# project name:

# CLEVELAND METROPOLITAN SCHOOL DISTRICT

# Davis Aerospace & Maritime School -Ground Floor Renovation

1440 Lakeside Avenue

Cleveland, OH 44114

Owner:



**CLEVELAND METROPOLITAN SCHOOL DISTRICT** 

ERIC GORDON, CHIEF EXECUTIVE OFFICER JUSTIN BIBB, MAYOR OF CLEVELAND ANNE E. BINGHAM, BOARD OF EDUCATION CHAIR

# symbols & materials



# abbreviations



# code review notes:

USE GROUP: "E"

CONSTRUCTION CLASSIFICATION: 2B

FIRE PROTECTION: EXTEND & MODIFY EXISTING SPRINKLER SYSTEM

FLOOR AREA: 17,747 SF EXISTING GROUND FLOOR AREA. RENOVATION AREA IS ON THE GROUND FLOOR. RENOVATION AREA: 2,623 SF ON THE GROUND FLOOR OF THE EXISTING BUILDING.

PROJECT IS INTERIOR RENOVATION WORK ONLY.

EXITS: GROUND FLOOR OCCUPANCY, 296. REQUIRED EXITS (3), EXITS EXISTING, (3) EXISTING EXITS. PLUMBING; 296 OCCUPANTS. E USE GROUP = 1/50 MEN/WOMEN WC & LAVS. 148 MEN & 148 WOMEN. REQUIRED; (3) WC/LAVS MEN & (3) WC/LAVS WOMEN. (1) SERVICE SINK. (3) DRINKING FOUNTAINS. PROVIDED; (5 WC & 3 URINALS) MEN & (6) WC/LAVS WOMEN. (1) SERVICE SINK. (4) DRINKING FOUNTAINS. Architect :





4230 RIVER STREET, WILLOUGHBY, OHIO 44094 TEL: 440-269-2266 FAX: 440-269-2277



# general notes

DIVISION 1 GENERAL INFORMATION

A. GENERAL

- 1. Conform to all general and special conditions of contract as specified by Architect and Owner
- 2. Specifications are applicable to all Contractors and/or Subcontractors. 3. Check other plans and specifications and fully coordinate with other systems and grades.
- 4. The drawings and project manual, where applicable, are intended to supplement each other and any material or labor called for in one shall be furnished even though not specifically mentioned in both. 5. Drawings are diagrammatic and are intended to show approximate locations. Dimensions given on the plans in figures shall
- take precedence over scaled dimensions; and all dimensions, whether figured or scaled, shall be verified in the field. 6. The architect reserves the right to make minor changes in location up to the time of installing without additional cost. 7. Visit site, check facilities and conditions, and take all items into consideration in bid. Contractor to review and become familiar with all existing conditions prior to commencing work. Any conditions not documented on these drawings or observed to
- be different than those shown on these drawings are to be reported to the architect, prior to beginning work. 8. Systems are to be complete and workable in all respects, placed in operation and properly adjusted. 9. Each Contractor shall provide for his own clean up, removal and legal disposal of all rubbish on a daily basis or as directed by
- Owner's representative. 10. Fully coordinate all work with other Contractors, Subcontractors, and the Owner and cooperate completely.
- 11. The Contractor shall take all precautions necessary to secure the area of work.
- 12. Arrange for and obtain Owner's permission for any service shutdowns required under this contract. 13. Parking at the site by all construction staff shall be limited to only the areas designated by the Owner.
- 14. Contractor to contact local utilities, if necessary, submit all applicable permit documents, qualifications, etc., and be responsible for all fees associated with permits, utility extensions, tap-ins, etc. Architect to submit documents for permit plan review and owner review; however, the contractor will be responsible for obtaining the permits and all permit and inspection
- 15. The Contractor shall protect existing facilities, equipment, fixtures, etc. from damage during the course of construction. 16. All damaged surfaces and/or finishes as a result of and adjacent to the work shall be repaired and finished to their original condition. 17. The Contractor shall be soley responsible for contruction means, methods, sequences of construction and the safety of
- workmen 18. Demolition and/or removal of existing pavement, equipment, etc. may necessitate the removal or relocation of existing piping, conduit, services, etc. Such removal and relocation shall be considered part of the demolition work without additional
- cost, whether or not specifically shown on the drawings or listed in the specifications. 19. The contractor shall schedule his work and material and equipment deliveries so as not to interfere with the daily operations of the facility.
- 20. Prior to completion, clean premises for occupancy by owner. cleaning shall include, but not be limited to the following:
  - removal of grease, mastic, adhesive, dust, dirt, stains, labels and other foreign materials from exposed surfaces.
  - the external surface of all equipment shall be cleaned at the completion of the work to remove all concrete, dust and dirt, welding and cutting splatter, etc.
  - prior to final completion, or owner occupancy, contractor shall conduct an inspection of sight-exposed surfaces, and all work areas, to verify that the entire work is clean.
- B. CODES, STANDARDS AND REGULATIONS 1. Conform to all applicable codes and government regulations.
- 2. Obtain permits and pay all fees. Arrange for all required inspections and approvals.
- C. BASE EQUIPMENT AND MATERIALS AND SUBSTITUTIONS
- 1. All equipment and materials shall be new and free of defects. 2. Base equipment, manufacturer, model, and capacity of equipment are listed on the drawings or in this specification. Any
- other manufacturer is considered a substitution. 3. Substitutions are subject to the approval of the Owner. If a substitution is submitted, include complete performance data for evaluation.
- 4. If substitutions are approved, notify all other Contractors and Subcontractors of trades affected by the substitutions and fully coordinate. Any costs resulting from substitution, whether by Contractor or others, shall be the responsibility of and paid for by the substituting Contractor.
- 5. All equipment shall be installed in full accordance with the manufacturer's data and installation instructions. It is the Contractor's responsibility to check and conform to these requirements prior to starting work.
- D. WARRANTY 1. Fully warrant all materials, equipment, and workmanship for one (1) year from date of acceptance, unless noted otherwise. 2. Repair or replace without charge to the Owner all items found defective during the warranty period.

sheet number	sheet title	sheet number	sheet title
CS	COVER SHEET	ELECTRICAL DRA	WINGS
ARCHITECTURAL	DRAWINGS	E1	ELECTRICAL PLANS
A1	GROUND FLOOR RENOVATION PLANS	E2	ELECTRICAL DETAILS
A2	FINISH AND FURNITURE PLANS	E3	ELECTRICAL SPECIFICATIONS
A3	DETAILS		
MECHANICAL DRA	AWINGS	FIRE PROTECTIO	N DRAWINGS
M1	MECHANICAL GENERAL NOTES & LEGENDS	F1	FIRE PROTECTION PLAN
M2	MECHANICAL PLANS		
M3	MECHANICAL DETAILS AND SCHEDULES		RAWINGS
M4	MECHANICAL SPECIFICATIONS	T-001	TECHNOLOGY LEGENDS
		T-002	TECHNOLOGY NOTES
		T-101	TECHNOLOGY FIRST FLOOR P
		T-501	TECHNOLOGY DETAILS (FACE
		T-502	TECHNOLOGY DETAILS

site map



location map









N4 N5 N6	<ul> <li>ALL WORK ASSOCIATED WITH BUILDING ROOM 003 IT TO BE AN ALTERNATE BID ITEM.</li> <li>PROVIDE CORNER GUARD.</li> <li>PATCH &amp; MATCH FLOORING AT REMOVED WALL LOCATION WITH NEW FLOORING TO MATCH OR PROVIDE ALUMINUM THRESHOLD OR TRANSITION STRIP TO COVER FLOORING GAP.</li> </ul>
	GENERAL NOTES
Α.	ALL NEW WALLS TO BE 5/8" ABUSE-RESISTANT GYPSUM BOARD ON EACH SIDE ON 20 GA. 6" METAL STUDS @ 16" O.C. PROVIDE SOUND BATT INSULATION IN ALL NEW WALLS. FOR CHASE OR FURRING WALLS JUST PROVIDE 5/8" GYP. BD. ONE SIDE. TAKE ALL WALLS TO FLOOR DECK ABOVE
Β.	PATCH & MATCH AT ALL LOCATIONS WHERE EXISTING WALLS OR OTHER ITEMS WHERE REMOVED.
C.	PROVIDE NEW BRACKET MOUNTED FIRE EXTINGUISHERS WHERE
D.	PROVIDE GRADE 1 BRUSHED STAINLESS STEEL HARDWARE ON ALL NEW DOORS. KEY HARDWARE AS REQUIRED BY OWNER. HAREWARE TO MATCH DISTRICT'S STANDARDS & PREFERED MANUEACTURER
E.	SEE FURNITURE DRAWINGS FOR FURNISHINGS AND COORDINATE
F.	IN AREAS TO BE PAINTED, PAINT COLORS ARE TO INCLUDE (1) FIELD COLOR AND (2) ACCENT COLORS - ONE FOR "TEACHING WALL", ONE FOR THE REMAING WALLS, AND ONE FOR TRIM, ETC.
G.	SALVAGE ALL TACK BOARDS AND MARKER BOARDS THAT INTERFER WITH NEW WORK OR DEMOLITION. RELOCATE IN FIELD AS DIRECTED. VERIFY REQUIREMENTS IN FIELD WITH THE OWNER.
Н.	PROVIDE ALL BLOCKING AS REQUIRED TO PROPERLY INSTALL RECESSED AND WALL MOUNTED EQUIPMENT AND CASEWORK.
J.	AS "4M" OR "4T". THE NUMBER IS THE FEET OF BOARD LENGHT REQUIRED. THE "T" IS FOR TACK BOARDS AND THE "M" IS FOR MARKER BOARDS. "IFP" STANDS FOR INTERACTIVE FLAT PANEL TV. THESE ARE PROVIDED BY OWNER & INSTALLED BY CONTRACTOR. COORDIANTE ALL TECH & ELEC AND WALL BLOCKING. THIS CONTRACT REQUIRES COMPLETE, FINISHED WORKABLE PROJECT OF THE AREAS INDICATED BY THE CONTRACT
K.	NECESSARY TO COMPLETE, REGARDLESS OF WHETHER OR NOT ALL WORK OR EACH ITEM IS SPECIFICALLY INDICATED ON ANY OTHER PORTION OF THE DRAWINGS AND/OR NOTES. CONTRACTOR IS RESPONSIBLE TO VERIFY ALL SITE AND FIELD AND CONDITIONS PRIOR TO SUBMITTING BIDS AND COMMENCING WORK IF THERE ARE ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS, NOTIFY THE CONSTRUCTION MANAGER AND
L.	ARCHITECT / ENGINEER AND REQUEST CLARIFICATION. CONTRACTOR SHALL OBTAIN FROM OWNER ALL REQUIREMENTS FOR INSTALLATION OF OWNER PROVIDED EQUIPMENT INCLUDING ROUGHING DIAGRAMS, INSTALLATION INSTRUCTIONS, ELECTRICAL SCHEMATICS, TEMPLATES, LAYOUTS AND DIMENSIONS AND ALL OTHER INFORMATION NECESSARY FOR A PROPER, WELL COORDINATED INSTALLATION. PRIOR TO ROUGH-IN OF SERVICES, CONFER WITH OWNER EXACT LOCATION OF ALL ITEMS
м.	ALL CONTRACTORS ARE TO COORDINATE THE WORK OF EACH OTHER, SO THAT THE WORK AND SCHEDULE ARE NOT IMPEDED. SCHEDULE WORK PROGRESS THROUGHOUT THE ENTIRE PROJECT TO PREVENT CONFLICTS AND INTERFERENCES. OBTAIN ALL NECESSARY INFORMATION SUCH AS SIZES, LOCATIONS, TEMPLATES LAYOUT, DIMENSIONS AND ALL OTHER INFORMATION NECESSARY FOR A PROPER AND WELL COORDINATED INSTALLATION. PRIOR TO INSTALLATION OF ITEMS, VERIFY AND CONFIRM WITH EACH
Ν.	PRIOR TO COMPLETION, CLEAN PREMISES FOR OCCUPANCY BY OWNER. CLEANING SHALL INCLUDE, BUT NOT BE LIMITED TO THE FOLLOWING: - REMOVAL OF GREASE, MASTIC, ADHESIVE, DUST, DIRT, STAINS, LABELS AND OTHER FOREIGN MATERIALS FROM FXPOSED

N1. PROVIDE NEW WALL - SEE GENERAL NOTES FOR WALL DETAILS.

