - 7. Tester shall support the following tests:
    - a. Near end crosstalk (NEXT).
    - b. Attenuation.
    - c. Equal level far end crosstalk (ELFEXT).
    - d. Return loss.
    - e. Ambient noise.
    - f. Wire map shall identify miswires, shorts, opens, reversals, and split pairs.
    - g. Shall measure cable length and distance to faults (if any).
    - h. Propagation delay.
    - i. Loop resistance.
  - 8. Tester shall support the following test standards:
    - a. TIA Cat 6 and ISO Class E.
    - b. TIA Cat 5.
    - c. TIA TSB-95.
    - d. TIA Cat 3, 4 and 5 per TIA TSB-67.
    - e. UTP, STP, SCTP coaxial and twinax cabling.
    - f. IEEE: all Ethernet 802.3UTP and fiber PMD interfaces including 1000BASE-T; other 802.x PMD interfaces including token ring and demand priority.
    - g. ATM: All UTP and fiber PMD interfaces.
  - 9. Tester shall have all required probes and accessories required to perform CAT-6 tests and "Network Tests."
  - 10. Tester shall have been recently calibrated (within 4 months), and shall be utilizing the latest software.

#### 2.03 PUNCHLIST PROCESS

- A. The contractor shall be required to go through a punchlist process prior to substantial completion and final completion/payment of each project
- B. Contractor shall be responsible for reviewing their own work and checking to ensure it has met the project requirements.
- C. The contractor shall:
  - 1. Review your work in each room
  - 2. Review the specifications and drawing and review their work to ensure it meets requirements
  - 3. Create a punchlist document showing what work is not yet done and what as-builts are yet to be completed. Send document to designer.
    - a. Provide a date when contractor punchlist work will be completed.
  - 4. Schedule a punchlist and substantial completion meeting with designer.
  - 5. Present updated punchlist document to the owner
  - 6. Walk the site with the contractor and demonstrate all systems and review the work completed. Demonstrate how all work is completed
- D. Designer will create an "Owner Punchlist" document
  - 1. This will be provided to the contractor
  - 2. Contractor shall review the list, fix/upgrade/replace all equipment and cabling and finish work on the punchlist
  - 3. Return punchlist to the designer showing when the work was fixed/completed and a signature on the sheet showing that the contractor has reviewed each item.
- E. Meet onsite with the designer to review the finished work.

### **PART 3 - EXECUTION**

#### **3.01 EXAMINATION**

- A. Testing shall be completed after fiber is installed inside the fiber patch panel and the fiber panel has been put together.
- B. All cables and panels where cables terminate shall be labeled with the cable label or name of each individual cable. Identify how each cable and panel will be labeled.

#### **3.02 CATEGORY UTP/STP CABLE TESTING**

- A. Cable tests for CAT 6 cables shall be provided for each user CAT-6 cable.
  - 1. Prior to beginning the testing, the Contractor shall provide the Engineer with a notice that testing will begin. Written notice shall be given at least 3 business days prior to testing beginning.
  - 2. Tester shall be calibrated each day with manufacturer provided calibration cable.
  - 3. Tests shall be saved under each cables unique location identifier.
  - 4. Contractor shall provide the correct cables and probes specifically for the cable and modular jacks that are being tested.
  - 5. During the test the tester shall be set to check all "Network Tests."
  - 6. Test results shall be provided in hard copy and soft copy. Along with the soft copy, provide a copy of the software required to read the test results.
  - 7. Contractor shall supply 2 copies of the paper results and 2 copies of the file results.
  - 8. Provide all paper results in 3-ring binders. Binders shall have a cover that shows the job name, job number, building and closet where the cables were tested, and the range in the location identifiers of the cables tests provided.
  - 9. Tester shall be set to match the cable being tested.
  - 10. Contractor is responsible for ensuring that all cables pass the tests. Any cable found not to pass shall be removed and replaced at the Contractor's expense.



- B. Multipair cables shall be tested for continuity, miswires, shorts, opens reversals, and split pairs.
  - 1. Provide the test results in the multiple pair cable Test Sheet

### 3.03 SECURITY SYSTEM COMMISSIONING

- A. After all Work is completed, and prior to requesting the Acceptance test, Contractor shall conduct a final inspection, and pre-test all equipment and system features. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test.
- B. Contractor shall submit a request for the Acceptance test in writing to the owner no less than fourteen days prior to the requested test date. The request for Acceptance test shall be accompanied by a certification from Contractor that all Work is complete and has been pre-tested, and that all corrections have been made.
- C. During Acceptance test, Contractor shall demonstrate all equipment and system features to the owner. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the owner.
- D. If the contractor has submitted all necessary paperwork and the system seems to be in working order according to the engineer then the system can be considered Substantially Complete after the engineer puts that in writing.
- E. Security System Substantial Completion.
  - 1. The access control system shall be considered substantially complete as soon as:
    - a. All doors are connected, configured in the system and are working as required.
    - b. All security devices are connected and have been tested and shown to be fully functional. All cables are labeled at each end.
    - c. Intercoms are functioning and able to release lock on a door.
    - d. All users are entered into the system and all cards/fobs have been distributed.
    - e. All locking and unlocking schedules are defined and are working.
    - f. User accounts are setup
    - g. As-built drawings have been updated to reflect any changes in the connectivity.
    - h. All manufacturer literature has been turned over to the Owner.
    - i. Maps are setup and populated in the system.
    - j. Training has been completed.
    - k. Copy of the system configuration has been provided to the owner via a CD or thumb drive.
  - 2. The video security system shall be considered substantially complete as soon as:
    - a. All cameras are connected and functional.
    - b. The system is fully configured and recording images as required.
    - c. User accounts are setup
    - d. As-built drawings have been updated to reflect any changes in the connectivity.
    - e. All manufacturer literature has been turned over to the Owner.
    - f. Maps are setup and populated in the system.
    - g. Training has been completed.
  - 3. The contractor shall schedule a substantial completion meeting where all security systems shall be demonstrated and shown to be in working order and configured as per the specs and the owner's requirements.
    - a. If the system is deemed to be in working order then the engineer shall sign a letter stating that the systems are Substantially Complete. The system is not Substantially Complete until a letter is provided to the contractor and owner.
  - 4. After substantial completion the systems shall be in good working order for a period of 30 days.
    - a. In the event that the system or systems should fail or not work as required during the 30-day period, the Contractor shall be on site the same day to fix and configure the system to make it work as designed.

- b. A new 30-day period will begin as soon as the system has been demonstrated to be in good working order and the engineer acknowledges in writing that the system has been fixed and is again considered substantially complete.
5. Once the system has been considered Substantially Complete and has been working for 30 consecutive days with no interruption in service, the system shall be thought of as "Finally Complete."
6. Warranty shall begin immediately after the system is deemed Finally Complete.

### 3.04 PAGING SYSTEM TESTING

- A. Paging system testing:
  1. The Contractor shall make up a spreadsheet that will be used for testing the equipment and connectivity in each room.
    - a. List each room that has a separate zone. Room # and Zone extension #
    - b. List each group zone and speakers in that zone.
  2. Note each input to the system and an area for testing of that input.
    - a. Desktop paging phone system
    - b. Desktop Microphone
  3. The spreadsheet shall also list each zone and input and shall contain a space to note that each audio speaker was tested and that it passed the test.
  4. Spreadsheet shall include space for noting who tested the speaker and the date of the test. All information on the sheet shall be printed by a printer except the name of the person performing the tests, the date, and the "PASS" column.
  5. This spreadsheet shall be submitted to the Designer and Owner prior to project completion. Shall be submitted showing that each piece was tested.
  6. Test music
    - a. Play music in certain zones
    - b. Play music during passing time
- B. After substantial completion the systems shall be in good working order for a period of 30 days.
  1. In the event that the system or systems should fail or not work as required during the 30-day period, the Contractor shall be on site the same day to fix and configure the system to make it work as designed.
  2. A new 30-day period will begin as soon as the system has been demonstrated to be in good working order and the engineer acknowledges in writing that the system has been fixed and is again considered substantially complete.
  3. Once the system has been considered Substantially Complete and has been working for 30 consecutive days with no interruption in service, the system shall be thought of as "Finally Complete."
  4. Warranty shall begin immediately after the system is deemed Finally Complete

**END OF SECTION 287700**

## **SECTION 287750 – TECHNOLOGY TRAINING**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. This section includes directions for the Contractor regarding training for technology and security systems.

#### **1.02 SYSTEM DESCRIPTION**

- A. The Contractor shall provide training on all the installed systems.

### **PART 2 - PRODUCTS**

Not used.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL TRAINING REQUIREMENTS**

- A. The Contractor shall provide training on all systems installed or upgraded as part of the contract.
  - 1. The Contractor shall involve the personnel from the Owner's office in the implementation and configuration of the systems.
  - 2. Prior to the cutover of the system, the Contractor shall work with the Owner on the training that will be provided. The Owner and the Contractor shall schedule the training at a time beneficial to both.
  - 3. Each system is to have training provided as part of the installation.
  - 4. Each training session shall include.
    - a. This training will give an overview of the capabilities of each system, and the methods to be employed in utilizing the system.
    - b. The Contractor shall provide a syllabus detailing what will be discussed at the training, and notes for the Owner to refer to during the life of the system. The notes shall list directions for general use of the system and possible fixes to general issues that could occur.
    - c. Training shall include as-built diagrams of the connectivity, a walk-thru of the system, a demonstration of actual user interface with the system, and directions on its general use.
    - d. This training is only meant to give an overview of each system. In depth training shall be provided for an in-depth analysis of certain systems as described below.
  - 5. For all training, the Contractor shall pay all expenses.
- B. Create cheat sheets for all systems that the users can keep after the training.
  - 1. Cheat sheet shall include details on how to use the system.
  - 2. A copy of the cheat sheet shall be laminated and installed at the system location.
  - 3. For individual training the contractor shall provide a cheat sheet for each person being trained.
  - 4. Cheat sheet shall be laminated.
  - 5. Provide a cheat sheet in each classroom or conference room.
  - 6. Submit these for approval to the designer and owner prior to training. Have the cheat sheets at the training.

### 3.02 PAGING TRAINING -COMMERCIAL SYSTEM

- A. The Contractor shall furnish pre-acceptance and post-acceptance training on the paging/bell system.
  - 1. The first training shall occur during the on-site system configuration. 1 or 2 Owner's Representatives shall be present when the technician is setting up the system and doing the programming of all the extension numbers and different call groups.
  - 2. Formal training shall be done with Owner's Representatives after installation and configuration of the system. The training shall include:
    - a. Copies of all pertinent paperwork and system booklets that come with the paging/sound masking system.
    - b. A spreadsheet listing all the speaker groups and their corresponding rooms and a drawing graphically representing the speaker groups.
    - c. The Contractor shall provide a short booklet detailing the steps required to perform all the general functions of the paging system.
    - d. A complete overview of the capabilities of the paging system and a demonstration of calling through the telephone system and desktop microphone shall be completed as part of the training.
    - e. At the end of the training, the administrators shall be able to fully configure and control all aspects of the paging systems.
    - f. All training shall take place on the Owner's site with the Owner's system.

### 3.03 VIDEO SECURITY TRAINING

- A. The Contractor shall provide training as part of this contract
  - 1. The Contractor shall involve the personnel from the Owner's office in the implementation and configuration of the security systems.
  - 2. Prior to the cutover of the systems, the Contractor shall work with the Owner on the training that will be provided. The Owner and the Contractor shall schedule the training at a time beneficial to both.
  - 3. The training shall include two separate training tracks:
    - a. Configuration Training of the Administrators of the Video security system
    - b. General user Training
  - 4. Contractor shall be at each site four (4) separate times to train and updated users at each building. These will be scheduled as detailed below.
  - 5. Training class shall be on-site utilizing the actual equipment installed as part of the system and a PC connected to the existing data network. Coordinate with the Owner's IT department on setting up the user interfaces.
  - 6. Training shall include all travel and other expenses.
- B. Configuration Training: Video Security
  - 1. A minimum of 10 hours of training shall be provided on the configuration of the video security system to minimum of 4 of the Owner's representatives.
    - a. This training will give an overview of the capabilities of the system, and the methods to be employed in utilizing the systems.
    - b. The Contractor shall provide a syllabus detailing what will be discussed at the training and notes for the Owner to refer to during the life of the systems. The notes shall list directions for general use of the system and possible fixes to general issues that could occur.
    - c. Video Security Training shall include but not limited to:
      - A) As-built diagrams of the connectivity.
      - B) A demonstration of actual user interface with the system, and directions on its general use.
      - C) Review of live and stored video.
      - D) Printing images. Storing video, Writing video clips to storage media.

- E) Configuring the cameras including frame rates, resolution etc.
- F) Changing number of images per camera/per second.
- G) Setting passwords and levels of security. Adding user accounts.
- H) Adding and changing parameters on the maps.
- I) Setting integration of the video security and access control.
- J) Setting schedules of the access control system and interoperations
- d. The training shall be provided on the schedule below.
  - A) Training 1. Shall occur during configuration and installation prior to substantial completion. This shall be a formal training class that will detail the system and how it works.
  - B) Training 2. To take place approximately 3 weeks after substantial completion. This shall be a formal class to review how the system works and allow the owner to ask questions and the contractor shall be available to make changes and discuss implementation questions.
  - C) Training 3. Training one month after Final Completion. This shall be an update to the training and shall review the owners list of questions and concerns. Work with the owner prior to the class to identify specific items that should be included in the training.
  - D) Training 4. Training shall occur three months after Final Completion. This shall be an opportunity for the contractor to update any software and shall include training on any procedures the owner feels they need more information on.
  - E) The owner shall be able to specify what is to be covered at each training session. This may require that the contractor review current settings or change settings on the system while demonstrating how this can be done.
- C. General User training:
  - 1. This training shall be for users of the system such as principals, secretary's and administrators.
  - 2. The goal of the training is to allow the users to become familiar on the user software. They shall be able to set up their own interface screen and shall be able to view live and stored video and control the locking/unlocking of doors.
  - 3. A minimum of 8 hours per building shall be provided for training. This shall be open to no less than four users at each building. This training is designed to allow the owner and their staff to fully review and print video and configure the access control system.
    - a. Video Security Training shall include but not limited to:
      - A) As-built diagrams of the connectivity.
      - B) A demonstration of actual user interface with the system, and directions on its general use.
      - C) Review of live and stored video.
      - D) Printing images. Storing video, Writing video clips to storage media.
      - E) Interface and control of the system via the map software.
    - b. Thoroughly review the use of the remote viewing software and how each user can individually set up their screen to review the cameras they want to view.
      - A) Training 1. Shall occur during configuration and installation prior to substantial completion. This shall be a formal training class that will detail the system and how it works.
      - B) Training 2. To take place approximately 3 weeks after substantial completion. This shall be a training class that will allow the owner to ask questions about the system and have the contractor fix/implement items that were not understood or yet used.
      - C) Training 3. Training one month after Final Completion. This shall be an update to the training and shall review the owners list of questions

and concerns. Be prepared to make changes to schedules and camera views during this training session.

- D) Training 4. Training shall occur three months after Final Completion. This shall be an opportunity for the contractor to update any software and shall include training on any procedures the owner feels they need more information on.
- E) The owner shall be able to specify what is to be covered at each training session. This may require that the contractor review current settings or change settings on the system while demonstrating how this can be done.

**END OF SECTION 287750**

## **SECTION 287800 – TECHNOLOGY WARRANTY**

### **PART 1 - GENERAL**

#### 1.01 SECTION INCLUDES

- A. This section includes directions for the Contractor regarding system and equipment warranties.

#### 1.02 SYSTEM DESCRIPTION

- A. The project is not complete until all paperwork has been provided.

#### 1.03 COORDINATION

- A. Coordinate as-built drawings and records with the Engineer and Owner.

### **PART 2 - PRODUCTS**

#### 2.01 MANUFACTURERS

- A. Provide manufacturer's warranty for all equipment installed
- B. Provide contractor warranty for workmanship and equipment
- C. Provide software upgrade protection (SUP) warranty as detailed in the specifications.

#### 2.02 MATERIALS

- A. The Contractor shall provide the following to the owner/designer at Substantial Completion and any updates prior to the issuance of the final payment
  1. Manuals and pamphlets on all electronic equipment.
  2. All spare parts and cover plates for all components of the network.
  3. Red lined set of as-built drawings for the entire project.
- B. Updated hard copy and soft copy of the As-Built Documentation. See associated spec section.

### **PART 3 - EXECUTION**

#### 3.01 EXAMINATION

- A. Contractor shall fully examine all components of the system to make sure that all manuals and paperwork are included in the final submittal.
- B. Examine all equipment and cabling to ensure that it is labeled as per the drawings and specifications.

#### 3.02 GENERAL WARRANTY

- A. Warranty Period shall be 1 year after a signed copy of Substantial Completion. This shall be the Warranty Period.
- B. See further specifications for additional warranty requirements that may be longer for certain systems.
  1. Contractor shall be responsible for generating and submitting the Substantial Completion document to the designer for review and signature.

- C. Warranty shall include each and every part, cable or software system provided as part of this project. This includes cabling, Networking, Wireless, Audio/Video systems and Access Control and Video Security systems.
  - 1. During the Warranty Period:
    - a. If any part is broken due to a manufacturing defect or installation defect, the Contractor shall fix and/or replace the broken item at their own expense.
    - b. If any equipment loses connectivity or fails for any reason the contractor shall be onsite to diagnose and fix or replace equipment and upgrades software.
    - c. The Contractor shall also supply all configuration and programming necessary to keep all electronic equipment to the latest revision of software during the warranty period.
    - d. If the "system" goes down, and needs configuration to be brought back up, the Contractor shall be liable for any programming or reconfiguration.
    - e. During the warranty period, the Contractor shall make the Owner aware of any software upgrades that are available.
    - f. Contractor shall install all software upgrades for that warranty period or as detailed below for specific systems.
    - g. If the system does not run well during the warranty period the contractor shall be onsite to diagnose and fix the system.
- D. The contractor shall be onsite within 24 hours after a call from the owner or designer regarding system or equipment issues.

### 3.03 EXTENDED CABLING WARRANTY

- A. The Contractor shall provide to the Owner a "Link Warranty" on all the components of the voice/data cabling system. This includes all components from the faceplate, through the jacks, cable, and back to the patch panels, not including patch cords. This does include Fiber Optic cabling and termination equipment.
- B. Cable shall be installed that is covered as part of the complete warranty on the data cabling system. Cable that cannot be covered under the warranty shall not be installed.
- C. The warranty shall be provided through the manufacturer of the faceplate, jacks, and patch panels. All components shall be by the same manufacturer.
- D. The warranty shall guarantee that if any part or piece of the "Link" is found to be defective for a period of no less than 15 years, then that part or piece shall be replaced or fixed at no cost to the Owner.
- E. The Contractor shall be responsible for installing the system in such a manner that the manufacturer will provide this warranty to the Owner.
- F. The Contractor is responsible for compiling and submitting all the paperwork required to receive the warranty. This includes gathering all the information, completing any required forms, and submitting these forms and any other records to the manufacturer as required.
- G. It shall be the Contractor's responsibility to receive the approved warranty notification from the manufacturer and provide that and all the associated paperwork to the Owner.
- H. The installation shall not be considered finally complete until the Owner has received notification, from the manufacturer, that the entire cabling system is covered by their warranty

### 3.04 SERVER WARRANTY

- A. Each Server that is provided as part of this project shall be provided with a three-year (3) next day replacement warranty.
  - 1. The warranty shall include that the contractor be onsite and replace the server and any software required.
  - 2. Coordinate with the manufacturer to facilitate the server replacement.
  - 3. Re-install the server and connect to the network.
  - 4. Re-implement the existing owner's software and configure based on the final initial implementation.
  - 5. Keep a copy of the original configuration of the system to allow easy implementation of the new server.



3.05 CAMERA WARRANTY

- A. All cameras shall be warranted by the manufacturer for 5 years.
- B. If camera fails during general warranty period than the contractor shall be onsite and replace camera with a new model. Install replacement camera.
- C. After general warranty period the manufacturer shall replace or repair the camera if it fails.

3.06 VIDEO SECURITY SOFTWARE WARRANTY

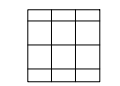

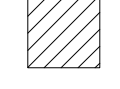
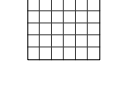
- A. As part of the project the contractor shall provide a three-year (3) video security recording system and security camera warranty that provides for all software updates during the years after Substantial Completion for new server and cameras.
  - 1. Contractor shall be required to install all software and firmware updates during the three years.

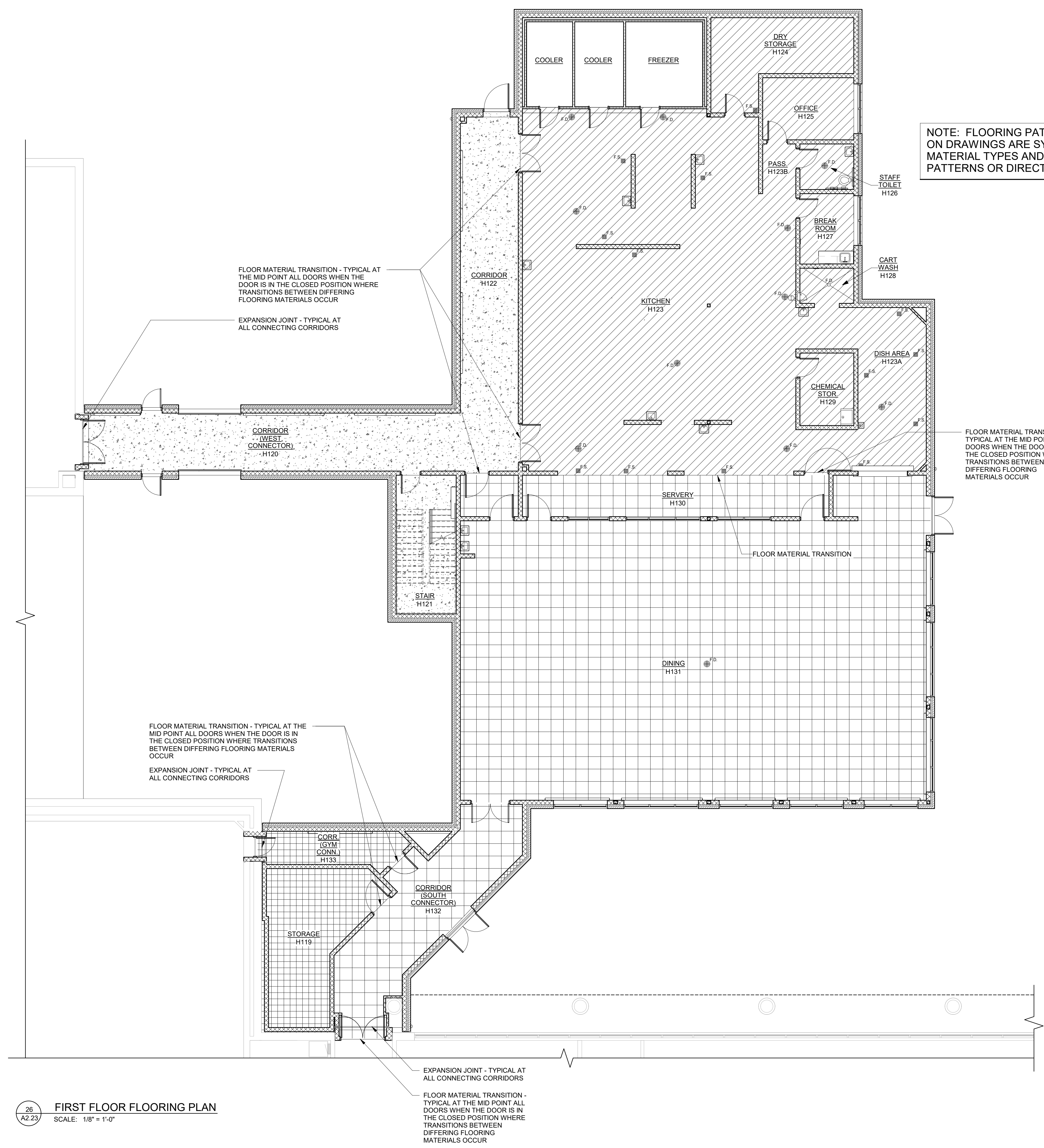
3.07 ACCESS CONTROL SOFTWARE WARRANTY

- A. As part of the project the contractor shall provide a three-year (3) access control system software warranty that provides for all software updates during the years after Substantial Completion.
  - 1. Contractor shall be required to install all software and firmware updates during the three years.

**END OF SECTION 287800**

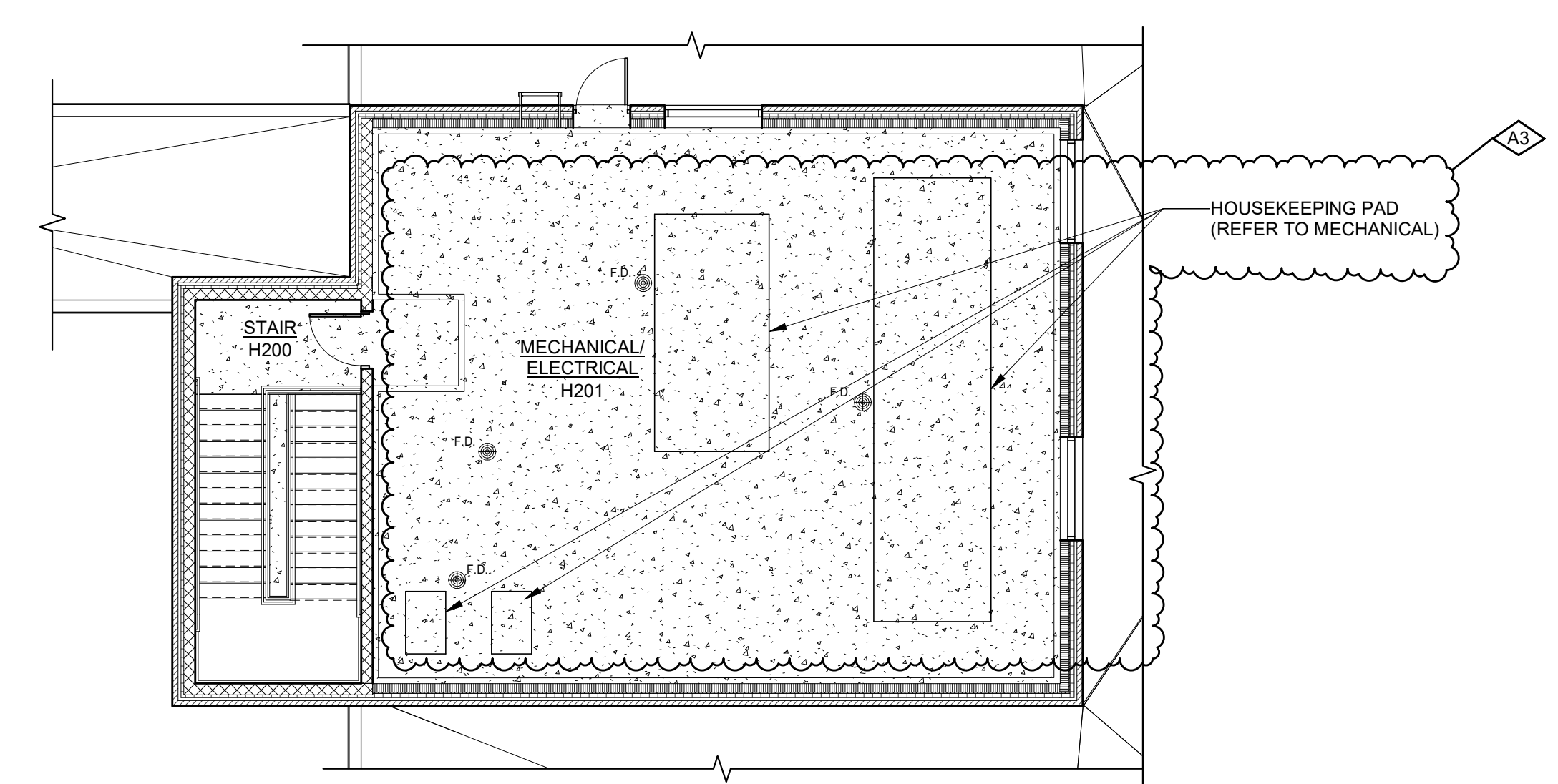
**FLOORING LEGEND**

-  CERAMIC TILE
-  SEALED CONCRETE
-  RESILIENT SHEET FLOORING
-  RESILIENT TILE FLOORING



**28**  
A2.23  
**FIRST FLOOR FLOORING PLAN**  
SCALE: 1/8" = 1'-0"

NOTE: FLOORING PATTERNS INDICATED ON DRAWINGS ARE SYMBOLIC OF MATERIAL TYPES AND NOT INSTALLATION PATTERNS OR DIRECTIONS.