N3 PROVIDE PANIC HARDWARE ON DOOR FOR EGRESS.

- SURFACES. - THE EXTERNAL SURFACE OF ALL EQUIPMENT SHALL BE CLEANED AT THE COMPLETION OF THE WORK TO REMOVE ALL CONCRETE, DUST AND DIRT, WELDING AND CUTTING SPLATTER, ETC. - PRIOR TO FINAL COMPLETION, OR OWNER OCCUPANCY, CONTRACTOR SHALL CONDUCT AN INSPECTION OF SIGHT-EXPOSED SURFACES, AND ALL WORK AREAS, TO VERIFY THAT THE ENTIRE WORK IS CLEAN.
- O. SQUARE FOOTAGES SHOWN ON PLANS ARE FOR SCHOOL USE ONLY.
- CONTRACTOR TO VERIFY ALL SQUARE FOOTAGES. P. CASEWORK IS BY CONTRACTOR. FURNITURE IS BY OWNER. Q. ARCHITECT TO SELECT ALL FINAL FINISH SELECTIONS DURING SHOP DRAWING PHASE.



	ROOM FINISH KEY						
FLOORS	BASE	WALLS	MISCELLANEOUS				
EXISTING CPT-1 CARPET - MODLAR MANUFACTURER: MOHAWK PATTERN: HEM GT295 COLOR: 585 BOOTCUT SIZE: 12" X 36"	EXISTING RB-1 RUBBER BASE MANUFACTURER: JOHNSONITE STYLE: COVE COLOR: 465 SEAFARER SIZE: 4 <sup>1</sup> HIGH. COIL	PNT-5 PAINT - CEILING MANUFACTURER: SHERWIN WILLIAMS COLOR: SW7006 EXTRA WHITE FINISH: (1) COAT LATEX PRIMER, (2) COATS LATEX FLAT WALL PAINT	PL-1       PLASTIC LAMINATE - CASEWORK         MANUFACTURER: WILSONART         COLOR:       10776-60 KENSINGTON MAPLE         3-MM PVC:       KENSINGTON MAPLE         PL-2       PLASTIC LAMINATE - COUNTERTOPS         MANUFACTURER:       FORMICA				
INSTALLATION: VERTICAL ASHLAR CS CONCRETE, SEALED	RB-2 RUBBER BASE MANUFACTURER: JOHNSONITE		COLOR: 8814-58 DENIM TWILL 3-MM PVC: DOELLKEN COLOR: BRITTANY BLUE				
<ul> <li>RAF-1 RESILIENT ATHLETIC FLOORING MANUFACTURER: TARKETT SPORTS PATTERN: OMNISPORTS 8.3 COLOR: WOOD, GREY MAPLE</li> <li>RAF-2 RESILIENT ATHLETIC FLOORING MANUFACTURER: TARKETT SPORTS PATTERN: OMNISPORTS 8.3 COLOR: SOLID, ROYAL BLUE</li> <li>RAF-3 RUBBER ATHLETIC TILE MANUFACTURER: ROPPE PATTERN: RECOIL COLOR: 378 COBALT/LIGHT GRAY SIZE: 36" x 36"</li> <li>VCT-1 VINYL COMPOSITION TILE MANUFACTURER: ARMSTRONG PATTERN: STANDARD EXCELON</li> </ul>	COLOR: TB6 FLAME SIZE: 4" HIGH, COIL RB-3 RUBBER BASE MANUFACTURER: JOHNSONITE STYLE: COVE COLOR: 31 ZEPHYR SIZE: 4" HIGH, COIL RB-4 RUBBER BASE MANUFACTURER: JOHNSONITE STYLE: COVE COLOR: 55 SILVER GREY SIZE: 4" HIGH, COIL WALLS PNT-1 PAINT: ACCENT MANUFACTURER: SHERWIN WILLIAMS	CEILINGS & TRIM ACT-1 ACOUSTICAL CEILING TILE MANUFACTURER: USG STYLE: RADAR CLIMAPLUS - HIGH NRC, HIGH CRC ITEM: 22441 EDGE: SQUARE COLOR: WHITE SIZE: 24" X 48"	<ul> <li>PL-3 PLASTIC LAMINATE - CASEWORK MANUFACTURER: FORMICA COLOR: 6477-58 SEASONED PLANKED ELM 3-MM PVC: DOELLKEN COLOR: SLATE GREY</li> <li>PL-4 PLASTIC LAMINATE - COUNTERTOPS MANUFACTURER: WILSONART COLOR: 4995-60 FORGED STEEL 3-MM PVC: DOELLKEN COLOR: SLATE GREY</li> <li>NOTE:1-MM PVC COLOR SELECTIONS SHALL MATCH THE LAMINATE COLOR SELECTION. IF A DIRECT MATCH 1-MM PVC IS NOT AVAILABLE, THE 3-MM COLOR SELECTION MAY BE USED.</li> </ul>				
COLOR: 51803 PEARL WHITE SIZE: 12" X 12"	COLOR: SW6529 SCANDA FINISH: (1) COAT LATEX PRIMER, (2) COATS LATEX ECCOMENT WALL PAINT	MISCELLANEOUS	DOORS				
INSTALLATION: LINEAR	PNT-2 PAINT: ACCENT MANUFACTURER: SHERWIN WILLIAMS COLOR: SW6594 POINSETTIA FINISH: (1) COAT LATEX PRIMER, (2) COATS LATEX EGGSHELL WALL PAINT PNT-3 PAINT: FIELD MANUFACTURED: SUF DWINNWELLANCE	WS-1 WINDOW SHADES MANUFACTURER: TBD STYLE: MANUAL ROLLER SHADES FASCIA COLOR: TBD SHADECLOTH STYLE: TBD BASKET WEAVE 5300 SERIES (3%OPEN) SHADECLOTH COLOR: TBD	PROVIDE WOOD DOORS TO MATCH EXISTING - WOOD TYPE AND FINISH.				
	MANUFACTURER: SHERWIN WILLIAMS COLOR: SW6071 POPULAR GRAY FINISH: (1) COAT LATEX PRIMER, (2) COATS LATEX EGGSHELL WALL PAINT PNT-4 PAINT: DOOR FRAMES MANUFACTURER: SHERWIN WILLIAMS COLOR: SW6072 VERSATILE GRAY FINISH: (1) COAT LATEX PRIMER, (2) COATS LATEX SEMI-GLOSS WALL PAINT	WC-1 WALLCOVERING I TACKBOARD MANUFACTURER: KOROSEAL PATTERN: DESERT SAND COLOR: FOG 5521-91					



## MILLWORK NOTES

- 1. ITEMS DETAILED ON THIS DRAWING REFER TO SPECIFICATION SECTION 064023 "INTERIOR ARCHITECTURAL WOODWORK".
- 2. PROVIDE GROMMETS AT WORKSURFACES WHERE INDICATED IN PLAN. 7. PROVIDE PVC EDGEBANDING ON ALL COUNTERTOP, DRAWER, DOOR,
- 3. PROVIDE LOCKS ON ALL CABINETS, WHICH SHALL BE KEYED ALIKE BY GRADE LEVEL OR DEPARTMENT.
- 4. PROVIDE SUPPORT BRACKETS WHERE REQUIRED.
- 5. PROVIDE CLEAR SEALANT AT ALL JOINTS BETWEEN COUNTERTOPS, BACKSPLASHES, AND ADJOINING SURFACES.
- 6. PROVIDE HIGH-PRESSURE NON-DECORATIVE BACKER SHEET ON ALL CONCEALED SURFACES.
- SHELF, AND BODY FRONT EDGES. 8. PROVIDE WALL SUPPORT AS REQUIRED TO INSTALL
- WALL-MOUNTED DEVICES, EQUIPMENT AND CASEWORK.

  - $\langle PT \rangle$  PAPER TOWEL DISPENSER HEIGHT VARIES ABOUT ELEVATIONS. SD SOAP DISPENSER



2 GROUND FLOOR FINISHES PLAN

A2 / 1/8" = 1'-0"



GROUND FLOOR FINISHES PLAN A2 / 1/8" = 1'-0"



N

CHRISTOPHER B SMITH 9912446 CHRISTOPHER D SMITH 9912446 CHRISTOPHER D SMITH LICENSE #9912446 CHRISTOPHER D SMITH LICENSE #9912446 EXPIRATION DATE 12/31/2023
CMSD - DAVIS A & M SCHOOL, GROUND FLR. RENOVATION 1410 LAKESIDE AVE., CLEVELAND, OHIO 44144
no. description date
Sheet Revisions
01 PLAN REV & BID 08.05.2022
Project Issues
design and construction documents as instruments of service are given in confidence and remain the property of thendesign architecture ltd. the use of this design and these construction architecture ltd. the use of this design and these construction documents for purposes other than the specific project named herein is strictly prohibited without expressed written consent of thendesign architecture ltd. FINISH & FURNTIURE PLANS FINISH & FURNTIURE PLANS



2. PROVIDE & INSTALL (1) EACH TYPE "N" AND TYPE "P" SIGN NEAR THE ENTRANCE OF EVERY ASSEMBLY AND STUDENT-OCCUPIED SPACE. INSERTS SHALL BE PROVIDED BY OWNER.















# GENERAL DOOR NOTES

3. WHERE RATED DOORS ARE INDICATED, DOOR FRAME RATING TO EQUAL DOOR RATING. 4. UL LABELS: B LABEL = 90 MIN., 60MIN. C LABEL = 45 MIN., 20MIN. 5. PLEASE REFER TO SHEET A3 FOR FRAME AND SIGNAGE TYPES. 1. SEE 087100 SPECIFICATION FOR DOOR HARDWARE REQUIREMENTS. EACH DOOR SHALL HAVE THE FOLLOWING MINIMUM HARDWARE; (3) HINGES, LEVER SET OR PANIC HARDWARE, CYLINDER LOCKS AND KEYING PER CMSD STANDARDS, STRIKES, CLOSER (WHERE NOTED), DOOR STOP APPROPRIATE FOR LOCATION, COAT

HOOK FOR OFFICES, DOOR SILENCERS. ALL DOORS TO HAVE MORTISE LOCKSETS (UNO). EXISTING DOORS TO REMAIN WITH KNOB LOCKSETS SHALL BE CHANGED TO ADA COMPLIANT LEVER HANDLE LOCKSETS.

FRP - FIBRE REINFORCED PLASTIC SCW - SOLID CORE WOOD













DOOR & SIGNAGE SCHEDULE												
ę	SPACE	DOOR				FRAME			SECURITY			
OOR #	ROOM NAME	WIDTH	HEIGHT	TYPE	MAT.	TYPE	Н	DETAILS J	S	(SEE SPECS)	SIGNAGE	REMARKS
001	CLASSROOM	3' - 0"	7' - 0 "	А	SCW	1M	H1	J1	-	A,N,P	1.A	CLASSROOM FUNCTION
002	CLASSROOM	3' - 0"	7' - 0 "	А	SCW	1M	H1	J1	-	A,N,P	1.A	CLASSROOM FUNCTION
003	OFFICE	3' - 0"	7' - 0 "	А	SCW	1M	H1	J1	•	В	1.A	OFFICE FUNCTION
004	COMMONS	3' - 0"	7' - 0 "	А	SCW	1M	H1	J1	•	A,N,P	1.A	EGRESS DOOR, PROVIDE PANIC HARDWARE & DOOR CLOSER.
005	CLASSROOM	3' - 0"	7' - 0 "	А	SCW	1M	H1	J1	•	A,N,P	1.A	CLASSROOM FUNCTION
006	EXISTING OFFICE									В	1.A	OFFICE FUNCTION. CHANGE HARDWARE TO ADA LEVER.
007	EXISTING OFFICE								-	В	1.A	OFFICE FUNCTION. CHANGE HARDWARE TO ADA LEVER.
	NOTE: NEW DOORS TO MATCH EXISTING WOOD FINISH.											