**17**  
A2.23  
**SECOND FLOOR FLOORING PLAN**  
SCALE: 1/8" = 1'-0"

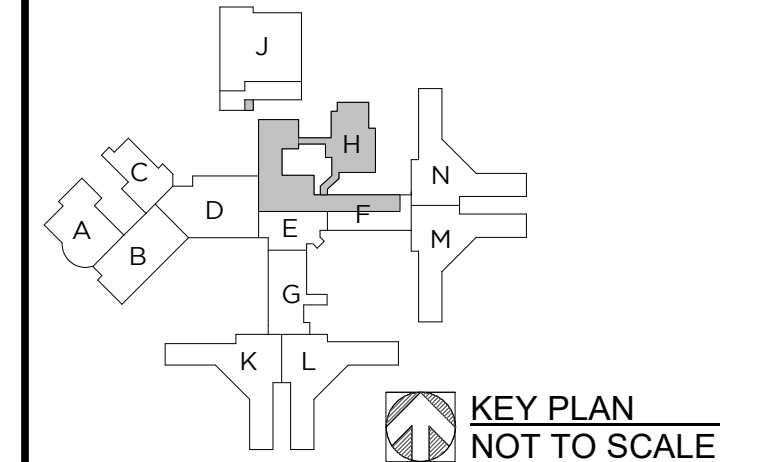
A3	ADDENDUM NO. 3	09/28/23
NO.	REVISION	DATE

STATE OF MICHIGAN  
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET  
FACILITIES AND BUSINESS SERVICES ADMINISTRATION  
DESIGN AND CONSTRUCTION DIVISION  
ADAM LACR, R.A. DIRECTOR

FILE NO.  
491/20167.SDW

FUNDING CODE  
171CODHHS7255

CONTRACT NO.  
Y22003



WTAARCH.COM

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PROJECT TITLE  
491/20167.SDW - PHASE 500:  
**CENTER FOR FORENSIC  
PSYCHIATRY - CREATE  
KITCHEN**  
SALINE, MICHIGAN

SHEET TITLE  
**FIRST & SECOND FLOOR  
FLOORING PLANS**

PROJECT NUMBER <b>2021094</b>	SHEET NUMBER <b>A2.23</b>
PROJECT DATE SEPTEMBER 6, 2023	
CHECKED BY C.D.S.	

ROOM FINISH SCHEDULE													
ROOM NO.	ROOM NAME	FLOOR	BASE	MAT.	FINISH	NORTH WALL	EAST WALL	SOUTH WALL	WEST WALL	CEILING	CL.G.	HEIGHT	REMARKS
E124	GYMNASIUM	EXISTING	EXIST.	EXIST.	PAINT	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.			O
E126	SECURE CORR.	EXIST.	EXIST.	EXIST.	PAINT	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.			O
H104	WAREHOUSE	EXISTING	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.	EXIST.			O
H116A	SECUR. VEST.	C. TILE	C. TILE	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		9'-0"	N
H119	STORAGE	RTF	R.W.B.	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		9'-0"	L
H120	CORRIDOR (WEST CONNECTOR)	SEALED CONC.	R.W.B.	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		9'-0"	L
H121	STAIR	SEALED CONC.	R.W.B.	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	EXP.			
H122	CORRIDOR	SEALED CONC.	R.W.B.	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		9'-0"	N
H123	KITCHEN	RSF	RSF COVE	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		9'-0"	N
H123A	DISH AREA	RSF	RSF COVE	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		9'-0"	N
H124	DRY STORAGE	RSF	RSF COVE	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		8'-0"	N
H125	OFFICE	RSF	R.W.B.	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		10'-0"	
H126	STAFF TOILET	RSF	R.W.B.	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		8'-0"	
H127	BREAK ROOM	RSF	R.W.B.	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-1		10'-0"	
H128	CART WASH	RSF	RSF COVE	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		9'-0"	N
H129	CHEMICAL STOR.	RSF	RSF COVE	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		9'-0"	N
H130	SERVERY	C. TILE	C. TILE	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-2		9'-0"	M
H131	DINING	C. TILE	C. TILE	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	SAT-2		9'-0"	M
H132	CORRIDOR (SOUTH CONNECTOR)	C. TILE	C. TILE	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		8'-0"	L
H133	CORR. (GYM CONN.)	RTF	R.W.B.	C.M.U.	PAINT	C.M.U.	PAINT	C.M.U.	PAINT	SAT-1		9'-0"	
H200	STAIR	SEALED CONC.	R.W.B.	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	C.M.U.	EPOXY PAINT	EXP.			
H201	MECHANICAL/ELECTRICAL	SEALED CONC.		GYP. BD.	EPOXY PAINT	GYP. BD.	EPOXY PAINT	GYP. BD.	EPOXY PAINT	EXP.			

DOOR & FRAME SCHEDULE													
DOOR NUMBER	ROOM NAME	PAIR	WIDTH	HEIGHT	THK.	MAT.	TYPE	FRAME	HEAD	JAMB	SILL	FIRE RATING	REMARKS
E124.C	CORR. (GYM CONN.)		3'-0"	7'-0"	1-3/4"	H.M.	D4		27/A7.02 SIM	11/A2.31	30/A7.02 SIM		90 D, K, V
E126.A	SECURE CORR.	X	3'-0"	7'-0"	1-3/4"	H.M.	D2		27/A7.02 SIM	25/A3.01			20 B, C, D, G, V
H120.A	CORRIDOR (WEST CONNECTOR)	X	3'-0"	7'-0"	1-3/4"	H.M.	D4		27/A7.02	1/A2.31	30/A7.02		90 B, C, G, W
H120.B	CORRIDOR (WEST CONNECTOR)		10'-0"	8'-0"	1-3/8"	STEEL	D3		27/A3.01	28/A3.01			
H120.C	CORRIDOR (WEST CONNECTOR)		10'-0"	8'-0"	1-3/8"	STEEL	D3		27/A3.01	28/A3.01			H
H120.D	CORRIDOR (WEST CONNECTOR)		3'-0"	7'-2"	1-3/4"	H.M.	D2		21/A3.01	29/A2.31 SIM			C, G, T
H120.E	CORRIDOR (WEST CONNECTOR)		3'-0"	7'-2"	1-3/4"	H.M.	D2		21/A3.01	29/A2.31			C, G, T
H121.A	STAIR		3'-0"	7'-2"	1-3/4"	H.M.	D4		30/A3.01	6/A2.31		B	60 H, R, W
H122.A	SECUR. VEST.		3'-8"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			C, G, S
H122.B	CORRIDOR	X	3'-0"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			C, G, R, Y
H122.C	CORRIDOR	X	3'-0"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			C, G, R, Y
H122.D	CORRIDOR		4'-0"	7'-2"	1-3/4"	WD.	D2		21/A3.01	29/A2.31			C, D, G, T
H124.A	DRY STORAGE		3'-0"	7'-2"	1-3/4"	H.M.	D1		20/A3.01	6/A2.31			H
H125.A	OFFICE		3'-0"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			H, R
H126.A	STAFF TOILET		3'-0"	7'-2"	1-3/4"	H.M.	D1		20/A3.01	6/A2.31			H
H127.A	BREAK ROOM		3'-0"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			H, R
H129.A	CHEMICAL STOR.		3'-0"	7'-2"	1-3/4"	H.M.	D1		20/A3.01	6/A2.31			H, R
H130.A	SERVERY		3'-8"	7'-2"	1-3/4"	WD.	D1		20/A3.01	6/A2.31			C, S, Y
H130.B	SERVERY		3'-8"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			H, S, Y
H130.C	SERVERY		3'-8"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			H, S, Y
H131.A	DINING	X	3'-0"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			B, H, S
H131.B	SECUR. VEST.		3'-8"	7'-2"	1-3/4"	WD.	D2		20/A3.01	6/A2.31			C, D, R, G, S
H131.C	DINING	X	3'-0"	7'-2"	1-3/4"	D.H.M.	D2		29/A3.01	5/A2.31			C, D, R, E, G, U
H131.D	DINING		8'-0"	3'-4"	1/2"	STEEL	D3		26/A3.01	26/A3.01	26/A3.01		H, X
H132.A	CORR. (S. CONN.)	X	3'-0"	7'-0"	1-3/4"	H.M.	D4		27/A7.02	13/A2.31	30/A7.02		90 B, H, V
H132.B	STORAGE		3'-8"	7'-2"	1-3/4"	H.M.	D1		20/A3.01	6/A2.31			H, R, W
H132.C	CORRIDOR (SOUTH CONNECTOR)	X	3'-0"	7'-2"	1-3/4"	D.H.M.	D2		21/A3.01	5/A2.31			C, D, E, G, U
H133.A	CORR. (GYM CONN.)		3'-0"	7'-2"	1-3/4"	WD.	D4		20/A3.01	6/A2.31			D, K, S
H201.A	MECHANICAL / ELECTRICAL		3'-0"	7'-2"	1-3/4"	H.M.	D1		22/A3.01	22/A3.01			H, R, W

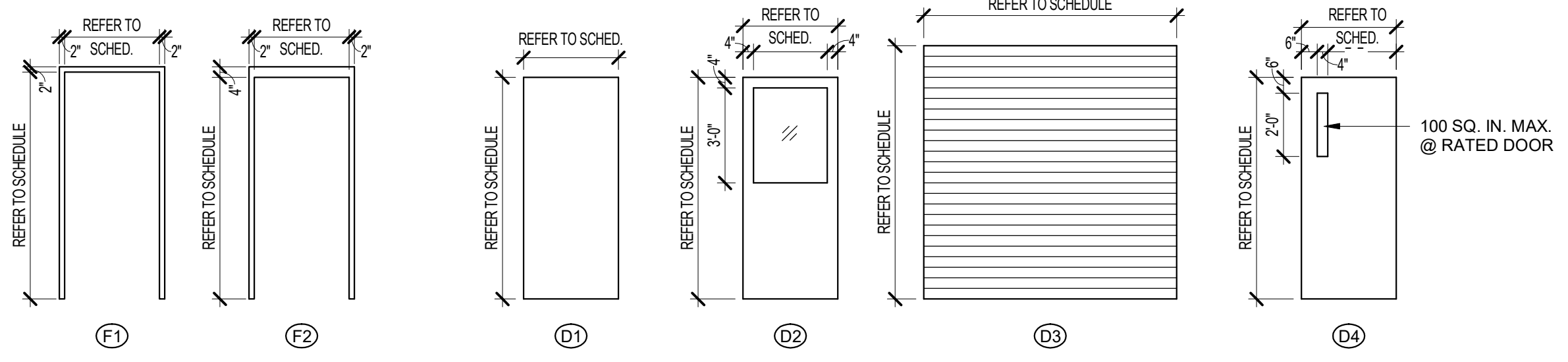
FINISH MATERIAL SCHEDULE					
MATERIAL	MANUFACTURER	STYLE	COLOR	SIZE	REMARKS
C. TILE - CERAMIC TILING	STONEPEAK	SIMPLY MODERN	SIMPLY TAN, HONED FINISH	12"x24"	WITH MATCHING SIMPLY MODERN 6"x12" COVE BASE, LATICRETE GROUT COLOR: HEMP 27, 1/3 ASHLAR LAYING PATTERN
PAINT - CEILINGS	SHERWIN-WILLIAMS		SW1004 PURE WHITE		
PAINT - EXTERIOR DOORS & FRAMES	SHERWIN-WILLIAMS		SW1004 PURE WHITE		
PAINT - INTERIOR DOORS & FRAMES	SHERWIN-WILLIAMS		SW1099 KNUBBY WOOL		
PAINT - STAIRS & RAILINGS	SHERWIN-WILLIAMS		SW6215 ROCKY RIVER		
PAINT - WALLS	SHERWIN-WILLIAMS		SW1102 CHENILLE WHITE		
RSF - RESILIENT SHEET VINYL	PROTECT-ALL	CLASSIC	LIGHT GRAY	5 FT. x 8 FT.	WITH MATCHING PROTECT-ALL 6" COVE BASE SYSTEM - ONLY WHERE NOTED.
RTF - RESILIENT TILE FLOORING	TARKETT	ID LATITUDE	HEARTHSTONE	18"x18"	DIRECT GLUE DOWN
RWB - RESILIENT WALL BASE	TARKETT	TP RUBBER	CHARCOAL 20	4" COVE	
SAT-1 - SUSPENDED ACOUSTIC TILE	ARMSTRONG	FISSURED	WHITE	24"x24"	
SAT-2 - SUSPENDED ACOUSTIC TILE	ARMSTRONG	KITCHEN ZONE	WHITE	24"x24"	

SCHEDULE GENERAL NOTES:

- FINAL LOCATIONS OF DOOR CARD READERS, DOOR INTERCOMS AND PUSH BUTTONS TO BE FIELD VERIFIED WITH OWNER.
- REFER TO SHEET A0.01 AND MATERIAL SCHEDULE (THIS SHEET) FOR ABBREVIATIONS.
- WALL TYPES ARE INDICATED w/ A DIAMOND AND A NUMBER. REFER TO SHEET A0.01 FOR DESCRIPTION OF WALL TYPES.

SCHEDULE OF REMARKS:

- PROVIDE DOOR CLOSER.
- PROVIDE HOLD OPEN w/ CLOSER TIED INTO FIRE ALARM.
- PROVIDE A CARD READER INSIDE AND OUTSIDE.
- PROVIDE A DOOR INTERCOM w/ PUSH BUTTON INSIDE AND OUTSIDE.
- REINFORCED DETENTION DOOR.
- PROVIDE A DOOR INTERLOCKS INSIDE AND OUTSIDE.
- PROVIDE AN ELECTRIC LOCK.
- PROVIDE A MORTISE LOCK.
- NOT USED.
- PROVIDE A CARD READER OUTSIDE.
- PROVIDE A PUSH BAR ON INSIDE.
- PROVIDE HOLD-DOWN CLIPS FOR S.A.T. CEILING IN AREA NEAR EXTERIOR DOORS IN QUANTITY AND SPACING REQUIRED TO PREVENT MOVEMENT / UPLIFT OF CEILING TILES.
- CEILING HEIGHT VARIES (REFER TO CEILING PLAN).
- RSF FLOORING INCLUDES: Z-BAR COVE CAP, S.S. CORNER GUARDS @ COVE BASE CORNERS, AND S.S. TRANSITIONS STRIPS AT ALL FLOOR MATERIAL TRANSITIONS; BY FLRG MFR.
- PATCH AND REPAIR AT DEMOLITION POINTS.
- PROVIDE AN INTERLOCK INSIDE.
- PROVIDED AN INTERCOM w/ PUSH BUTTON INSIDE.
- DOOR LITE TO BE GL-1 (REFER TO SPECS).
- DOOR LITE TO BE GL-2 (REFER TO SPECS).
- DOOR LITE TO BE GL-3 (REFER TO SPECS).
- DOOR LITE TO BE GL-4 (REFER TO SPECS).
- DOOR LITE TO BE GL-5 (REFER TO SPECS).
- DOOR LITE TO BE GL-6 (REFER TO SPECS).
- PROVIDE DOOR STOP (REFER TO SPECS).
- PROVIDE CLOSER AND HOLD OPEN.

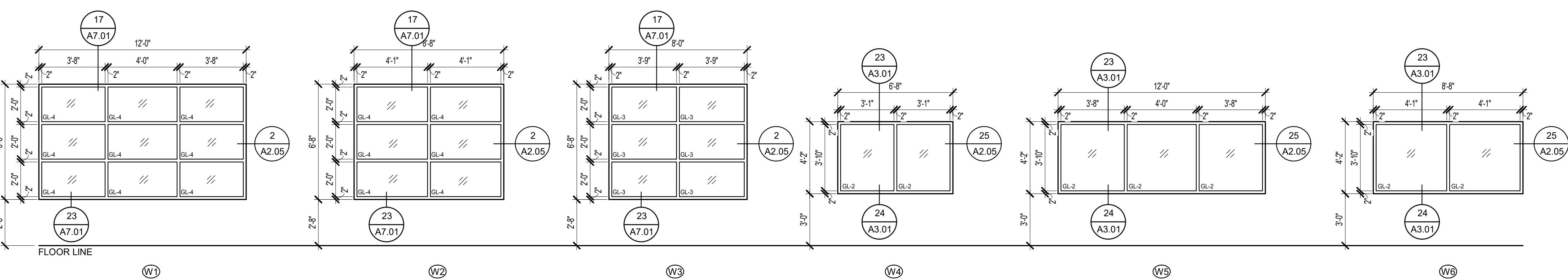


DOOR FRAMES

DOOR TYPES

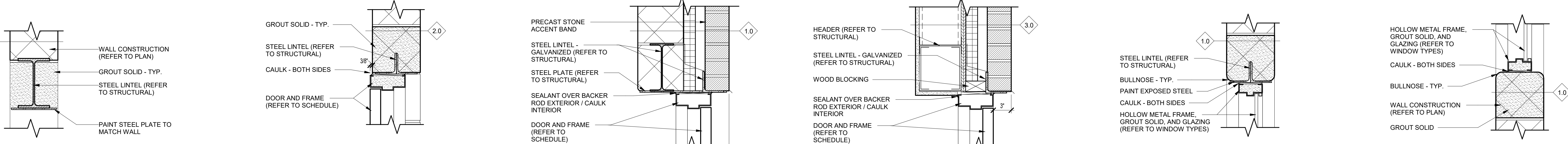
1/4" = 1'-0"

1/4" = 1'-0"



WINDOW TYPES

1/4" = 1'-0"



19 A3.01 OPENING HEAD DETAIL @ SERVERY SCALE: 1 1/2" = 1'-0"

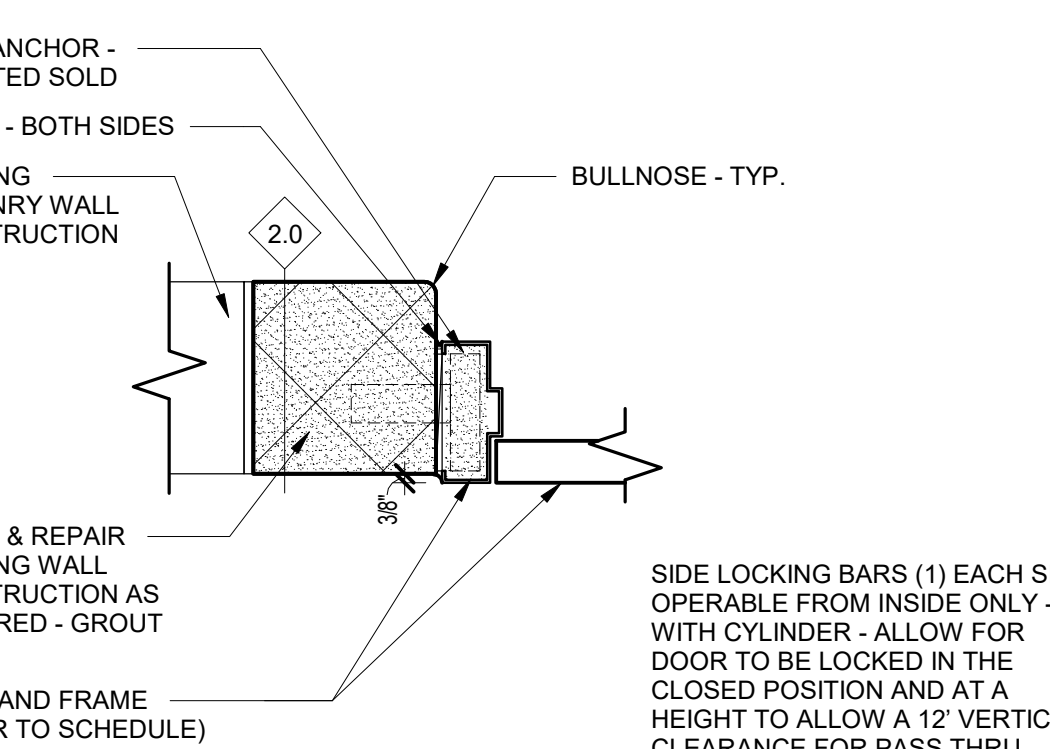
20 A3.01 TYP. INT DOOR HEAD DETAIL SCALE: 1 1/2" = 1'-0"

21 A3.01 TYP. EXT DOOR HEAD DETAIL SCALE: 1 1/2" = 1'-0"

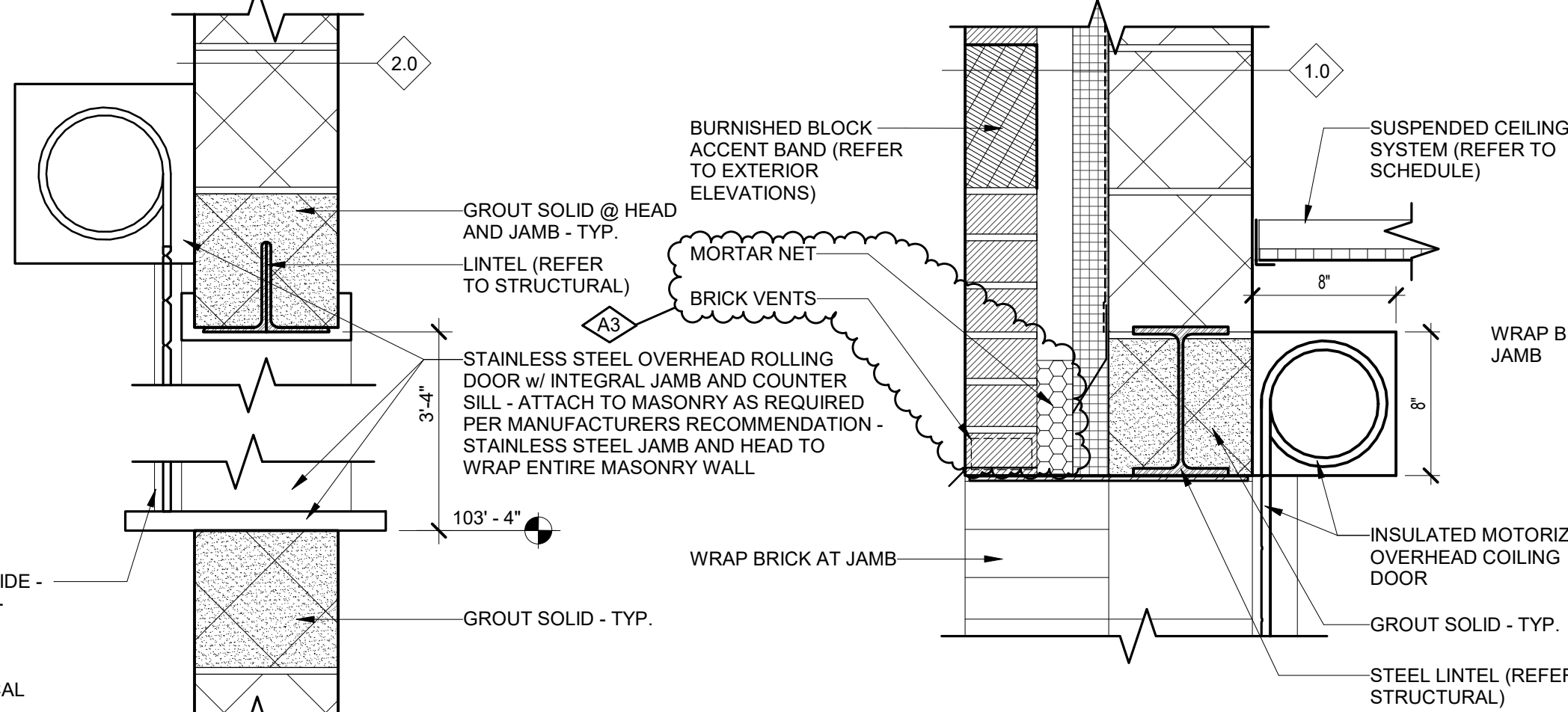
22 A3.01 DOOR HEAD DETAIL @ MECHANICAL / ELECTRICAL SCALE: 1 1/2" = 1'-0"