#### DESIGN CRITERIA

- 1. Applicable Building Codes A. Building: OBC 2017
- a. Primary use and occupancy classification: Educational: Group E B. Mechanical: OMC 2017
- C. Plumbing: OPC 2017 D. Fire Protection: IFC 2017
- a. Fully suppressed with wet and/or dry sprinkler system. E. Electrical: NEC 2015
- F. Energy: ASHRAE 90.1 2010 G. Gas: IGC 2015
- H. NFPA: latest edition 13 I. Local Building Code and Revisions.
- 2. ASHRAE Design Requirements
- A. Heating/Cooling Loads a. Heating
- Outside air temperatures: 1 degrees F DB (ASHRAE 99.6%). b. Cooling
- Outside air temperatures: 89 degrees F DB / 73 degrees F WB (ASHRAE 99%). B. Building Desian a. ASHRAE and Energy Code guidelines. b. Indoor relative humidity at 50 percent RH for cooling loads only. Humidity is not being controlled or maintained in the heating or cooling equipment modes.
- 3. Design Ventilation

#### A. Use State of Ohio Code. <u>GENERAL</u>

- 1. The term General Contractor (GC), as used in these documents, refers to the Contractor / Construction Manager in responsible charge of the project in terms of coordination, scheduling, subcontractor coordination, etc. This term refers to, but is not limited to, General Contractor, Construction Manager, Design Build Contractor, Prime Contractor, etc. The term is referencing the entity that coordinates the work of other trades.
- 2. These drawings are diagrammatic and indicate the general extent of the work. The contractor shall be responsible for the coordination and proper installation of all mechanical systems. The contractor shall provide all necessary offsets and fittings which may be required due to space constraints or other conditions.
- 3. Existing building HVAC, Plumbing and Fire Protection systems shown on these drawings which are to be removed or modified where taken from the original drawings dated 3/21/1974 and may not show current installations or conditions. Each contractor shall field verify all existing systems.
- 4. The mechanical systems or its modifications are designed to be a complete operating system and stable after the building or its modifications are fully completed. It is solely the contractor's responsibility to determine construction, installation, and programming procedures and sequences to have a complete and working system and to insure the safety of the construction personnel, public, building and its component parts, and adjacent buildings and properties. This includes the addition of whatever temporary or permanent bracing, etc. that may be necessary to brace new or existing construction, walls, and framing to remain so that the structure is braced for construction loads, etc. and that no horizontal or vertical settlement or any damage occurs to the adjacent new or permanent supports and bracing that are installed. Design of these supports shall be provided by the contractor. Provide all materials, labor, equipment, and accessories required to furnish and install the systems identified in specifications and drawings.
- 5. It is the contractor's responsibility to enforce all applicable safety codes and regulations during all phases of construction. 6. Construction loads shall not exceed structural design live loads. The contractor shall be responsible for all design required
- to support construction equipment used in constructing this project. Verify and coordinate with structural drawings. 7. The contractor shall perform all construction for the project in a manner and sequence that are based on accepted industry standards that recognize the interaction of the components that comprise the systems, without causing distress,
- unanticipated movements or irregular load paths as a result of the construction means and methods employed. 8. The contractor shall provide all miscellaneous supporting steel, etc. for the proper installation of all mechanical systems.
- 9. Before fabrication and/or installing any work, contractor shall see that it does not interfere with clearance required for finish on beams, columns, pilasters, walls, or other structural or architectural members, as shown on architectural drawings. If any work is so installed and it later develops that architectural design cannot be followed, contractor shall, at his own expense, make such changes in his work as architect may direct to permit completion of architectural work in accordance with plans and specifications.
- 10. All piping shall be protected as required by the applicable Mechanical, Plumbing, Fire Protection and Building Codes: " General Regulations" and other Code Chapters.
- 11. Pipes passing through or under walls shall be protected from breakage. Pipes passing through studs, joist, rafters or similar members less than 1-1/2" from the nearest edge of the members shall be protected by steel shield plates.
- 12. Piping shall be installed to prevent strains and stresses that exceed the structural strength of the pipe. Where necessary provisions shall be made to protect piping from the damage resulting from pipe expansion and contraction and structural/soil settlement. Expansion joint fittings shall be used where necessary to provide for expansion and contraction of the pipes. Sleeved openings shall be sized appropriately to accommodate pipe movement and structural/soil settlement. Expansion joint fittings shall be of the typical material suitable for use with the type of piping in which fittings are installed. At a minimum install rubber mechanical joint couplings or CSA-certified expansion joints on all vertical piping at every other floor of the building and rigidly support the stack pipe on alternating floors to direct any movement into the appropriate expansion compensator. Design of these expansion fittings shall be provided by the contractor. Any analysis which requires additional support or expansion detailing shall be shared with the mechanical design professional and any stresses or point loads created by the engineered system shall be shared with the structural designer for review.
- 13. Install additional offsets on piping or ductwork where required to obtain maximum headroom or to avoid conflict with other work without additional cost to owner.
- 14. Report any interferences between work under this division and that of any other contractors to architect as soon as they are discovered. Architect will determine which equipment shall be relocated, regardless of which was first installed, and his decision shall be final.
- 15. The contractor shall coordinate floor, wall, and roof penetrations, louver sizes, etc. with general trades.
- 16. Principal openings on these drawings through the framing are shown on the structural drawings. The mechanical contractor shall examine the structural and mechanical drawings for the required openings and shall verify size and location of all openings with the general contractor. General contractor shall provide all openings required through the framing by the mechanical, electrical, plumbing, or other trades, whether or not shown on the structural drawings. Any deviation from the openings shown on the structural drawings shall be brought to the engineer's attention for review.
- 17. All mechanical and electrical work: Ductwork, plumbing, piping, wiring, lighting, etc. and all architectural items that need to be removed during the modification of or reinforcing of, existing structure shall be replaced in kind by the respective contractor. The contractors shall keep all existing systems in operation during the construction phase of the project.
- 18. All contractors are required to examine the drawings and specifications carefully, visit the site and fully inform themselves as to all existing conditions and limitations, prior to agreeing to perform the work. Failure to visit the site and familiarize themselves with the existing conditions and limitations will in no way relieve the contractor from furnishing any materials or performing any work in accordance with drawings and specification without additional cost to the owner to have a complete and working system.
- 19. Details labeled "Typical Details" or "Typical" on drawings apply to situations occurring on the whole project that are the same or similar to those specifically detailed. Such details apply whether or not details are referenced at each location on drawings. Notify engineer for clarifications regarding applicability of "Typical Details".
- 20. Work and coordinate these drawings with architectural, civil, structural, mechanical, plumbing, fire protection, electrical, and technology drawings.
- 21. Do not scale drawings.
- 22. Any discrepancies between mechanical and architectural drawings shall be brought to the attention of the architect and mechanical engineer.
- 23. Should any of the general notes conflict with any details or instructions on plans, or in the specifications, the strictest provision shall govern.
- 24. Shop drawings and submittals
- A. Shop drawings and submittals shall be checked and coordinated with other materials and contracts by the general, mechanical and electrical contractors and shop drawings and submittals shall bear the prime contractor's review stamp with the checker's initials before being submitted to the architect for approval.
- B. When the contractor has been authorized to use the architect and engineer's drawings as construction coordination drawings, the contractor must remove all title blocks, professional seals and any other references to the architect and engineer from those drawings. The contractors name and title shall be placed on the drawings. C. Where voltage, amp draw, dimensions and elevations of existing construction could affect the new construction, it is
- the contractor's responsibility to make field verifications and measurements in time for their incorporation into the shop drawings.
- 25. Refer to architectural and electrical reflected ceiling plans for exact location of light fixtures. Contractors to coordinate locations of lighting, speakers, air diffusers, grilles, sprinkler heads and the like, with reflected ceiling lay-outs as required and directed by the architect.
- 26. Ductwork or piping shall not be located over the top of any electrical panels or equipment. 27. Contractor shall include in his bid all cutting, trenching, and patching associated with the installation of this projects work.
- 28. Cutting, Patching and Drilling A. All cutting and patching of the building construction required for this work shall be by this contractor unless shown on architectural drawings and confirmed as to size and location prior to new construction. Cutting shall be in a neat and workmanlike manner. B. Neatly saw cut all rectangular openings, set sleeve through opening, and finish patch or provide trim flange around
- openina Neatly saw cut floors and patch floor to match existing, including floor covering. D. Contractor shall field verify slab-on-grade or supported floor construction type prior to cutting. Under no circumstances shall this contractor cut a floor thicker than 4 inches, a structural floor slab, whether on grade or
- supported, without prior written approval from the architect. If floor slab indicated to be cut on mechanical plans is found to be structural in nature, do not cut. Contact architect immediately for further directions. E. Core drill and sleeve all round openings.
- F. Do not cut any structural components without architect's written approval, including, but not limited to roof joists, columns floor joists beams girders structural floor slabs rebar etc G. Patch, and finish to match adjacent areas that have been cut, damaged or modified as a result of the installation of
- the mechanical systems. Fire-stop all penetrations of fire rated construction in a code approved manner. H. All contractors shall confirm with owner, prior to bid, times available for noise producing work such as cutting and
- core drilling of floors, walls, etc. as well as times for work which requires access into adjoining tenant spaces. Include any premium time in bid. I. Exact location of roof top air conditioning units shall be approved by the structural engineer. Mechanical contractor
- shall furnish and install all supplemental support steel for equipment and roof penetrations after approval of structural engineer J. The mechanical contractor shall coordinate work with the general contractor prior to construction. The mechanical contractor shall provide information regarding openings in walls, floors, etc., concrete equipment pads and
- foundations to the general contractor. If the mechanical contractor fails to comply with this request, or if incorrect information is given, the necessary cutting and patching will be performed by the general contractor at the mechanical contractor's expense. K. All openings required for this branch of work shall be accomplished in time to be incorporated in, and be compatible
- with the construction program; otherwise this contractor shall be responsible and pay for all changes made necessary for his failure to do so. Pipe holes in floors and walls shall be core drilled if not sleeved during construction. L. Existing slabs shall be core drilled at reentrant corners of new floor openings to prevent overcutting.
- 29. Refer to mechanical, plumbing, fire protection, and electrical plans for location of mechanical, plumbing, and electrical equipment. Coordinate location of disconnect switch associated with each piece of mechanical and plumbing equipment with electrical contractor
- 30. Installation requirements for all HVAC, plumbing, and fire protection systems shall be reviewed and coordinated with all other trades involved prior to rough-in. Give equipment shop drawings from installer/supplier/contractor equipment, as required, for review and coordination to all other trades involved. Contact architect/engineer with any discrepancies found between construction drawings and equipment being furnished prior to rough-in.

31. The contractor shall furnish all access panels or doors in hard ceilings and walls with a size as required for servicing and testing, for equipment, valves and/or devices furnished under this contract. The general contractor shall install access panels. The contractor shall coordinate the size and location of each access panel with the architect and general contractor prior to rough-in.