23 A3.01 TYP. WINDOW HEAD DETAIL SCALE: 1 1/2" = 1'-0"

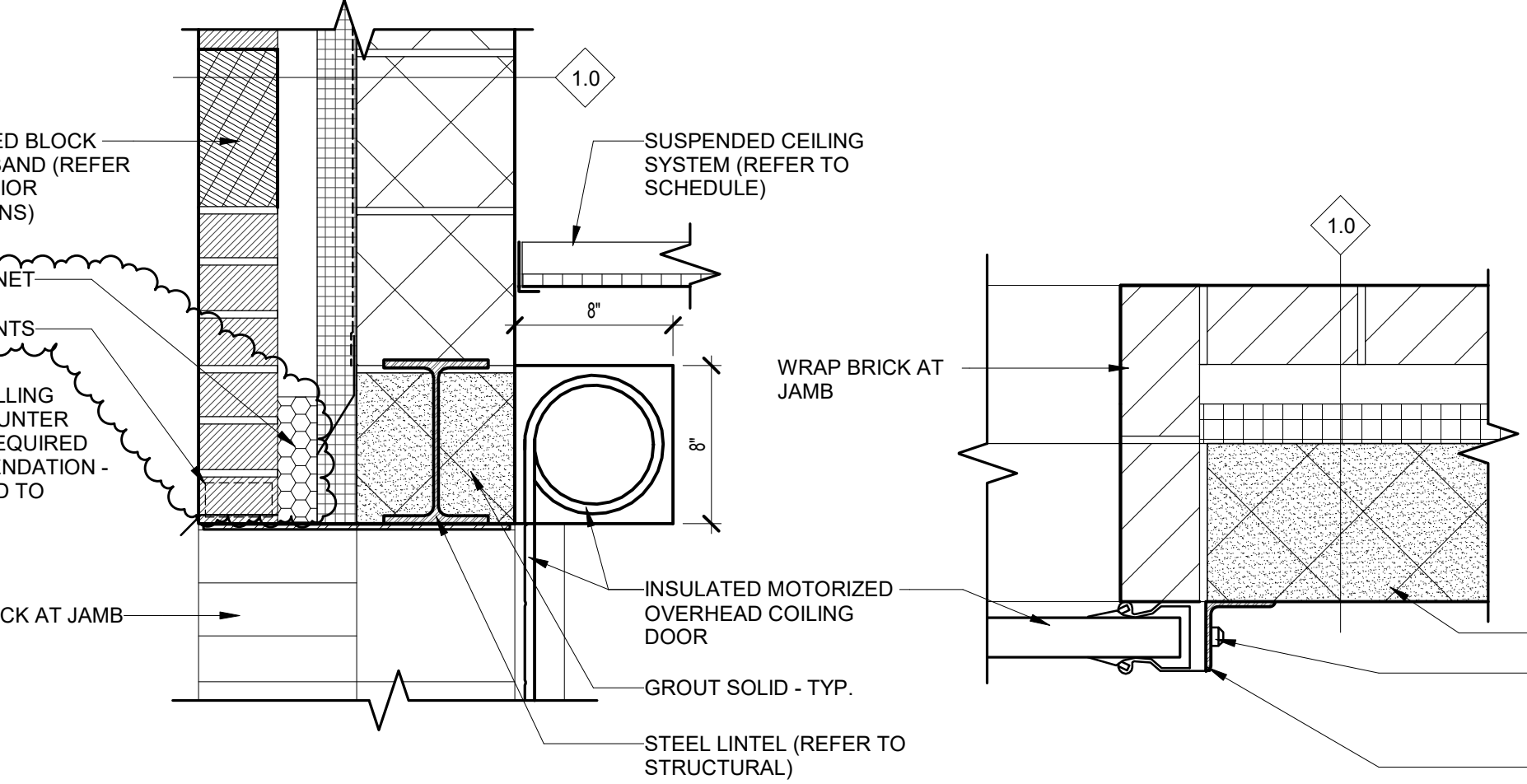
24 A3.01 TYP. WINDOW SILL DETAIL SCALE: 1 1/2" = 1'-0"



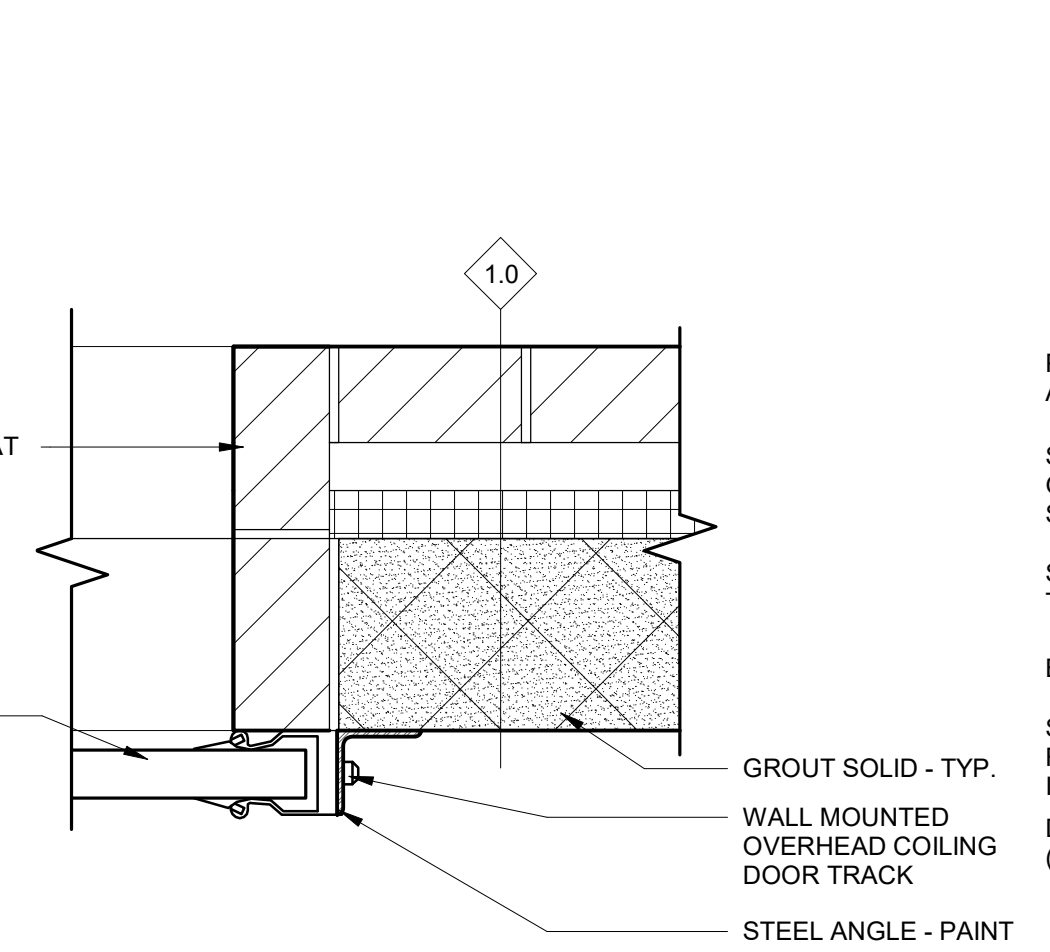
25 A3.01 TYP. INT DOOR JAMB DETAIL SCALE: 1 1/2" = 1'-0"



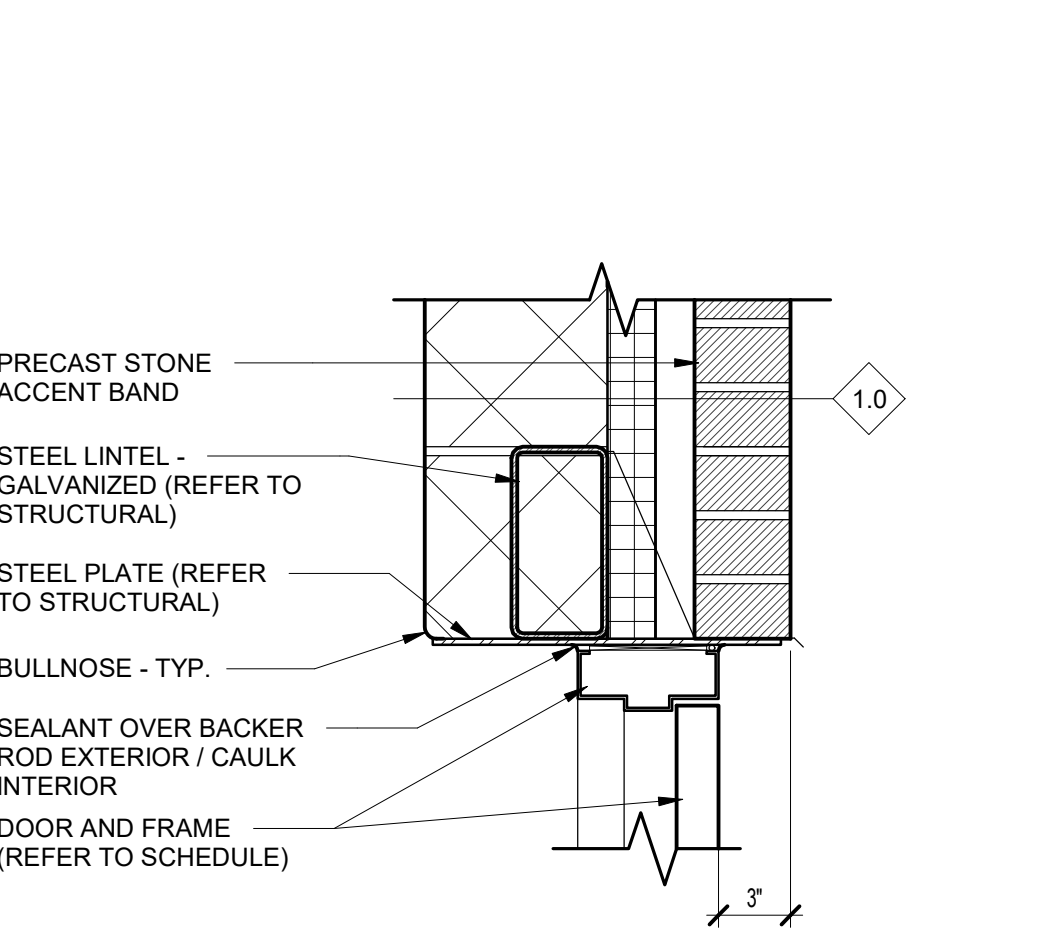
26 A3.01 COILING DOOR HEAD DETAIL @ TRAY DROP OFF SCALE: 1 1/2" = 1'-0"



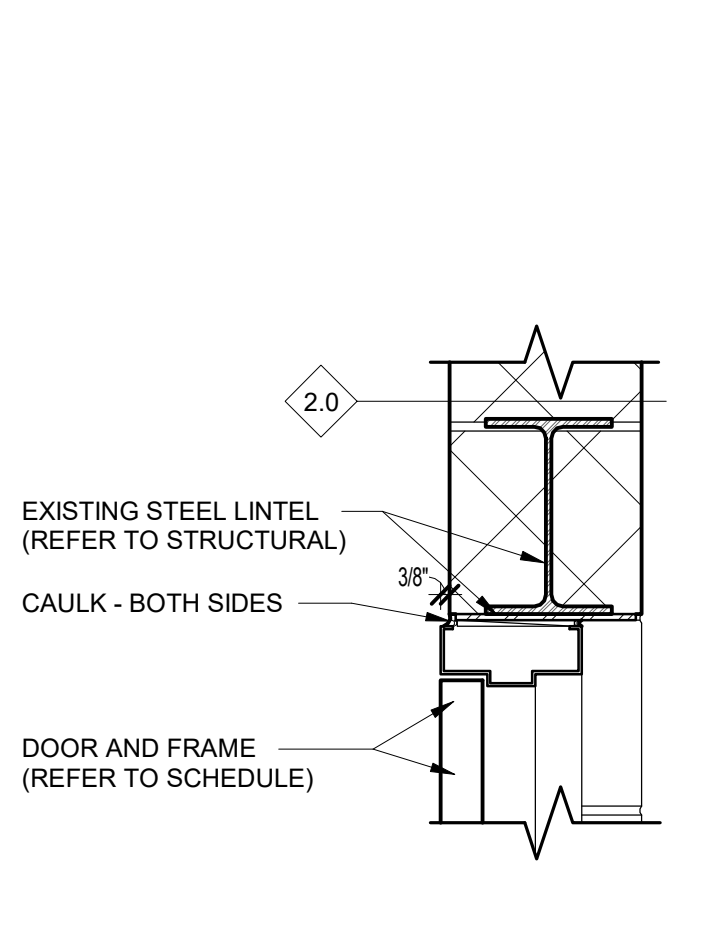
27 A3.01 COILING DOOR HEAD DETAIL @ CORRIDOR (WEST CONNECTOR) SCALE: 1 1/2" = 1'-0"



28 A3.01 JAMB DETAIL @ CORRIDOR SCALE: 1 1/2" = 1'-0"

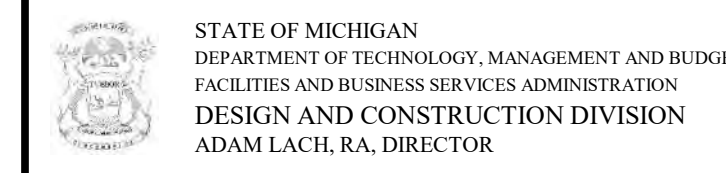


29 A3.01 DOOR HEAD DETAIL SCALE: 1 1/2" = 1'-0"



30 A3.01 DOOR HEAD DETAIL SCALE: 1 1/2" = 1'-0"

NO.	ADDENDUM NO. 3	DATE
A3		09/28/23



FILE NO.  
491/20167.SDW

FUNDING CODE  
171CODHHS7255

CONTRACT NO.  
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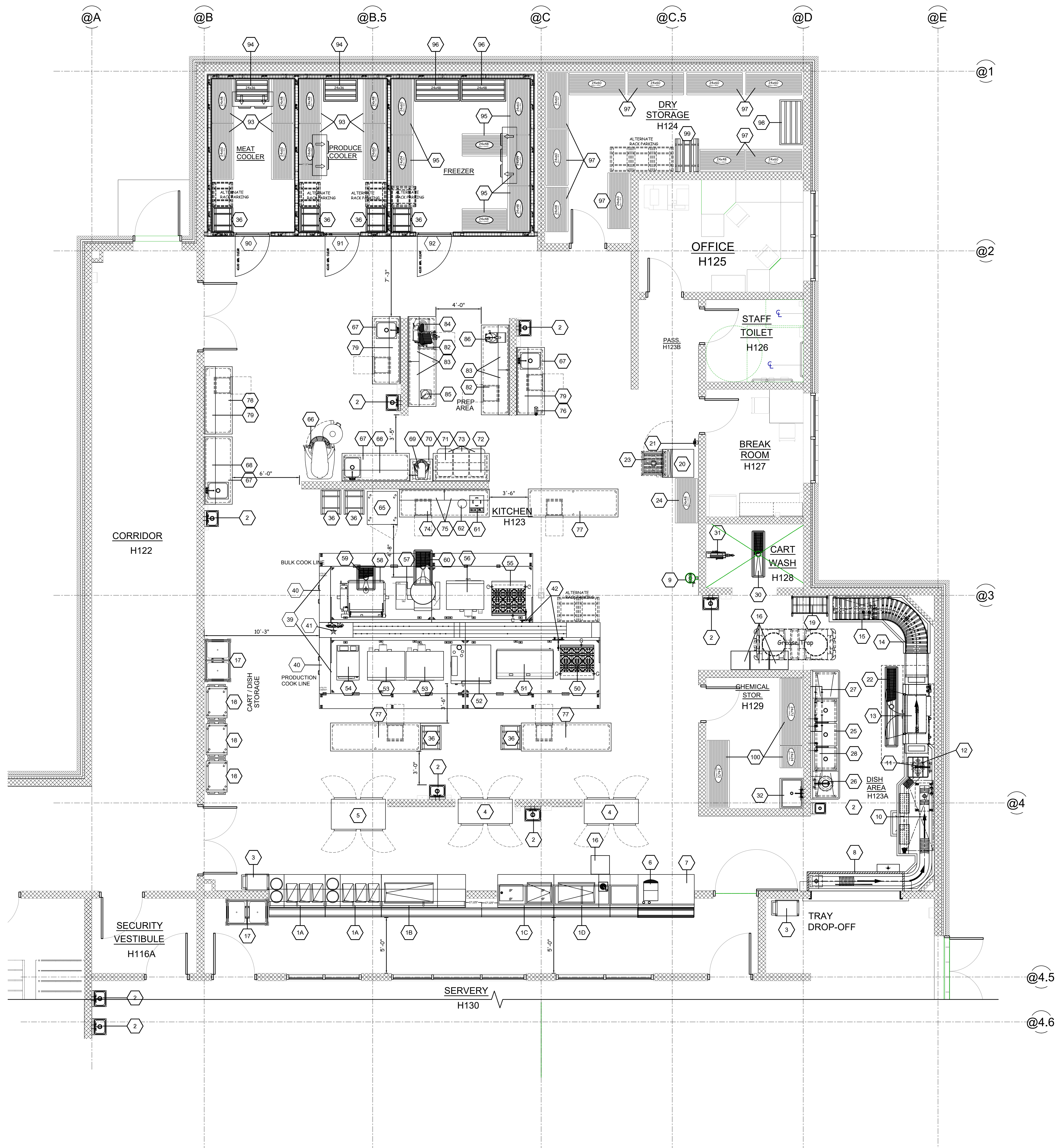
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PROJECT TITLE  
491/20167.SDW - PHASE 500:  
CENTER FOR FORENSIC  
PSYCHIATRY - CREATE  
KITCHEN