## 32. Firestopping

- provide all fire dampers and firestopping required for these walls whether shown or not on the mechanical plans. B. All penetrations through fire rated walls associated with the installation shall be sleeved and fire-stopped using a UL approved method. UL approved method shall meet or exceed fire rating of structure being penetrated. Reference architectural plans for fire rated structures. If shown, reference architectural, mechanical and electrical drawings for penetration details.
- C. All openings through fire rated walls, floors, and/or roofs for ductwork, piping, conduit, etc., shall be fire sealed with a
- the intended fire rating and associated UL ratings as recommended by the architect and/or sealant manufacturer. D. All fire stopping sealants shall be thixotropic so as not so slump or sag and shall be trowelable. Fire stopping sealants shall be intumescent and shall be free of asbestos, halogens, and volatile solvents.
- E. Fire stopping materials shall be classified in the Underwriters Laboratories (UL) fire resistance directory or listed in the Warnock Hersey International Directory.
- 33. All equipment and devices for this project must be UL listed. Devices, equipment, systems shall be installed per National Electrical Code requirements and manufacturer's instructions.
- 34. All conduit and cabling shall be properly supported as required by the National Electrical Code. For existing installations, the contractor shall be responsible to replace and/or rework existing conduit and/or cabling that is not in compliance with this requirement.
- 35. All materials and work in the return air plenum shall be approved for plenum rated application in accordance to the current building code. Where open wiring methods for low voltage systems is permitted by the contract documents and local authority, the conductor insulation must be plenum rated.
- 36. Shop Areas and Material Storage
- A. No plumbing or mechanical trade is permitted to use as shop working area, any concrete slab that is to receive metallic waterproofing, asphalt tile, plastic tile, etc., except by express permission of the architect. 37. The contractor shall make provisions for the delivery and safe storage of his materials and equipment in coordination with the work of others. Materials and equipment shall be delivered at such stages of the work as will expedite the work as a whole and shall be marked and stored in such a way as to be easily checked and inspected. The arrival and placing of large equipment items shall be scheduled early enough to permit entry and setting when there is no restriction or problem due to size and weight.

## DEMOLITION

- 1. The architectural drawings are to be used only as a guideline for demolition. The contractor must visit the site prior to bidding to verify all work required for a complete job and include the cost of such work in his bid.
- 2. The mechanical drawings are intended to show only the general existing building construction within the area of conditions to define all elements within the scope of demolition.
- 3. Examine areas and conditions under which demolition work must be performed. This contractor shall coordinate his work with other trades performing demolition work and/or demolition work performed by the owner. In every instance of demolition and/or remodeling, the contractor shall figure a complete job as none other shall be accepted.
- 4. The extent of work shown or not shown shall include removal and legally dispose off site, all the items and systems being removed.
- 5. Where temperature controls are indicated for demolition, retain the services or a temperature control contractor to perform such demolition.
- 6. This contractor shall retain on the premises in neatly stacked piles where instructed for selection by the owner, all material, wire, fixtures and/or equipment which are specified to be removed or replaced. All such items, not selected for salvage by the owner, shall become the property of this contractor and shall be removed from the premises and legally disposed.
- 7. Conform to all applicable codes for demolition of items and systems, safety of adjacent systems, dust control, legal run-off control, disposal and all items necessary to complete the work completely.
- 8. Demolition shall be done in a manner so as not to damage adjacent work and not affect the operation of systems to remain in use. Any item to remain that is damaged by the contractor shall be replaced and/or repaired at the contractor's
- expense. 9. Demolition and cutting shall be done in a manner which does not deform or apply loads to the existing framing and equipment of the building to remain.
- 10. All walls, ceilings, floors, etc., being disturbed by the work shall be returned to finished conditions to match existing by the contractor and contractor shall do his own cutting and patching as necessary under his contract.
- 11. The contractor shall maintain existing services to and in the existing area as required.
- 12. The existing systems to remain are to be supported as required until the modified elements are installed and supported.
- 13. If necessary, the contractor shall provide temporary services in the existing areas.
- 14. Existing slabs shall be saw-cut in a manner that does not cause the steel framing or the rebar supporting the slab to be cut. Contractor shall field verify slab thickness and rebar spacing.
- 15. Existing slabs shall be core drilled at reentrant corners of new floor openings to prevent over cutting.
- 16. The demolished systems shall be reduced to pieces of a weight, and transported across the remaining structure in a
- manner, such that the remaining structure is not overstressed. 17. The electrical contractor shall disconnect and remove electric service to all mechanical equipment being removed as a result of the renovation.
- 18. Equipment and devices shall be removed complete including hangers, supports, controls, conduit, wire, pipes, ductwork, etc. Wiring shall be disconnected at circuit breakers, removed and breakers marked "spare."
- 19. All open ended piping and ductwork that is to remain shall be capped and property secured.
- 20. Any existing pipes, ductwork, conduit, low voltage control, wiring and/or electrical and mechanical devices being disturbed by the work shall be reworked by this contractor as required to return to its former existing operating condition.
- 21. Any pipes or ductwork, or control wiring, or tubing feeding through devices or equipment being relocated, reworked, or
- according to federal requirements.
- 23. All asbestos removal will be handled by the owner and is not a part of this work.
- 24. Use of explosives shall not be permitted.

demolition.

- 26. Contractor shall submit a proposed deconstruction sequence to the owner and architect for review prior to
- commencement of work.

# A. The contractor shall review all architectural drawings for type of walls, fire ratings, & firestopping details and shall

calcium salicate, silicone "RTV" foam, "3M" fire rated sealants, Hilti Firestop Systems, or approved equal to maintain

demolition. The drawings do not show all systems, quantities, sizes, obstructions, etc., and are not intended to be used by the contractor to define the complete scope of demolition. The contractor must field verify the actual building and systems

abandoned and serving other devices, and/or equipment shall be maintained in working condition. 22. Mechanical contractor shall remove and reclaim any refrigerant in existing systems prior to demolition of any equipment

25. Existing architectural, mechanical and electrical equipment and systems shall be protected from damage resulting from

AMPS ADD'L ADDITIONAL AFF ABOVE FINISH FLOOR AFG ABOVE FINISH GRADE AIR HANDLING UNIT AHU ACCESS PANEL ARCH ARCHITECTURAL BLDG BUILDING BOT BOTTOM COOLING COIL CEILING DIFFUSER CL (ଢ଼) CLG CENTERLINE CEILING COL COLUMN CONST CONSTRUCTION CONT CONTINUOUS CONTR CONTRACTOR CTX CONNECT TO EXISTING DAMPER DIAMETER DIA(ø) DOWN DSW DISCONNECT SWITCH EXHAUST AIR ELECTRICAL CONTRACTOR EXHAUST FAN EXHAUST GRILLE ELEVATION ELEC ELECTRICAL FMFRGFNCY FM EQUIPMENT

EXISTING TO REMAIN

ETR



MECHANICAL LEGEND







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AND 120V POWER BY ELECTRICAL CONTRACTOR. TEMPERATURE CONTROL CONTRACTOR SHALL PROVIDE TRANSFORMER AND LOW VOLTAGE POWER AND WIRING TEMPERATURE SENSOR, MOUNT 48" AFF, UNLESS OTHERWISE NOTED

POINT OF CONNECTION

EQUIPMENT TAG

SUPPLY OR OUTDOOR AIR DUCT

RETURN OR EXHAUST DUCT

DUCT LINING

DUCT UP

DUCT DOWN

AIRFLOW DIRECTION 3/4" DOOR UNDERCUT TRANSFER AIR CENTERLINE





OA











ROOMS OR AREAS SHOWN SHADED ON THIS PLAN, WITH THE FOLLOWING SHADING TYPE ARE DEDICATED FOR A SPECIFIC USE. EXAMPLES INCLUDE ELECTRICAL ROOMS, TECHNOLOGY/DATA CLOSETS, EXIT STAIRWELLS, AND ELEVATOR EQUIPMENT ROOMS. UNDER NO CIRCUMSTANCES SHALL PIPING, DUCTWORK, OR EQUIPMENT BE INSTALLED IN OR ROUTED THROUGH THESE ROOMS OR AREAS EXCEPT FOR BRANCH PIPING OR DUCTWORK SPECIFICALLY SERVING THE ROOM OR AREA. DEDICATED SPACE SHALL EXTEND VERTICALLY FROM FLOOR TO STRUCTURAL CEILING.

TEMPERATURE CONTROL 120V JUNCTION BOX FOR LOW VOLTAGE CONTROL TRANSFORMER. POWER WIRING, BOX,

TEMPERATURE CONTROL CONTRACTOR















DUCT BRANCH TAKE-OFF DETAILS

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	GRILLE AND DIFFUSER SCHEDULE							
MARK	MANUFACTURER	MODEL	FRAME OR BORDER TYPE	MODULE SIZE	DAMPER MODEL NUMBER	FINISH	REMARKS	
SUPPLY								
CD-1	TITUS	OMNI	LAY-IN	24 x 24	AG-100	OFF WHITE	1,2	
SG-E	-	-	DUCT MOUNTED	-	-	-		
RETURN				_				
RG-1	TITUS	350 RL	LAY-IN	SEE PLANS	AG-15	OFF WHITE	2	
RG-2	TITUS	350 RL	DUCT MOUNTED	SEE PLANS	AG-15	OFF WHITE	2	
REMARKS	5:							

1. ACCEPTABLE MANUFACTURERS: ANEMOSTAT, KRUEGER, NAILOR, PRICE, TITUS, OR TUTTLE AND BAILEY. 2. ALL CEILING DIFFUSERS ARE 4-WAY THROW UNLESS INDICATED OTHERWISE ON PLAN.

	DUCT MATERIAL, LINING, AND INSULATION SCHEDULE							
type No.	DESCRIPTION	SMACNA PRESSURE CLASSIFICATION	DUCT MATERIAL	INSULATION	REMARKS			
GENE	RAL DUCTWORK							
1	LOW VELOCITY SUPPLY AIR	RECTANGULAR - 2" ROUND - 4"	GALVANIZED STEEL (SPIRAL WHERE EXPOSED TO VIEW)	1" THICK INTERNAL LINING TO 10' DOWNSTREAM OF EQUIPMENT, EXTERNAL FIELD APPLIED 1" THICK FLEXIBLE INSULATION WHERE NOT INTERNALLY LINED (NO EXTERNAL WRAP WHERE EXPOSED)	1, 3			
2	RETURN AIR	2"	GALVANIZED STEEL	1" THICK INTERNAL LINING WITHIN 10' OF EQUIPMENT	2,3			

GENERAL NOTE: DUCTWORK SHALL BE CONSTRUCTED & INSULATED AS NOTED IN THIS SCHEDULE. SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION AND FOR ANY DUCTS NOT LISTED IN SCHEDULE.

## <u>REMARKS:</u>

1. ALL EXPOSED SUPPLY AND RETURN DUCTWORK SHALL BE PAINTED A COLOR SELECTED BY THE ARCHITECT. 2. SIZES OF INTERNALLY LINED DUCTWORK INDICATED ON THE PLANS ARE INSIDE CLEAR DIMENSIONS.

3. DUCTWORK EXPOSED TO EXTERIOR (OUTDOOR) TEMPERATURES EITHER IN UNCONDITIONAL SPACE OR OUTSIDE SHALL BE WRAPPED WITH A MINIMUM 2" THICK FIBERGLASS INSULATION. DUCTS EXPOSED TO WEATHER SHALL BE WRAPPED WITH VENTURECLAD ALUMINUM FACING.





Section 200500 - General Requirements

A. General

- Divisions 01, 20, 21, 22, and 23. 2. This contractor is also referred to the architectural, structural, electrical and all other drawings and specifications pertinent to this project and fully coordinate with all other trades, owner and architect requirements. All of the above mentioned drawings and specifications are considered a part of the contract documents.
- architect and/or owner 4. Refer to "Alternate Proposals" for possible changes affecting the extent of this section of work. 5. Before submitting a bid, each contractor is requested to visit the job site to familiarize themselves with
- measurements. Note conditions under which work is to be performed and take all items into consideration in bid. No consideration will be given for his failure to do so. 6. Systems are to be complete and workable in all respects, placed in operation and properly adjusted.
- 7. Each contractor shall provide for his own clean-up, removal and legal disposal of all rubbish daily. 8. Each contractor shall protect his work, his existing and adjacent property against weather. 9. Each contractor shall protect his work, materials, apparatus and fixtures from damage. Any work damaged by failure to provide protection required, shall be removed and replaced with new material at
- the contractor's expense. 10. Each contractor must confirm all utility company requirements and connection points in field, prior to starting work. Each contractor shall include cost of utility companies work in their bid.
- to rough-in of new work
- 12. Arrange for and obtain owner's and insurance representative's permission for any service shutdowns. 13. Each contractor shall be solely responsible for construction means, methods, sequences of construction and the safety of workmen. 14. No piping, ductwork, wiring, etc., shall be installed or routed above or below electrical panels and equipment, through elevator equipment rooms or elevator shafts or stairways unless these items serve
- these areas only 15. All contractors shall coordinate with the electrical contractor and obtain a written approval identifying the electrical characteristics of all mechanical equipment prior to ordering of equipment. No additional payment will be made for lack of contractor coordination of electrical characteristics.
- the contractors may uncover an existing condition that will have to be modified. Any such work which comes under the jurisdiction of this contractor shall be done by this contractor without extra cost to the owner and project
- 17. Work related to the existing building shall be coordinated to minimize interference or interruption of normal building use by the owner. Refer to architectural plans for phasing requirements. 18. Ceiling grid systems shall not be supported from ductwork, heating or plumbing lines or any other
- each shall be independently supported from the building structure concrete, steel or masonry. Where interferences occur, in order to support ductwork, piping, ceiling grid systems, etc., trapeze type hangers or supports shall be employed which shall be located so as not to interfere with access to such mechanical equipment as valves, regulators, mixing boxes, fire dampers, etc.
- B. Work Coordination and Scope

and specialty systems.

- 1. Each contractor under this division shall familiarize himself with the work to be done under other divisions of this specification and their related drawings and shall so coordinate and schedule his work as not to cause delays or interference with the work of others. Such coordination and scheduling shall accomplish the installation of mechanical and plumbing equipment and piping with a minimum of cutting through masonry and other adjustments. Work included under this division shall consist of furnishing all materials, supplies, equipment, tools, transportation and facilities and performing all labor and services necessary for the complete installation of the mechanical systems of plumbing, fire protection, heating, ventilating, air conditioning,
- 3. The contractor under this division shall report discrepancies in the work of others which affect his work. Any changes made necessary by failure or neglect to report such discrepancies shall be made by and at the expense of the contractor of this division. Obtain written instructions for changes necessary to accommodate work of others.
- 4. The contractor under this division shall be responsible for proper size and location of anchors, chases, recesses, opening, etc., required for the proper installation of his work.
- C. Codes, Permits, Standards and Regulations 1. Contractors shall install work in full accordance with rules and regulations of all applicable codes (local, city, county, state, national codes, NFPA, OSHA, etc.), government regulations, utility company requirements, and applicable standards having jurisdiction over premises. This shall include safety requirements of the state department. Do not construe this as relieving contractor from compliance with any requirements of specifications which are in excess of code requirements and not in conflict
- therewith 2. Contractors shall secure and pay for all fees, permits, and certificates of inspection incidental to this work required by foregoing authorities. Arrange for all required inspections and approvals.
- 3. Contractor shall be responsible for payments to all public utilities for work performed by them in connection with provision of service connections required under this division of specifications. 4. Deliver all permits and certificates to architect in duplicate.
- D. Design Drawings
- 1. The design drawings, as submitted, are diagrammatic and are not intended to show exact location of equipment, piping and ductwork unless dimensions are given. Piping and ductwork are to be installed along the general plans shown on the drawings while conforming to actual building conditions. Each contractor shall confirm all dimensions by field measurement. 2. Before entering into a contract, the successful bidder may be required to submit satisfactory evidence to show that the manufacturer of all parts of the equipment offered have been regularly engaged in the manufacture of such equipment for three (3) years and have not less than three (3) installations of a
- similar type which have been in successful operation under conditions similar to those specified for not less than two (2) years. 3. All equipment, piping and material specified herein after as shown on the drawings shall be furnished and installed by the contractor, unless specifically indicated to the contrary. Installation shall comply
- with all required "Building Codes" and "Reference Standards." 4. If this contractor proposes to install equipment requiring space conditions other than those as specified and/or shown on the design drawings, or to rearrange the equipment, he shall assume full responsibility and submit drawings for the rearrangement of the space and shall obtain the full
- approval of the architect prior to start of any work. 5. The exact locations for fixtures, equipment and piping which is not covered by drawings shall be obtained from the architect or his representative in the field and the work shall be laid out accordingly.
- 6. Drawings and specifications are intended to supplement one another. Any materials or labor called for in one but not the other shall be furnished as if both were mentioned in the specifications and shown on the drawings.
- E. Base Bid Equipment, Materials and Substitutions
- 1. All equipment and materials shall be new, free of defects and UL labeled. 2. Base bid manufacturers are included in the specification or listed in schedules on the drawings. All other manufacturers are considered substitution.
- 3. The name or make of any article, device, material, form of construction, fixture, etc., stated in this specification, whether or not the words "or approved equal" are used, shall be known as a "standard". 4. All cost shall be based on "standards" specified.
- 5. The equipment schedules on the drawings indicate manufacturer and their equipment model numbers that this design has been based on. Each contractor is required to bid upon the basis of design and furnish the makes specified. 6. Where more than one make or name is mentioned as being acceptable, it shall be understood that
- only the name or make referring to the manufacturers model numbers or sizes shall be considered the "Specified Standards." It shall be further understood that other makes and names, even though mentioned, have not been checked for detail and that their size and arrangement are the contractor's responsibility the same as a proposed substitute item. The use of other manufacturer's equipment that is listed as acceptable alternates that entails general trades, structural, mechanical, electrical, etc., revisions is this contractor's responsibility to provide revisions. Any additional cost of such changes shall be paid by the contractor submitting the acceptable alternates which necessitates changes in installing such submitted alternate equipment, even though such costs may be part of another division of work
- 7. Bids concerning the use of substitute products must be accompanied by complete specifications and performance characteristic covering these products. Contractor shall provide all available test data and experience records which may be helpful to the architect in evaluating the quality and/or suitability of alternate products.
- 8. Contractor is also invited to bid on any other similar products the contractor desires to propose as substitutions, stating any difference in cost (add or deduct from base bid cost) for each proposed substitution on the substitution sheet. If the architect decides to accept any of the proposed substitutions, proper notations thereof shall be made in the written contract. Where several makes are mentioned in the specifications and the contractor fails to state that he prefers a particular make in his bid, the owner shall have the right to choose any of the makes mentioned without change in price. No consideration will be given to proposals for alternative products unless submitted with the original bids.
- 9. Substitutions are subject to the approval of the owner. If a substitution is submitted, it is the contractor's responsibility to evaluate it and certify that the substitution is equivalent in all respects to the base specifications.
- substitution and fully coordinate with them. Any costs resulting from substitution, whether by this contractor or others, shall be the responsibility of and paid for by the substituting contractor. Approved shop drawings do not absolve this contractor from this responsibility.
- 11. All equipment shall be installed in full accordance with the manufacturer's data and installation instructions and service clearances. It is this contractor's responsibility to check and confirm these requirements prior to starting of any work.
- F. Warranty 1. Fully warrant all materials, equipment and workmanship and the successful operation of all equipment
- and apparatus installed by this contractor for one (1) year from date of final acceptance 2. Extend all manufacturers' warranties to owner; including five (5) year compressor and ten (10) year
- heat exchanger extended warranty on HVAC equipment to include material and labor. 3. Repair or replace without material and labor charge to the owner all items found defective during the warranty periods. In the case of replacement or repair due to failure within the warranty period, the warranty on that portion of the work shall be extended for a minimum period of one (1) year from the date of such replacement or repair.
- G. Shop Drawing Submittals
- 1. Submit shop drawings for mechanical, plumbing, fire protection, and control systems; including but not limited to sheetmetal, plumbing fixtures and equipment with adequate details and scales to clearly show construction. Indicate the operating characteristics for each required item. Clearly identify each item on the submittal as to mark, location and use, using the same identification as provided on the construction documents.
- 2. Sheetmetal and fire protection shop drawings shall be fully dimensioned and coordinated based on field verified building dimensions and clearances and architectural ceiling layouts. Indicate structural systems, lighting, ductwork and piping at all critical locations. 3. Contractor shall review and indicate his approval of each shop drawing prior to submittal for review. Shop drawings will not be reviewed by the engineer unless the contractor's approval is noted. Do not start work or fabrication until shop drawings have been reviewed by the engineer and returned to the
- contractor. 4. Submittals will be reviewed only for general compliance with the contract documents and not for dimensions or quantities. The architect and engineer will make every effort to detect and correct errors, omissions, and inaccuracies in such drawings, but the failure to detect errors, omissions, and inaccuracies shall not relieve the contractor of responsibility for the proper and complete installation in accordance with the intent of the contract documents. The submittal review shall not relieve the contractor of responsibility for purchase of any item in full compliance with the contract documents or

its complete and proper installation.

1. Specifications are applicable to all contractors and/or subcontractors for all mechanical systems in

3. Conform to all Instructions to Bidders, general and special conditions of contract as specified by

construction condition, check facilities and conditions and make all necessary observations and

11. Each contractor must confirm size, location and materials at point of tie in connections in the field prior

16. Each contractor shall include modifying existing conditions to complete the project. During construction

utility lines, and vice versa. Each utility and the ceiling grid system shall be a separate installation and

10. If substitutions are approved, notify all other contractors, subcontractors, etc., affected by the

- 5. Where submittals vary from the contract requirements, the contractor shall clearly indicate on submittal or accompanying documents the nature and reason for the variations. 6. Each manufacturer or his representative must check the application of his equipment and certify at time of shop drawing submittal that the equipment specified has been properly applied and can be
- installed, serviced and maintained where indicated on the drawings. Advise engineer in writing with submittal drawings of any potential problems. The manufacturer shall be responsible for any changes that might be necessary because of physical characteristics of equipment that have not been called to the engineer's attention at the time of submittal.
- 7. Submit a minimum of one (1) print and an electronic "pdf" of shop drawings to the architect. The architect and engineer shall review and return a pdf. The contractor shall distribute copies as required to properly conduct the work, including requirements of the operating manual.
- H. Record Drawings
- 1. Each contractor or subcontractor shall keep one (1) complete set of the contract drawings and equipment submittals on the job site on which he shall regularly record any deviations or changes from such contract drawings made during construction. All recording shall be done in color ink. 2. These drawings shall record the installed location of all concealed equipment, piping, electric service, sewers, wastes, vents, ducts, conduit, etc., by measure dimensions to each such item from column centerlines or readily identifiable and accessible walls or corners of the building. Plans also shall show invert elevation of sewers and top elevation of all other below-grade lines.
- 3. Record drawings shall be kept clean and undamaged and shall not be used for any purpose other than recording deviations from working drawings and exact locations of concealed work.
- 4. After the project is completed, these drawings shall be scanned to an electronic "pdf" format and pdf and hard drawings shall be delivered to the architect in good condition, as a permanent record of the installation as actually constructed.

## I. Supervision

1. The contractor shall have in charge of work at all times during construction a competent foreman or superintendent whose experience and background shall qualify him for the work to be performed under this division. Once assigned, the foreman or superintendent shall be retained until completion of the project and any consideration as to his removal on grounds of incompetence shall either be initiated by or referred to the architect for decision.

#### Section 200510 - Basic Materials and Methods

- A. General 1. Provide all materials, labor, equipment, and accessories required to furnish and install the mechanical
- items identified in this section. 2. This section includes basic mechanical materials and methods to complement other division sections in this specification and requirements indicated on the mechanical drawings.
- B. Interferences
- Before installing any work, contractor shall see that it does not interfere with clearance required for finish on beams, columns, pilasters, walls, or other structural or architectural members, as shown on architectural drawings. If any work is so installed and it later develops that architectural design cannot be followed, contractor shall, at his own expense, make such changes in his work as architect may direct to permit completion of architectural work in accordance with plans and specifications.
- 2. Install additional offsets on piping or ductwork where required to obtain maximum headroom or to avoid conflict with other work without additional cost to owner.
- 3. Report any interferences between work under this division and that of any other contractors to architect as soon as they are discovered. Architect will determine which equipment shall be relocated, regardless of which was first installed, and his decision shall be final.