SALINE, MICHIGAN

SHEET TITLE ROOM FINISH & DOOR SCHEDS, DOOR & DW TYPES, AND DOOR DTLs	SHEET NUMBER A3.01
PROJECT NUMBER 2021094	CHECKED BY C.D.S.
PROJECT DATE SEPTEMBER 6, 2023	





EQUIPMENT SCHEDULE			
ITEM NO	QTY	EQUIPMENT CATEGORY	EQUIPMENT REMARKS
1A	2	SERVING LINE - HOT FOOD	
1B	1	SERVING LINE - HOT/COLD FOOD COMBO	
1C	1	SERVING LINE - COLD FOOD	
1D	1	SERVING LINE - COLD FOOD	
2	9	HAND SINK, WALL MOUNT	
3	2	CART, UTILITY	
4	2	DISPLAY CASE, REFRIGERATED	
5	1	CABINET, HEATED, PASS-THRU	
6	1	COFFEE MAKER, DISPENSER	
7	1	TABLE, WORK	
8	1	SOILED DISHTABLE TRAY CONVEYOR	
9	1	EYE WASH STATION	
10	1	DISHTABLE, ACCESSORY	
11	1	PRE-RINSE FAUCET, WALL MOUNT	
12	1	DISPOSER, GARBAGE	
13	1	WAREWASHER, RACK CONVEYOR	
14	1	CLEAN DISH ROLLER TABLE	
15	1	SHELF, WALL MOUNT	
16	3	DOLLY, DISHRACK	
17	2	DISPENSER, SELF-LEVELING TRAY	
18	3	CART, DISH & TRAY	
19	1	RACK, DOME DRYING	
20	1	ICE MAKER W/ BIN	
21	1	FILTER SYSTEM, ICEMAKER	
22	1	FLOOR TROUGH	
23	1	FLOOR TROUGH	
24	1	SHELVING UNIT	
25	1	SINK, SCULLERY, 3 COMPARTMENTS	
26	1	DISPOSER, GARBAGE	
27	1	POT RACK, WALL MOUNT	
28	1	SHELF, WALL MOUNT	
29	-	SPARE NUMBER	
30	1	FLOOR TROUGH	
31	1	HOSE REEL WITH SPRAY	
32	1	SINK, MOP W/SERVICE FAUCET	
33	-	SPARE NUMBER	
34	-	SPARE NUMBER	
35	-	SPARE NUMBER	
36	8	RACK, PAN	
37	-	SPARE NUMBER	
38	-	SPARE NUMBER	
39	2	VENTILATION SYSTEM	
40	2	FIRE SUPPRESSION SYSTEM	
41	1	UDS SYSTEM	
42	2	FAUCET, POT FILLER, WALL MOUNT	
43	-	SPARE NUMBER	
44	-	SPARE NUMBER	
45	-	SPARE NUMBER	
46	-	SPARE NUMBER	
47	-	SPARE NUMBER	
48	-	SPARE NUMBER	
49	-	SPARE NUMBER	
50	1	RANGE, HEAVY DUTY, GAS	
51	1	GRIDDLE, GAS W/STAND	
52	1	OVEN-STEAMER, COMBINATION, GAS	
53	2	DOUBLE OVEN, CONVECTION, GAS	
54	1	STEAMER, PRESSURELESS	
55	1	RANGE, HEAVY DUTY, GAS	
56	1	DOUBLE OVEN, CONVECTION, GAS	
57	1	KETTLE, STEAM JACKETED, GAS, TILT	
58	1	TILT SKILLET, GAS	
59	1	FLOOR TROUGH	
60	1	FLOOR TROUGH	
61	1	INDUCTION CHARGER	
62	101	THERMAL PELLET BASE	
63	-	SPARE NUMBER	
64	-	SPARE NUMBER	
65	1	CHILLER/FREEZER, BLAST	
66	1	MIXER, FLOOR	
67	4	TABLE, WORK W/SINK	
68	2	SHELF, WALL MOUNT	
69	1	MIXER, COUNTER	
70	1	STAND, EQUIPMENT	
71	1	TABLE, WORK	
72	1	SHELF, WALL MOUNT	
73	3	INGREDIENT BIN	
74	1	TABLE, WORK W/DRAWER ASSEMBLY	
75	1	SHELF, WALL MOUNT	
76	1	CAN OPENER	
77	3	TABLE, WORK W/DRAWER ASSEMBLY	
78	1	TABLE, WORK W/DRAWER ASSEMBLY	
79	3	SHELF, WALL MOUNT	
80	-	SPARE NUMBER	
81	-	SPARE NUMBER	
82	2	TABLE, WORK W/DRAWER ASSEMBLY	
83	4	SHELF, WALL MOUNT	
84	1	SLICER	
85	1	FOOD PROCESSOR	
86	1	FOOD PROCESSOR	
87	-	SPARE NUMBER	
90	1	WALK-IN MEAT COOLER	
91	1	WALK-IN PRODUCE COOLER	
92	1	WALK-IN FREEZER	
93	8	COOLER SHELVING UNIT	
94	2	COOLER DUNNAGE RACK	
95	7	FREEZER SHELVING UNIT	
96	2	FREEZER DUNNAGE RACK	
97	9	DRY STORAGE SHELVING UNIT	
98	1	DRY STORAGE DUNNAGE RACK	
99	1	CAN RACK	
100	3	CHEMICAL STORAGE SHELVING UNIT	

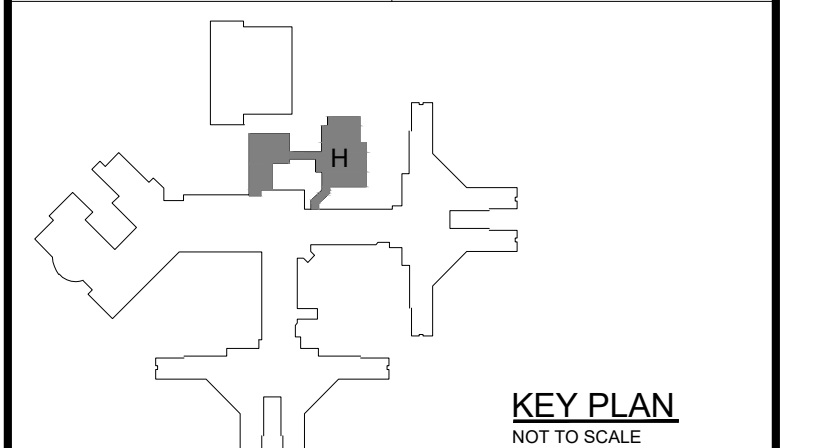
A3	ADDENDUM NO. 3	09/28/23
NO.	REVISION	DATE

STATE OF MICHIGAN  
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET  
FACILITIES AND BUSINESS SERVICES ADMINISTRATION  
DESIGN AND CONSTRUCTION DIVISION  
ADAM LACH, RA, DIRECTOR

FILE NO.  
491/20167.SDW

FUNDING CODE  
171C0DHS7255

CONTRACT NO.  
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COMMERCIAL REFRIGERATION, FOOD SERVICE EQUIPMENT  
5415 S BURBANK/ALAMADO, MICHIGAN 48861  
PH: 989/261-0277