#### C. Protection of Work and Property

- 1. The contractor shall be responsible for safeguarding work, property, and facilities against damage, both his own as well as others with which he may come into contact in the performance of his work. 2. Stored materials shall be protected against damage from weather. Pipe and duct openings shall be closed with caps or plugs during installation. All fixtures and equipment shall be covered and protected against damage. Any materials or equipment damaged at any stage in the construction shall be
- replaced or repaired. Final completion, all work shall be in a clean and unblemished condition. 3. During construction, all return air ductwork and transfer air openings serving new and existing air handling equipment and/or adjacent tenant spaces shall be protected. Openings which need to remain active shall be covered and protected with MERV 8 filtration media; openings which can remain inactive during construction shall be covered with plastic sheathing and sealed air tight. Filter media shall be replaced regularly as required during construction in order to ensure adequate airflow through all required active openings. In addition, at the end of each phase of construction and at the end of the construction project, all filtration media within each piece of equipment serving the space shall be
- D. Supports and Hangers

replaced.

- 1. Hangers and supports are to be provided to properly support, secure and align piping and to meet field conditions and as manufactured by Grinnell, Michigan Hanger or Caddy. All hangers, brackets, clamps, etc., shall be of standard weight steel. Perforated strap hangers shall not be used in any work. When two or more pipes are run parallel, they may be supported on
- unistrut-type trapeze hangers. Other hangers for pipe 3" in size and smaller shall be clevis. For pipe transporting medium above 150 degrees F and 4" in size and above, use pipe roll. Each hanger is to be sized to include pipe insulation saddle for protection.
- E. Access Panels
- 1. Each contractor shall be responsible for providing all required access panels necessary for his work. This includes any access panels required for HVAC, plumbing and fire protection. Each contractor shall also provide access panels for any existing conditions as required. 2. Refer to architectural drawings and specifications for type of access panel and coordinate locations
- prior to any work. 3. Contractor shall mark lay-in ceiling tiles, in a method approved by the architect, where access is required to such mechanical, plumbing, and fire protection equipment, valves, regulators, mixing boxes, fire damper, etc.

#### F. Noise and Vibration Isolation

- 1. Vibration or noise created in any part of the building by the operation of any equipment furnished and/or installed under this contract will be prohibited, and this contractor shall take all precautions by isolating the various items of equipment, pipe and sheet metal work form the building structure. The major items of equipment shall be isolated as called for on the plans and specified herein. The minor items shall be held the responsibility of this contractor.
- 2. Piping and ductwork shall be supported independently of the mechanical equipment and shall be isolated as follows: Flexible connections shall be used between air handling equipment and ductwork.
- b. All ductwork within the mechanical equipment and air handling rooms shall be suspended with rod and rubber-in-shear hangers.
- 3. Isolation efficiency shall be based on the lowest operating speed of the supported equipment. The isolator manufacturer shall provide, as a part of his submittal data, and isolating efficiencies for the isolators supporting each piece of equipment. Isolators shall be manufactured by Consolidated Kinetics Corp., 401 Dublin Avenue, Columbus, Ohio, or Mason Industries, Inc., Hollis, New York.

#### G. Miscellaneous Steel

1. Furnish and install all miscellaneous steel required for supports, hangers, anchors, guides, etc., required for installation of equipment and materials furnished and installed under this division.

#### H. Painting

- 1. This contractor shall perform all painting incidental to this work.
- 2. All insulation shall be painted at the time of installation with one coat of Benjamin Foster "Lagtone" water base paint. At the completion of the work, all such insulation shall be given an additional coat of alkyd resin paint of a color to match existing building structure or as selected by the
- 3. All uncovered exposed sheet metal shall be thoroughly cleaned and neutralized and given two (2)
- coats of alkyd resin paint of a color to match existing building structure or as selected by the architect. 4. All painting shall be done with a brush or roller. Spray painting will be prohibited. 5. All finishing materials, thinners, etc., shall be the best quality, first line materials as manufactured by:
- a. E.I. Dupont De Nemours and Company
- b. Pratt and Lambert, Inc. c. The Glidden Company
- d. The Sherwin-Williams Company
- e. The Pittsburgh Plate Glass Company
- 6. All paint materials shall be delivered to the job in the manufacturer's original unopened and labeled
- containers, and they shall be used strictly in accordance with the manufacturer's directions. 7. This contractor shall submit a list of materials to the architect. The list shall state the branch names of
- the materials that the contractor intends to use. This list shall be secured from the paint manufacturer and shall be on his stationery.
- 8. The architect's approval must be secured before any painting work is started.

#### I. Clean-Up

- 1. Insofar as this contract is concerned, at all times keep premises and building in a neat and orderly condition: Follow explicitly any instructions of architect in regard to storing of materials, protective
- measures, cleaning-up of debris, etc. 2. Upon completion of work, this contractor shall thoroughly clean all apparatus furnished by him, pack all
- valves and thoroughly clean piping, fixtures and equipment removing all dirt, grease and oil. 3. Air systems shall not be operated without filters. Upon completion of work, replace all filters.

#### J. Operating and Maintenance

- 1. This contractor shall furnish competent personal instruction to the owner's operating personnel for a period of two (2) days in the proper operation of the heating and air conditioning equipment. He shall also supply the owner with copies of an operation manual containing the following: a. Step-by-step procedures for start-up and shut-down for each system and piece of equipment.
- b. Performance data, curves, ratings.
- c. Wiring diagrams.
- d. Manufacturer's descriptive literature. e. Automatic controls with diagrams and written description of operation.
- f. Manufacturer's maintenance and service manuals.
- g. Plumbing fixtures.

and make all necessary adjustments.

- h. Spare parts and replacement parts list for each piece of equipment.
- i. Name of service agency and installer.

## j. Final approved shop drawings.

## Section 200593 - Testing, Adjusting and Balancing

- A. General 1. After installation, check all equipment and perform start up in accordance with the manufacturer's
  - instructions
- 2. All piping shall be tested and free of leaks as required by the local authority having jurisdiction. 3. Work that is scheduled to be concealed or insulated shall remain uncovered until required tests have been completed. If the construction schedule requires, arrange for tests on sections of the system at a

4. Balance all systems, calibrate controls, check for proper operation and sequence under all conditions

5. Instruct owner in operation of systems and submit operating and maintenance manual for all equipment and systems.

6. Submit air balance report from independent AABC or NEBB certified subcontractor for all air and water systems per AABC or NEBB standards.

Submit duct leakage test report from independent AABC or NEBB certified contractor. 8. When the contractor is ready to run capacity tests, he shall notify the architect. When this notice is given, the architect will assume that the contractor has made preliminary tests and is satisfied that the plant will develop specified and guaranteed capacities. It will be the contractor's responsibility to furnish any and all instruments required to obtain test data which shall include thermometers, electric

meters, pressure gauges, etc. 9. Work under this division of the specifications shall not be considered complete until the contractor has obtained required inspection, performance tests, made necessary adjustments and has submitted satisfactory evidence of the architect or his representative will make spot checks to determine the accuracy and completeness of final adjustments. Should spot checks indicate more than a reasonable

deviation from design requirements, the contractor shall repeat tests and adjustments to the satisfaction of the engineer. 10. During one complete heating and one complete cooling season, the contractor shall make any minor adjustments that may be necessary to ensure uniform temperatures throughout the spaces.

11. Test results shall be submitted to the architect/engineer. 12. The Test and Balancing contractor shall adjust all sheaves or provide new sheaves and belts as required in order to properly balance all air handling equipment.

#### B. Balancing, Start Up and Instructions

1. After equipment is placed in operation, systems shall be balanced to within 10% of design flow with report submitted to owner. Balancing shall be performed by an independent AABC or NEBB certified contractor.

2. Balance the air systems prior to balancing hydronic, steam, and refrigerant systems. 3. Test, adjust and balance cooling systems during summer season and heating systems during winter season. Balance systems when the outside air conditions are within 5 degrees F wet bulb temperature of the maximum summer design condition and within 10 degrees F dry bulb temperature of the minimum winter design condition.

4. Start up and place all systems in operation and tag all switches and controls with permanent labels. 5. Train and instruct owner on proper operation and preventative maintenance of system.

C. Air Handling Equipment: For each piece of air handling equipment, this contractor shall list the data of the fan, motor and drive and shall obtain by measurement and furnish to the architect/engineer the fan speed, motor voltage, operating amps, for cfm and static pressure as determined from the manufacturer's fan curves. This contractor shall also determine the fan cfm by means of a velocity traverse which shall be taken a minimum of three fan diameters from fan outlet. Before running any tests, the contractor shall have installed all the components of the system and shall ensure the cleanliness of the filters.

D. Diffusers, Registers, Grilles: After completion of the air distribution systems and final adjustments, the contractor shall adjust all dampers and air supply, return and exhaust outlets so that each outlet handles its proper quantity of air. Supply registers and diffusers shall be adjusted to provide for the proper throw and a uniform distribution pattern.

1. For supply, return and exhaust air outlets, the velocity shall be measured with a heated wire resistance type anemometer held 1" from the face of the outlets; the air velocity shall be the average of velocity readings taken at points no more than 6" apart. The area shall be the net core area of the outlet. 2. Test readings shall be taken for each register, grille and diffuser. For each of these units, obtain and furnish information on manufacturer, testing equipment used, procedure followed, location, size, average, velocity, gross and net core areas, observed cfm and specified cfm. Separate tabulations shall be furnished for each manufacturer, each system and each type of register, grille and diffuser.

F. During the testing period, this contractor shall maintain on the job a competent individual thoroughly familiar with all phases of air conditioning, including refrigeration, temperature control and distribution, for as long a period as may be required to thoroughly adjust all of the systems and to demonstrate to the architect that they are functioning properly.

E. Holes in ducts and casings used for static pressure and velocity readings shall be provided with removable

G. The testing and balancing engineer shall, as part of his work, perform a "Spot" re-check balancing conditions between 30 to 90 days after both summer and winter balancing operations at which time a representative of the temperature control manufacturer capable of performing adjustments to his system shall accompany the balancing engineer. This operation shall include a check of space temperature, calibration of controls, pump and fan performance and the necessary adjustments thereto.

#### Section 200700 - Insulation

A. General

1. Furnish all material, labor and equipment as required to install complete plumbing and HVAC insulation as indicated on mechanical drawings and in these specifications. 2. Install in full accordance with manufacturer's recommendations.

B. Scope: This contractor shall furnish and install all insulation necessary to the project and in accordance with the following requirements. All insulation and accessories used in an air plenum space, and all duct covering and lining, regardless of physical location, shall have a composite (insulation, jacket, and adhesive) fire and smoke hazard rating as tested under procedure ASTM E-84, NFPA 255 and UL 723, not exceeding a flame spread 25 and smoke developed 50. All other areas shall have insulating materials and accessories on pipes and vessels rated at a flame spread 25 and smoke developed 150 as tested by the same procedure. All calcium silicate shall be asbestos free.

C. Workmanship: 1. All insulation shall be installed over clean, dry surfaces. Insulation must be dry and in good condition. Wet or damaged insulation will not be acceptable. No insulation shall be applied prior to pressure test completion of the respective piping and/or duct system.

All insulation ends shall be tapered and sealed regardless of services. 3. All insulated, exposed piping 8'-0" and below to the finished floor shall include a 0.020" thick vinyl

jacket. This jacket is in addition to the normal finish for the respective service. 4. Rigid duct insulation shall be impaled over welded pins and secured with white insulation caps. All seams shall be firmly butted and sealed with white pressure sensitive vapor barrier tape. No staples. 5. Wrap around duct insulation shall be applied with all joints butted firmly together. Insulation shall be cemented to the surface with fireproof adhesive applied in 6" wide strips on 12" centers. All joints in the insulation covering shall be sealed with adhesive. Where ducts are over 24" wide, the duct-wrap shall be additionally secured to bottom of rectangular or oval ducts with mechanical fasteners on 16" centers to prevent sagging. Vapor barrier shall be legibly printed by the manufacturer to show nominal thickness and type of insulation. Aluminum corner angles shall be used to prevent over

compressing insulation during installation. 6. Duct liner insulation shall be applied with joints pre-coated with adhesive and butted firmly together. Lining shall be cemented to ductwork with a minimum of 75 percent coverage of fire resistant adhesive. Mechanical fasteners on 16" centers and adhesive shall be used when duct width exceeds 12" or when duct height exceeds 24".

7. All ductwork in the mechanical rooms is to be considered as "exposed

ductwork," i.e. supply, return, relief, and outdoor air. 8. All round diffuser duct drops connected to lined ductwork shall be insulated the same

as "ductwork" schedule non-lined 9. Repair all damaged sections of the existing piping and mechanical insulation damaged during this construction period. Use insulation of same thickness as existing insulation. Install new jacket lapping and seal over existing. 10. Replace damaged insulation which cannot be repaired satisfactorily, including units with vapor barrier

damage and moisture saturated units.

D. HVAC Insulation (as manufactured by Owens Corning, Knauf) 1. All insulation to be applied in full accordance with the manufacturer's recommendations and comply with 25/50 flame and smoke hazard ratings per ASTM E-84, NFPA 255 and UL 723. 2. Insulate all supply, return and exhaust air ducts with 3/4" thick lined insulation near equipment 10 foot

out and/or through first elbow for sound deadening. 3. Insulate all supply, return and outside air ducts and exhaust air ducts between isolation damper and penetration of the building's exterior with 2" thick, 1.5 pcf, minimum R-6, foil faced reinforced kraft jacket fiberglass duct wrap fully secured to duct. Lap and tape seams and secure tightly to the ducts with wire or stick pins. Exposed to view ductwork in conditioned spaces shall not be insulated, unless otherwise noted to be insulated. Ductwork in ceiling return air plenums shall be insulated. 4. Exposed to view ductwork in conditioned spaces more than 15'-0" above finished floor and/or in high

humid climates, duct work shall be double walled with 1" thick, 1.0 pcf, minimum R-3.0 insulation.

#### Section 211000 - Fire Protection Systems

A. General

1. Furnish all labor, materials and equipment as required to install a complete fire protection system for

2. Field-verify sizes and location of existing sprinkler piping before fabrication of new. 3. This contractor shall be responsible for the removal and reinstallation of existing ceiling tiles, as required, for the installation of work shown in areas where existing ceilings are to remain. See

architectural drawings for areas where existing ceilings are to remain. 4. This removal and reinstallation of existing lay-in ceiling tiles shall be the responsibility of the fire protection contractor (under the supervision of the general contractor) as required to perform his work. Any damage to existing ceiling tiles or supports shall be the responsibility of the general contractor. Ceiling tiles may be left out of the ceiling areas under construction only if stored in areas as directed

by the owner so as not to hinder the daily operations of the building's occupations. 5. This contractor shall modify and relocate sprinkler piping and provide new sprinkler piping and heads, as required, to accommodate new mechanical work in full compliance with NFPA 13. This contractor shall also perform hydraulic calculations for sprinkler piping in the remodeled areas in accordance with NFPA 13.

B. Design Basis 1. Design basis for system shall be per NFPA 13 (latest edition) building code requirements, local water department, local fire department, state fire marshal, local code, and owner and owner's fire insurance underwriter requirements.

2. System shall be hydraulically calculated as required by code. 3. Pipe sizes indicated on drawing are approximate and shall be verified per the contractor's hydraulic

#### C. Drawings and Calculations

1. Contractor shall prepare submittal drawings and hydraulic calculations with a 10% factor of safety for building in accordance with owner's insurance company building department, and local fire authority requirements, tenant's requirements for design density, whichever is most stringent. 2. Contractor shall perform a flow test data on water main and submit data with calculations.

3. It is the fire protection contractor's responsibility to verify each tenant's design density with agreed upon lease documentation and that tenant's prototype or insurance underwriters requirements. 4. Provide wet standpipe system for project in accordance with NFPA 14 requirements. 5. Contractor and designer shall be state certified.

6. Coordinate layout and installation of sprinklers with ductwork and equipment above ceilings and other construction that penetrates ceilings, including but not limited to light fixtures, speakers, HVAC equipment, doors and partition assemblies. No sprinkler piping shall be routed beneath equipment above any ceilings that must be dropped directly down for service, repair, or replacement. 7. Examine areas and conditions under which fire protection materials and products are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to installer. Schedule rough-in installations with installations of other building components. 8. Shop drawings review does not relieve fire protection contractor from responsibility to meet each tenant's requirements for sprinkler coverage.

9. Fire protection contractor is responsible for verifying any high pile storage requirements of future tenants and providing an incoming sprinkler service size and risers to meet the requirements for adequate sprinkler coverage.

#### D. Piping

1. All piping shall be installed in accordance with NFPA 13, 14 (latest edition) and local code requirements

- 2. Fire protection piping shall be as follows: a. Below-grade outside building - ductile iron, cement lined. Class of pipe as directed by local water purveyor with mechanical or push-on type joints.
- b. Inside building pipe and tubing shall be steel or copper in accordance with NFPA requirements. c. Piping shall match existing building standards.
- d. Contractor shall arrange with owner and insurance underwriter prior to shut down of existing
- e. Flush all piping upon completion of project and test per NFPA requirements.
- f. No piping shall be installed at locations subject to freezing. 3. Excavation and backfill - see Section 200510, Basic Materials and Methods.

#### E. Sprinkler Heads

- 1. Sprinkler heads shall be UL listed, match existing building standards and be manufactured by Central, Star or Viking.
- Sprinkler heads shall be as follows: a. Areas with exposed structure
  - 1) Upright rough brass.
- b. Areas with ceilings
- 1) Recessed Pendent chrome plated with matching two (2) piece, flush escutcheon. Concealed - brass finish with off-white ceiling cover plate.
- 3) Sidewall chrome plated with off-white, two (2) piece, semi-recessed escutcheon.
- 3. Install concealed heads with white flush mounted cover plate in (sales area). 4. Install higher temperature sprinkler heads where required by code or application.
- 5. Sprinkler heads shall be located in the center of ceiling tiles or the center of an area of a 24" x 24" tile
- section. See architectural reflected ceiling plans. 6. Submit samples of sprinkler heads to architect prior to fabrication of any piping.
- 7. Install inspector's test connection with valve and terminate drain through exterior wall with text fitting and splash block.

#### F. Valves

- 1. Install all valves as required by NFPA 13, UL or FM listed and as manufactured by Grinnell, Hammond or Milwaukee
- 2. All shut-off valves shall be fitted with tamper switches by fire protection contractor and wired by electrical contractor. Tamper switches shall be as manufactured by Notifier, Potter or Viking.
- 3. Install flow switch in riser as manufactured by Notifier, Potter or Viking and wired by electrical contractor.
- 4. Install UL listed alarm check valve with all required trim, including water motor alarm bell and drains as
- manufactured by Central Star or Viking. 5. Install wall mounted indicator valve as manufactured by Potter Roemer, Croker or Elkhart and
- approved by local authorities. 6. Install double check detector assembly backflow preventer, as required by local water purveyor and as manufactured by Watts, Zurn or Conbraco.

#### G. Extra Materials

- 1. Valve wrenches: Furnish to owner, 2 valve wrenches for each type of sprinkler head installed.
- 2. Sprinkler heads and cabinets: Furnish 2 extra sprinkler heads of each style included in the project. Furnish each style with its own sprinkler head cabinet and special wrenches.
- 3. Obtain receipt from owner that extra stock has been received and give architect a copy of this receipt.

Section 233000 - Air Distribution Systems

#### A. General

- 1. Furnish all materials, labor, equipment and accessories required to install complete air distribution
- 2. Contractors bidding this project shall visit this site and familiarize themselves with all condition affecting their work. Submission of a bid on this project shall be construed as having such knowledge. 3. Verify exact conditions in field and coordinate with these drawings and other trades before beginning new work.
- Determine exact locations for all new and relocated ductwork and accessories in field. Coordinate work of this contract with other trades
- 6. Any discrepancies between what is shown on drawings or specified and the actual conditions in the field shall immediately be brought to the attention of the architect before proceeding.
- 7. Building and surfaces damaged during installation shall be repaired, replaced, and/or restored to original condition after completion of work and before acceptance by owner. 8. This contractor is also referred to the appropriate mechanical and plumbing specification sections the
- items of equipment to be bid as a part of this project. B. Ductwork
- 1. Fabricate and erect all ductwork to ASHRAE and SMACNA standards from galvanized steel. Comply with NFPA 90A requirements.
- 2. Ductwork shall be SMACNA low pressure construction 2" static pressure rating with Seal Class A seams and joints, unless otherwise noted.
- 3. Outdoor-Air, Supply-Air, Return-Air, and Exhaust-Air ductwork (no matter the pressure class) shall have a Seal Class A construction.
- 4. Ductwork upstream of VAV and FPVAV terminals shall be SMACNA medium pressure construction 4" static pressure rating with Class A seams and joints sealed with EC-800 compound or similar.
- 5. Include all acoustic, airfoil shaped perforated aluminum turning vanes, manual dampers, flexible connectors, grilles and diffusers, acoustic lining, and other sheet metal accessories for the project. 6. Changes in direction, in low velocity supply air rectangular ductwork, shall be made with full radius elbows with radius equal to 1\_1/2 times the horizontal width of the duct, or with square elbows with
- turning vanes. Turning vanes shall be constructed of the same material as the surrounding ductwork and two (2) gauge numbers heavier. 7. Furnish and install all manual balancing dampers, splitter dampers, extractors, and deflectors required to properly distribute the air. All dampers, extractors and deflectors shall be constructed of the same
- material as the surrounding ductwork, unless noted otherwise on the drawings. All manual balancing dampers shall be the opposed blade type. 8. Furnish and install all automatic control dampers unless noted otherwise on the drawings, all control
- dampers shall be opposed blade type and shall have leakage of less than 1 percent when closing against 4" water column static pressure and when sized for 2000 fpm velocity.
- 9. All manual balancing dampers, splitter dampers, extractors and deflectors shall be controlled by Young No. 1 or Ventlock No. 688 regulators. If ductwork is accessible, mount the regulator on the ductwork. If ductwork will be inaccessible after the installation of the ceiling or walls, mount the regulator in a steel, flush mounted box specifically designed for this purpose. Provide all linkage, top bearings and/or gear drives required for the remote installation of the regulator.
- 10. All branch connection fittings in rectangular ductwork shall be 45 degree transition type, conical fittings or spin-in fittings with integral air scoops. Butt fittings are not acceptable.
- 11. Exhaust duct outlets shall be installed a minimum of 10'-0" from all outside air intakes. 12. All exposed round ductwork shall be spiral seam ductwork and painted a color as selected by the architect
- 13. All ductwork operating at 3 in. w.c. and/or greater and all ductwork located outdoors (no matter the pressure rating) shall have a leakage test performed and results submitted to the engineer.
- C. Drain Pans 1. Install 2" deep secondary drain pan below all furnaces, hot water generators, and domestic water
- heaters. Pipe 3/4" drain to floor drain independently off all the other drains.
- D. Duct Liner 1. Acoustic line all rectangular ducts indicated on drawings with 1" thick non-flaking, coated medium density liner, apply to manufacturer's recommendations.
- 2. Duct dimensions indicated on drawings are clear inside dimensions (free area).
- 3. All rectangular ductwork downstream of FPVAV boxes shall be lined with 1" coated medium density liner. Apply to manufacturer's recommendations. 4. Duct liner shall comply with NFPA 90A and 90B (latest edition) requirements.
- E. Duct Accessories

schedules.

- 1. Flexible ductwork (as manufactured by Clevaflex, Flexmaster or Wiremold).
- a. Flexible ducts shall be independently supported from the structure and connected with plastic draw bands and tightened. Flexible ducts shall be limited to 48" maximum straight length. Flexible ducts shall be constructed of 1 1/2" insulation with vinyl vapor barrier jacket and rated at 10" W.C. for sizes though 12", UL listed, and meet 25/50 flame and smoke test. Flexible ducts
- are not permitted in rooms without ceiling. 2. Dampers (as manufactured by Ruskin, Nailor or Safe-Air) a. Fabricate in accordance with SMACNA Standards. Provide end bearings and locking, indicating
- quadrant regulators. Blade to be single thickness with continuous hinge or rod. 3. Control Dampers (as manufactured by Ruskin, Nailor or Safe-Air) a. Fabricate blade of double thickness sheet metal, opposed blade type with self-aligning rod and end bearing suitable for use with an actuator.