PROJECT TITLE  
491/20167.SDW CFP - CREATE KITCHEN  
BID AND CONSTRUCTION:  
CENTER FOR FORENSIC  
PSYCHIATRY

SALINE, MICHIGAN

SHEET TITLE  
KITCHEN EQUIPMENT PLAN

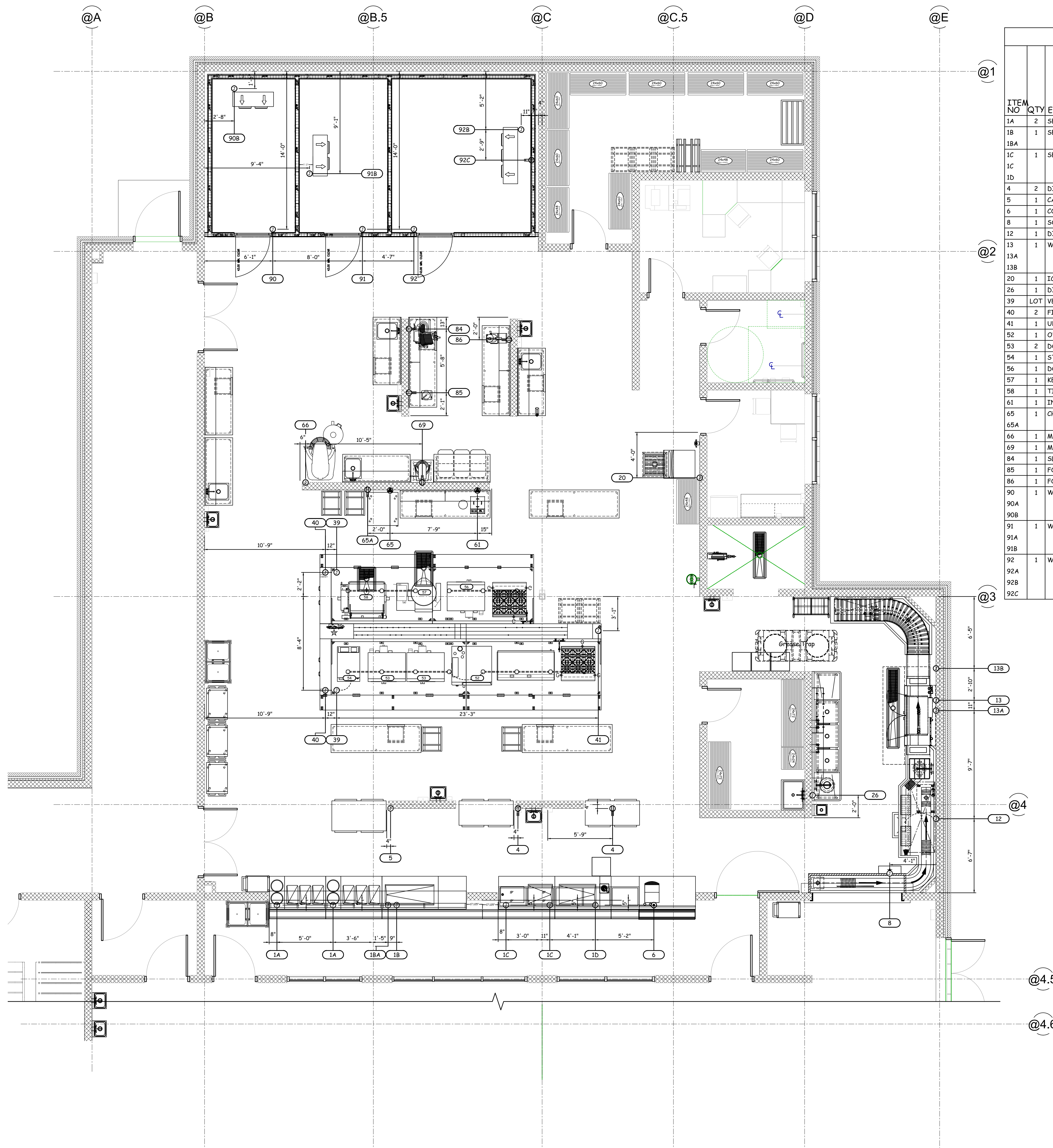
PROJECT NUMBER  
2021094

SHEET NUMBER

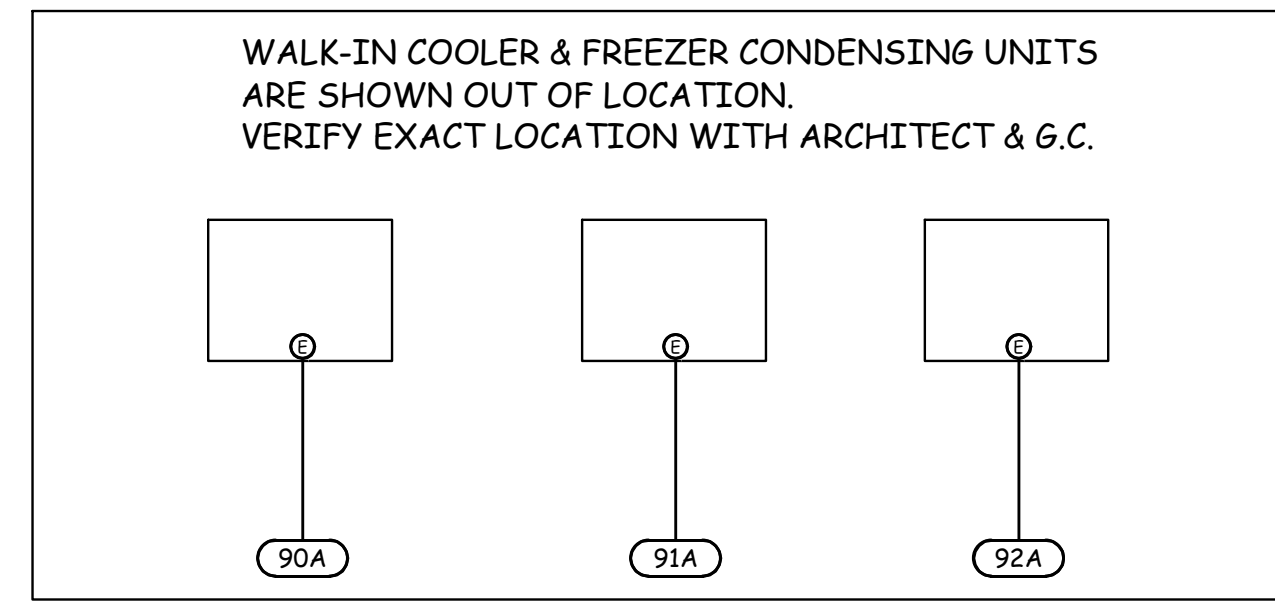
PROJECT DATE  
SEPTEMBER 6, 2023

FS2.01

CHECKED BY  
T.M.M.



ITEM NO	QTY	EQUIPMENT CATEGORY	AMPS	KW	HP	VOLTS	PHASE	CYCLE	DIRECT	PLUG	NEMA	ELECTRICAL AFF. (IN)	ELEC REMARKS
1A	2	SERVING LINE - HOT FOOD	15.9	3.3		208	1	60	X			SU	'STUB UP' UTILITIES
1B	1	SERVING LINE - HOT/COLD FOOD COMBO	15.9	3.3		208	1	60	X			SU	'STUB UP' UTILITIES
1BA			3.5			115	1	60	X			SU	'STUB UP' UTILITIES
1C	1	SERVING LINE - COLD FOOD	3.5			115	1	60	X			SU	'STUB UP' UTILITIES
1D			3.5			115	1	60	X			SU	'STUB UP' UTILITIES
4	2	DISPLAY CASE, REFRIGERATED	10.6		0.5	115	1	60	X	5-20P	86		STUB UP OR BRING DOWN FROM ABOVE FOR UNIT AWAY FROM WALL
5	1	CABINET, HEATED, PASS-THRU	15.5	1.6		115/208	1	60	X			86	
6	1	COFFEE MAKER, DISPENSER	12.0	1.44		120	1	60	X	5-15P		SU	
8	1	SOILED DISHTABLE TRAY CONVEYOR	15.0			208	1	60	X			60	
12	1	DISPOSER, GARBAGE	6.0		3.0	208	3	60	X			12	E.C. TO INTERWIRE TO CONTROL PANEL
13	1	WAREWASHER, RACK CONVEYOR	44.9	25.0		480	3	60	X			63.75	FOR MOTORS, CONTROLS & TANK HEAT
13A			40.1	30.0		480	3	60	X			63.75	FOR BOOSTER HEATER
13B			15.7			480	3	60	X			60	FOR BLOWER DRYER
20	1	ICE MAKER W/ BIN	11.9			115	1	60	X			72	
26	1	DISPOSER, GARBAGE	3.3		2.0	208	3	60	X			12	E.C. TO INTERWIRE TO CONTROL PANEL
39	LOT	VENTILATION SYSTEM	15.0			115	1	60	X			DFA	SERVICE TO LIGHTS & TEMP SENSORS
40	2	FIRE SUPPRESSION SYSTEM	20.0			120	1	60	X			DFA	20 AMP, 24-HR DEDICATED CIRCUIT
41	1	UDS SYSTEM	50.0	14.4		120/208	3	60	X			DFA	UDS SERVES ALL EQUIPMENT UNDER HOODS
52	1	OVEN-STEAMER, COMBINATION, GAS	9.6	2.2		208/240	1	60	X	6-50P	*		UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
53	2	DOUBLE OVEN, CONVECTION, GAS	(2)7.7		(2)1/2	120	1	60	X	5-15P	*		UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
54	1	STEAMER, PRESSURELESS	2.0	0.3		120	1	60	X			*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
56	1	DOUBLE OVEN, CONVECTION, GAS	(2)7.7		(2)1/2	120	1	60	X	5-15P	*		UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
57	1	KETTLE, STEAM JACKETED, GAS, TILT	5.0			115	1	60	X			*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
58	1	TILT SKILLET, GAS	5.0			115	1	60	X			*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
61	1	INDUCTION CHARGER	20.0	6.7		208	3	60	X	L15-20P	48		
65	1	CHILLER/FREEZER, BLAST	10.0		3.0	208	3	60	X	L15-20P	12		MAIN SERVICE TO UNIT
65A			2.0			120	1	60	X	5-15P	12		SERVICE FOR CONDENSATE EVAPORATOR
66	1	MIXER, FLOOR	12.0		3.0	200-240	3	50	X			54	CORD & PLUG NOT PROVIDED; L15-20P RECEPTACLE & PLUG CAN BE USED
69	1	MIXER, COUNTER	9.0		0.5	120	1	60	X	5-15P	36		
84	1	SLICER, FOOD	5.6		0.5	120	1	60	X	5-15P	45		
85	1	FOOD PROCESSOR	8.0		0.75	120	1	60	X	5-15P	45		
86	1	FOOD PROCESSOR	10.0		1.0	120	1	60	X	5-15P	45		
90	1	WALK-IN MEAT COOLER	15.0			120	1	60	X			DFA	SERVICE TO LIGHTS, ALARMS & HEATERS
90A			7.4		0.75	208-230	1	60	X			SU	SERVICE TO MEAT COOLER CONDENSING UNIT
90B			1.6			115	1	60	X			DFA	SERVICE TO MEAT COOLER EVAPORATOR COIL
91	1	WALK-IN PRODUCE COOLER	15.0			120	1	60	X			DFA	SERVICE TO LIGHTS, ALARMS & HEATERS
91A			7.0		0.75	208-230	1	60	X			SU	SERVICE TO PRODUCE COOLER CONDENSING UNIT
91B			1.6			115	1	60	X			DFA	SERVICE TO PRODUCE COOLER EVAPORATOR COIL
92	1	WALK-IN FREEZER	15.0			120	1	60	X			DFA	SERVICE TO LIGHTS, ALARMS & HEATERS
92A			21.4		3.0	208-230	1	60	X			SU	SERVICE TO FREEZER CONDENSING UNIT
92B			14.3			208-230	1	60	X			DFA	SERVICE TO FREEZER EVAPORATOR COIL
92C			15.0			120	1	60	X	5-15P	84		15 AMP CIRCUIT FOR DRAIN LINE HEAT TAPE



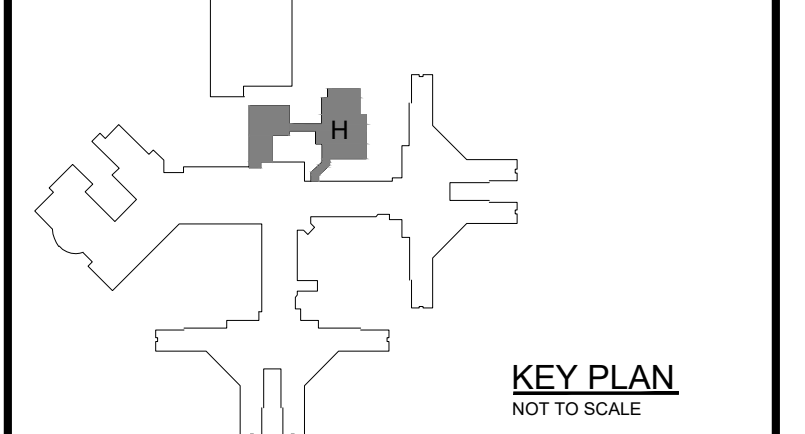
A3	ADDENDUM NO. 3	09/28/23
NO.	REVISION	DATE

STATE OF MICHIGAN  
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FILE NO.  
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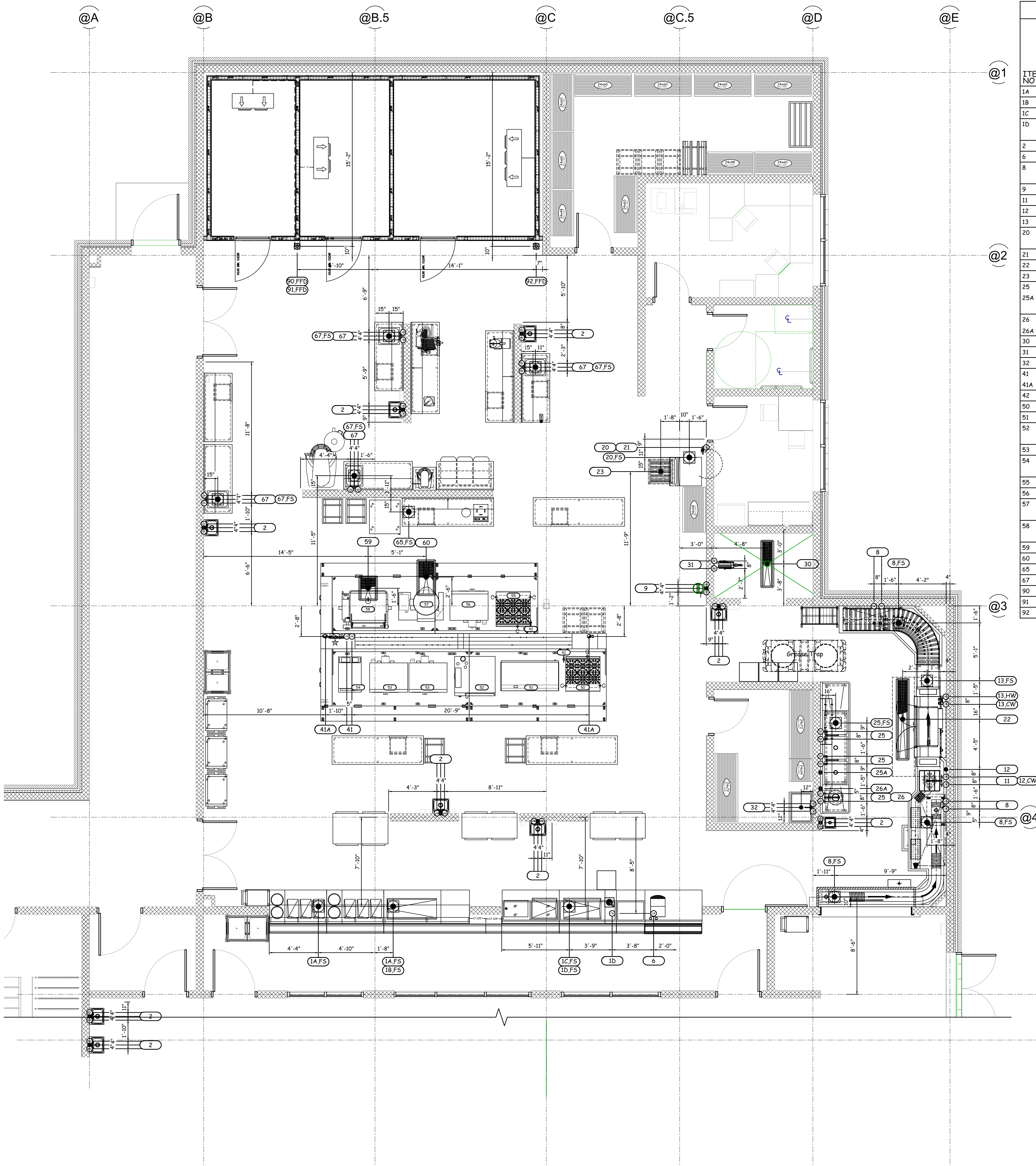
PROJECT TITLE  
 491/20167.SDW CFP - CREATE KITCHEN  
 BID AND CONSTRUCTION:  
**CENTER FOR FORENSIC  
 PSYCHIATRY**

SALINE, MICHIGAN

SHEET TITLE

**KITCHEN ELECTRICAL PLAN**

PROJECT NUMBER 2021094	SHEET NUMBER
PROJECT DATE SEPTEMBER 6, 2023	<b>FS2.02</b>
CHECKED BY T.M.M.	



PLUMBING SCHEDULE												
ITEM NO.	QTY	EQUIPMENT CATEGORY	COLD WATER SIZE (IN)	COLD WATER AFF (IN)	COLD WATER SIZE (IN)	HOT WATER AFF (IN)	DRIVE/DRAIN AFF (IN)	INDIRECT DRAIN AFF (IN)	INDIRECT DRAIN SIZE (IN)	MBTUH	GAFF (IN)	PLUMBING REMARKS
1A	2	SERVING LINE - HOT FOOD							FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
1B	1	SERVING LINE - HOT/COLD FOOD COMBO							FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
1C	1	SERVING LINE - COLD FOOD							FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
1D	1	SERVING LINE - COLD FOOD	0.5	SU					FS			STUB UP COLD WATER FOR WATER FILLER M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
2	9	HAND SINK, WALL MOUNT	0.5	18	0.5	18	1.5	20				
6	1	COFFEE MAKER, DISPENSER	0.375	SU								
8	1	SOILED DISHTABLE TRAY CONVEYOR	(2)0.5	16	(2)0.5	16			1.5,FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
9	1	EYEWASH STATION	0.5	24	0.5	24	1.25	24				
11	1	PRE-RINSE FAUCET, WALL MOUNT	0.75	14	0.5	14						BRANCH CW FROM PRE-RINSE TO DISPOSER
12	1	DISPOSER, GARBAGE	0.5	*								BRANCH CW FROM PRE-RINSE TO DISPOSER
13	1	WAREWASHER, RACK CONVEYOR	0.5	8	0.5	8			2.0,FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
20	1	ICE MAKER W/ BIN	0.375	*					0.75,FS			BRANCH CW FROM ITEM 21, FILTER TO ICE MAKER M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
21	1	FILTER SYSTEM, ICEMAKER	0.375	60								BRANCH CW FROM ITEM 21, FILTER TO ICE MAKER
22	1	FLOOR TROUGH							SU			
23	1	FLOOR TROUGH							SU			
25	1	SINK, SCULLERY, 3 COMPARTMENTS	(3)0.75	14	(3)0.75	14						H&C WATER TO FAUCETS & PRE-RINSE UNIT M.T. TO EXTEND WASH SINK DRAIN DIRECT TO GREASE TRAP
25A	1								2.0,FS			M.T. TO EXTEND RINSE & SANITIZE SINK DRAINS TO FLOOR SINK BRANCH CW FROM PRE-RINSE UNIT TO DISPOSER
26	1	DISPOSER, GARBAGE	0.5	*								
26A	1								2.0	8		
30	1	FLOOR TROUGH							SU			
31	1	HOSE REEL WITH SPRAY	0.5	42	0.5	42						STUB OUT TO MIXING VALVE & RUN UP TO HOSE REEL UNIT
32	1	SINK, MOP	0.5	36	0.5	36	2.0	SU				
41	1	UDS SYSTEM	0.75	DFA	0.75	DFA			2.0	2350	DFA	UDS SERVES EQUIPMENT UNDER HOODS 2" GAS LOOP SYSTEM
41A	1											
42	2	FAUCET, POT FILLER, WALL MOUNT	0.5	*	0.5	*						UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
50	1	RANGE, HEAVY DUTY, GAS							1.25	260	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
51	1	GRIDDLE, GAS W/STAND							0.75	135	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
52	1	OVEN-STEAMER, COMBINATION, GAS							0.75	303.5	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
53	2	OVEN, CONVECTION, GAS							0.75	100	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
54	1	STEAMER, PRESSURELESS (1-FILTERED & 1-NON-FILTERED)	(2)0.375						1.5,FS			UTILITY SERVICE FROM ITEM 41, UDS SYSTEM M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
55	1	RANGE, HEAVY DUTY, GAS							1.25	260	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
56	1	OVEN, CONVECTION, GAS							0.75	100	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
57	1	KETTLE, STEAM JACKETED, GAS, TILT	0.5	*	0.5	*			0.5	100	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
58	1	TILT SKILLET, GAS	0.5	*	0.5	*			0.5	144	*	UTILITY SERVICE FROM ITEM 41, UDS SYSTEM
59	1	FLOOR TROUGH							4.0	SU		
60	1	FLOOR TROUGH							4.0	SU		
65	1	CHILLER/FREEZER, BLAST							0.75,FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
67	4	TABLE, WORK W/SINK	0.5	14	0.5	14			1.5,FS			M.T. TO EXTEND DRAINS TO NEAREST FLOOR SINK
90	1	WALK-IN MEAT COOLER							FFD			M.T. TO EXTEND EVAPORATOR COIL DRAIN TO FUNNEL TYPE FLOOR DRAIN
91	1	WALK-IN PRODUCE COOLER							FFD			M.T. TO EXTEND EVAPORATOR COIL DRAIN TO FUNNEL TYPE FLOOR DRAIN
92	1	WALK-IN FREEZER							FFD			M.T. TO EXTEND EVAPORATOR COIL DRAIN TO FUNNEL TYPE FLOOR DRAIN

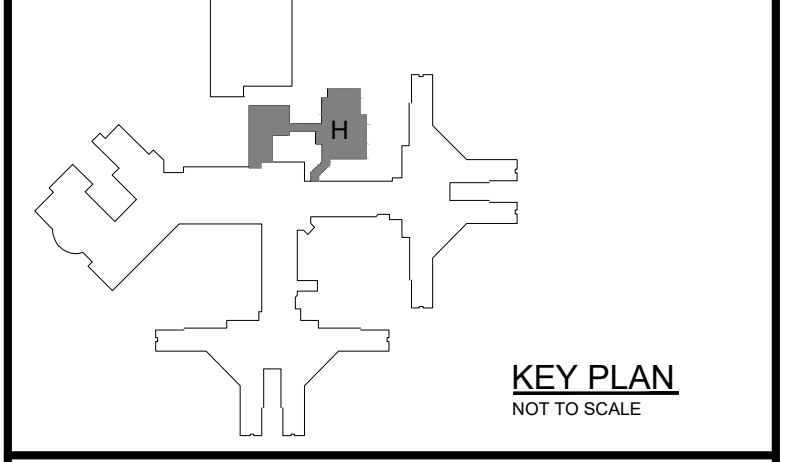
A3	ADDENDUM NO. 3	09/28/23
NO.	REVISION	DATE

STATE OF MICHIGAN  
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET  
FACILITIES AND BUSINESS SERVICES ADMINISTRATION  
DESIGN AND CONSTRUCTION DIVISION  
ADAM LACH, RA, DIRECTOR

FILE NO.  
491/20167.SDW

FUNDING CODE  
171C0DHH57255

CONTRACT NO.  
Y22003



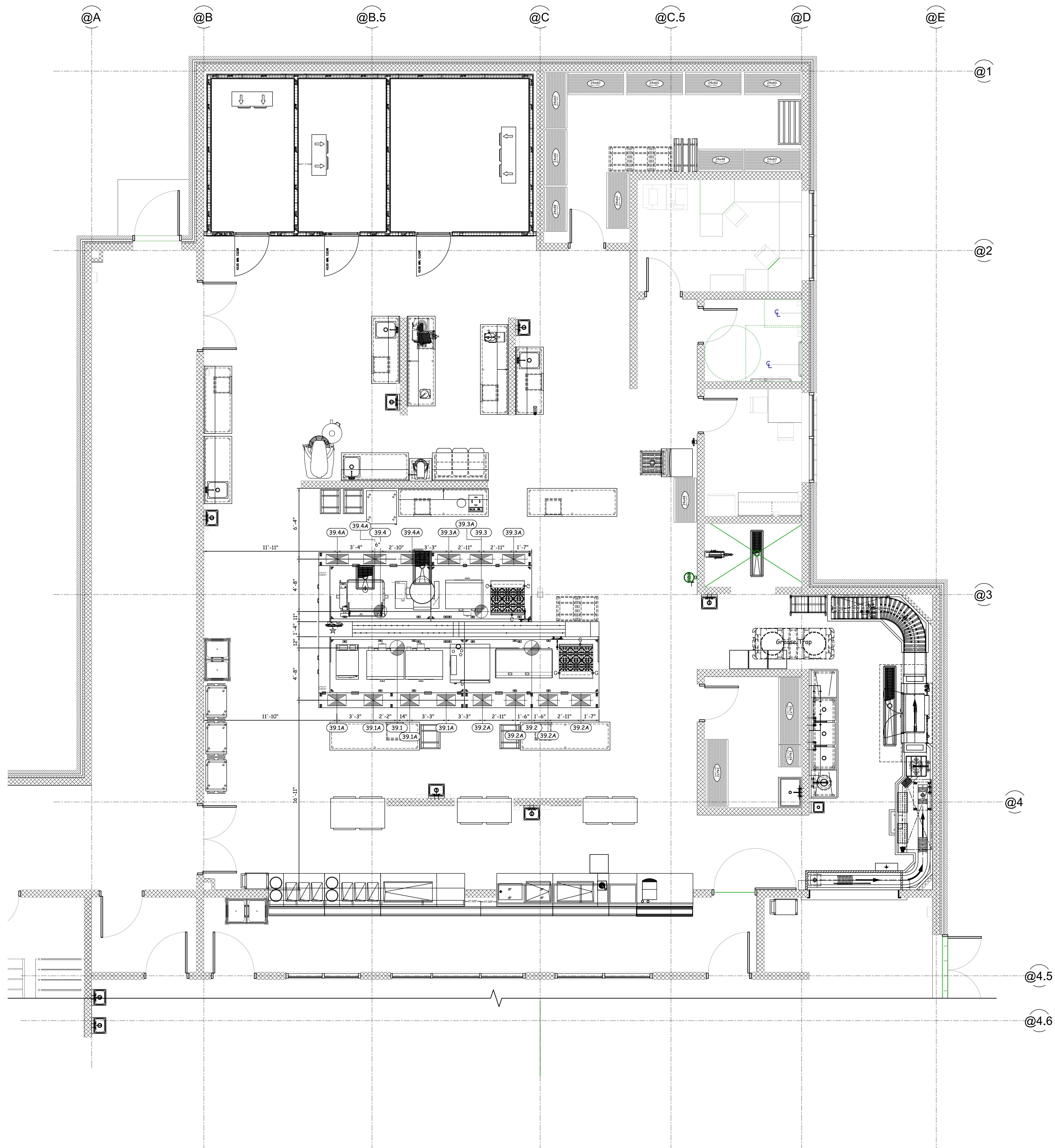
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COMMERCIAL REFRIGERATION FOOD SERVICE EQUIPMENT  
3916 S BURGESS AVE, ANN ARBOR, MICHIGAN 48106  
PH: 734.763.0277

PROJECT TITLE  
491/20167.SDW CFP - CREATE KITCHEN  
BID AND CONSTRUCTION:  
**CENTER FOR FORENSIC  
PSYCHIATRY**  
SALINE, MICHIGAN  
SHEET TITLE

**KITCHEN PLUMBING PLAN**

PROJECT NUMBER <b>2021094</b>	SHEET NUMBER
PROJECT DATE SEPTEMBER 6, 2023	<b>FS2.03</b>
CHECKED BY T.M.M.	



VENTILATION SCHEDULE										
ITEM NO	QTY	EQUIPMENT CATEGORY	HVAC EXHAUST DUCT SIZE (IN)	HVAC EXHAUST CFM	HVAC EXHAUST SPWG	HVAC MAKE-UP DUCT SIZE (IN)	HVAC MAKE-UP CFM	HVAC MAKE-UP SPWG	HVAC AFF (IN)	HVAC REMARKS
39.1	1	VENTILATION SYSTEM	16"DIA	2350	-0.764	(4)12" X 20"	637(EA)	0.217	DFA @ 113"-AFF	
39.1A			16"DIA	2750	-1.046	(4)12" X 20"	637(EA)	0.217	DFA @ 113"-AFF	
39.2			16"DIA	2750	-1.046	(4)12" X 20"	637(EA)	0.217	DFA @ 113"-AFF	
39.2A			14"DIA	1800	-0.666	(3)10" X 24"	566(EA)	0.174	DFA @ 113"-AFF	
39.3			14"DIA	1800	-0.666	(3)10" X 24"	566(EA)	0.174	DFA @ 113"-AFF	
39.3A			14"DIA	1800	-0.666	(3)10" X 24"	633(EA)	0.215	DFA @ 113"-AFF	
39.4			14"DIA	1800	-0.666	(3)10" X 24"	633(EA)	0.215	DFA @ 113"-AFF	
39.4A			14"DIA	1800	-0.666	(3)10" X 24"	633(EA)	0.215	DFA @ 113"-AFF	

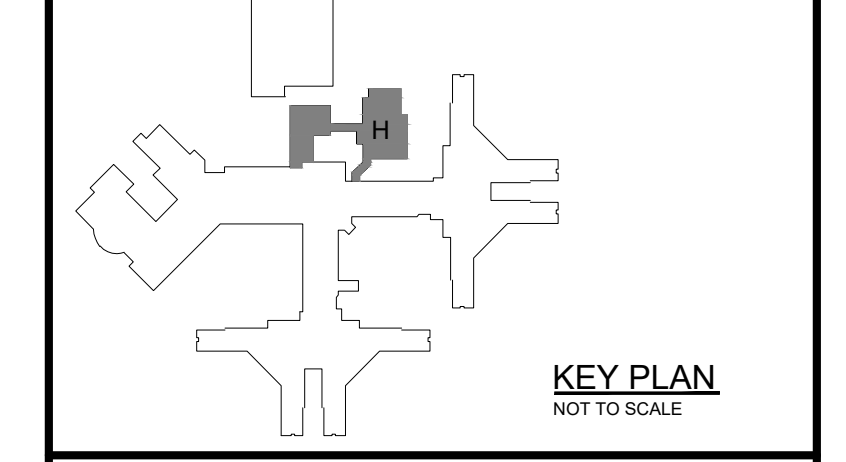
A3	ADDENDUM NO. 3	09/28/23
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STATE OF MICHIGAN  
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 PH: (734) 761-2277

PROJECT TITLE  
 491/20167.SDW CFP - CREATE KITCHEN  
 BID AND CONSTRUCTION:  
**CENTER FOR FORENSIC  
 PSYCHIATRY**

SALINE, MICHIGAN

SHEET TITLE

**KITCHEN VENTILATION PLAN**

PROJECT NUMBER 2021094	SHEET NUMBER
PROJECT DATE SEPTEMBER 6, 2023	<b>FS2.04</b>
CHECKED BY T.M.M.	