4. Backdraft Dampers (as manufactured by Ruskin, Nailor or Safe-Air)

5. Access Doors (as manufactured by Ruskin, Nailor or Safe-Air)

with sealing gasket and guick locking device.

finished a color as selected by the architect.

H. Roof mounted equipment shall be supported using Pate curbs.



KOBE

E-71263



 $\underbrace{\text{ELECTRICAL DEMOLITION PLAN}}_{1/8" = 1'-0"}$ 

5





# POWER & SYSTEMS PLAN

POWER GENERAL NOTES:

- 2. REFERENCE ARCHITECTURAL DRAWINGS FOR ADDITIONAL INFORMATION RELATED TO THE ELECTRICAL INSTALLATION. COORDINATE FLOOR BOX AND DEVICE LOCATIONS WITH SYSTEMS FURNITURE AND EQUIPMENT BEING PROVIDED BY OTHERS. 3. ARCHITECTURAL DRAWINGS HAVE PRIORITY OVER MEP DRAWINGS WITH REGARD TO LOCATIONS OF ALL VISIBLE ELEMENTS AND DEVICES. COORDINATE EXACT DEVICE LOCATIONS WITH DIMENSIONS INDICATED ON ARCHITECTURAL DRAWINGS.
- REFERENCE ARCHITECTURAL ELEVATIONS AND TYPICAL DEVICE MOUNTING DETAILS AND NOTES. 4. PRIOR TO ROUGH-IN COORDINATE EXACT POWER REQUIREMENTS AND LOW VOLTAGE ROUGH-IN REQUIREMENTS FOR ALL OWNER FURNISHED EQUIPMENT AND SYSTEMS.

ALL RECEPTACLES SHALL BE TAMPER-RESISTANT TYPE EXCEPT FOR THE FOLLOWING EXEMPT LOCATIONS PER 2017 NEC 406.12:

1. NOT ALL CODED NOTES SHOWN MAY APPLY TO THIS DRAWING.

RECEPTACLES LOCATED HIGHER THAN 66" AFF RECEPTACLES THAT ARE DEDICATED TO APPLIANCES AND

CODED NOTES (POWER): (#>

NOT READILY ACCESSIBLE

- 1. RECEPTACLE FOR WALL MOUNTED PROJECTOR OR TV, MOUNTED AT 54" AFF. COORDINATE EXACT LOCATION WITH TECHNOLOGY INSTALLER.
- 2. RECEPTACLE MOUNTED ADJACENT TO CABINET. COORDINATE EXACT LOCATION WITH TECHNOLOGY INSTALLER. 3. RECEPTACLE FOR TABLET CHARGING CART. VERIFY EXACT
- LOCATION WITH ARCHITECT/OWNER. 4. UTILIZE 20A/1P SPARE CIRCUIT PREVIOUSLY SERVING DEMOLISHED RECEPTACLES WITHIN ROOM. FIELD VERIFY. PROVIDE NEW DEDICATED CONDUIT AND WIRE BACK TO PANEL
- SPARE 20A/1P BREAKER OR NEW 20A/1P BREAKER IN EXISTING SPACE IF REQUIRED.





 $\bigcup_{1/8"=1'-0"} \frac{\text{LIGHTING PLAN}}{1/8"=1'-0"}$ 



CODED NOTES (LIGHTING): (#>

1. UTILIZE EXISTING CIRCUIT(S) PREVIOUSLY SERVING HIGHER WATTAGE FLUORESCENT LIGHTING WITHIN SPACE. FIELD VERIFY EXISTING CIRCUIT LOAD PRIOR TO INSTALL. PROVIDE ADDITIONAL POWER PACKS IF REQUIRED BASED ON EXISTING CIRCUITING.

2. REPLACE EXISTING FLUORESCENT 2X4 LIGHTING FIXTURES AND LINE VOLTAGE SWITCH WITHIN ROOM. MAINTAIN EXISTING CIRCUITING AND PROVIDE ADDITIONAL DIMMING WIRING AS REQUIRED.





#### LIGHTING FIXTURE SCHEDULE APPARENT TYPE LOAD VOLTAGE NO. LAMP MANUFACTURER CATALOG NUMBER 2BLT4-48L-ADP-GZ1-LP835 LITHONIA AA4 42 VA ED (3500K 120 \ 3500K AND 0-10V 1% INTEGRAL DIMMING. LQM-S-W-X-X-ELN LITHONIA LIGHTING FIXTURE SCHEDULE NOTES REFER TO ARCHITECTURAL REFLECTED CEILING PLAN AND/OR ROOM FINISH SCHEDULE TO DETERMINE PROPER TYPE OF LIGHT FIXTURE REQUIRED FOR THE CEILING CONSTRUCTION PRIOR TO ORDERING THE FIXTURES & PROVIDE FIXTURES THAT ARE COMPATIBLE WITH THE CEILING SYSTEM.

PHOTOMETRIC CALCULATIONS MAY BE REQUIRED FOR SOME FIXTURE TYPES AS PART OF SHOP DRAWING SUBMITTALS AS DETERMINED BY THE ENGINEER. . WHERE APPLICABLE, ALL EMERGENCY BACKUP CONFIGURATIONS SHALL INCLUDE AN INDEPENDENT SECONDARY DRIVER WITH AN INTEGRAL RELAY TO IMMEDIATELY DETECT ACPOWER LOSS, MEETING INTERPRETATIONS OF NEC - 700.16. 4. ALL LIGHTING FIXTURES ON EMERGENCY CIRCUITS SHALL BE FORCED ON UPON LOSS OF NORMAL POWER. WHERE EMERGENCY CIRCUITS ARE ROUTED THROUGH THE LOW VOLTAGE LIGHTING CONTROL SYSTEM. THAT SYSTEM SHALL FORCE THE LIGHTS ON (REFER TO LOW VOLTAGE LIGHTING CONTROL SYSTEM DIAGRAM NOTES). IN AREAS WITH LOCAL LIGHTING CONTROLS, THE LOCAL CONTROLS SHALL BE PROVIDED WITH UL924 EMERGENCY POWER PACKS TO FORCE THE LIGHTS ON. NOTE: SOME AREAS/FIXTURES HAVE BOTH TYPES OF CONTROL. . ALL LIGHTING FIXTURE(S) ON EMERGENCY CIRCUITS INDICATED TO BE CONTROLLED WITH FIXTURES ON NORMAL POWER SHALL BE FORCED ON AT FULL OUTPUT UPON LOSS OF NORMAL POWER OR ACTIVATION OF FIRE ALARM SYSTEM. PROVIDE UL924 EMERGENCY RELAY/POWER PACK AND WIRE TO FIRE ALARM RELAY MODULE AS REQUIRED. WHERE EMERGENCY CIRCUITS ARE ROUTED THROUGH THE LOW VOLTAGE LIGHTING CONTROL SYSTEM, THAT SYSTEM SHALL BE UL924 LISTED TO FORCE THE LIGHTS ON (REFER TO LOW VOLTAGE LIGHTING CONTROL SYSTEM DIAGRAM NOTES).



EMERGENCY LIGHTING FIXTURES LOW VOLTAGE DIMMING WIRING TO LIGHTING FIXTURES (WHERE APPLICABLE)

SHOWN ON PLANS) LINE VOLTAGE WIRING TO

LOW VOLTAGE DIMMING WIRING TO LIGHTING FIXTURES (WHERE APPLICABLE) ACCESSIBLE CEILING (NOT

LINE VOLTAGE WIRING TO

LIGHTING FIXTURES

WIRING (TYP.)



TO ADDITIONAL OCCUPANCY - SENSORS (QUANTITY AS SHOWN ON PLANS) > LOW VOLTAGE PLENUM RATED WIRING TO BUILDING EMS



DESCRIPTION 2'x4' LED TROFFER WITH CURVED ACRYLIC CENTER BASKET AND LINEAR PRISMS, 4800 LUMEN OUTPUT THERMOPLASTIC WALL MOUNT LED EXIT SIGN WITH NICKEL CADMIUM BATTERY BACKUP.

5.	THE ELECTRICAL CONTRACTOR SHALL DISCONNECT & REMOVE ELECTRIC SERVICE TO	l I
	ALL MECHANICAL EQUIPMENT BEING REMOVED AS A RESULT OF THE REMODELING.	l I
6.	ELECTRICAL EQUIPMENT & DEVICES SHALL BE REMOVED COMPLETE INCLUDING	l I
	CONDUIT & WIRE.	l I
7.	FLUSH MOUNTED OUTLETS SHALL BE BLANKED-OFF WITH A COVERPLATE.	l I
	COVERPLATE COLOR SHALL BE SELECTED BY ARCHITECT.	l I
8.	ANY EXISTING CONDUIT, WIRING AND/OR ELECTRICAL & MECHANICAL DEVICES BEING	l I
	DISTURBED BY THE WORK SHALL BE REWORKED BY THIS CONTRACTOR AS REQUIRED	l I
	TO RETURN TO ITS FORMER EXISTING OPERATING CONDITION.	l I
9.	ANY CIRCUITS FEEDING THROUGH DEVICES OR EQUIPMENT BEING RELOCATED,	l I
	REWORKED, OR ABANDONED & SERVING OTHER ELECTRICAL DEVICES, AND/OR	l I
	EQUIPMENT SHALL BE MAINTAINED BY PROVIDING J-BOXES OR OTHER ACCEPTABLE	l I
	METHOD AS REQUIRED.	l I
10.	ALL WALLS, CEILINGS, FLOORS, ETC., BEING DISTURBED BY THE WORK SHALL BE	l I
	RETURNED TO FINISHED CONDITIONS TO MATCH EXISTING BY THE ELECTRICAL	l I
	CONTRACTOR & HE SHALL DO HIS OWN CUTTING & PATCHING AS NECESSARY UNDER	l I
	HIS CONTRACT.	l I
11.	EXISTING MATERIALS SHALL BE TURNED OVER TO THE OWNER. IF NOT REQUIRED BY	l I
	OWNER, THE ELECTRICAL CONTRACTOR SHALL REMOVE THESE MATERIALS FROM THE	l I
	PREMISES.	l I
12.	CONTRACTOR SHALL FIELD VERIFY SLAB ON GRADE FLOOR CONSTRUCTION TYPE	l I
	PRIOR TO CUTTING. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR CUT A	l I
	STRUCTURAL FLOOR SLAB THICKER THAN FOUR (4") INCHES WITHOUT PRIOR WRITTEN	l I
	APPROVAL FROM ENGINEER OF RECORD. NOTIFY ENGINEER OF RECORD OF ANY SLAB	l I
	THICKNESS GREATER THAN FOUR (4") INCHES PRIOR TO PROCEEDING WITH ANY SAW	1
	CUTTING	

DEMOLITION NOTES

THE DRAWINGS ARE TO BE USED ONLY AS A GUIDELINE FOR DEMOLITION. THE

ELECTRICAL CONTRACTOR MUST VISIT THE SITE PRIOR TO BIDDING TO VERIFY ALL

THE ELECTRICAL CONTRACTOR SHALL MAINTAIN EXISTING SERVICES TO & IN THE

IF NECESSARY, THE ELECTRICAL CONTRACTOR SHALL PROVIDE TEMPORARY

EXISTING AREA AS REQUIRED.

SERVICES IN THE EXISTING AREAS.

WORK REQUIRED FOR A COMPLETE JOB & INCLUDE THE COST OF SUCH WORK IN HIS

CONTRACTOR SHALL FIGURE A COMPLETE JOB AS NONE OTHER SHALL BE ACCEPTED.

IN EVERY INSTANCE OF DEMOLITION AND/OR REMODELING, THE ELECTRICAL

	ELECTRICAL SYMBOL LEGEND
SYMBOL	DESCRIPTION
	SWITCHBOARD FLOOR MOUNTED ON 4" HIGH CONCRETE HOUSING KEEPING PAD. SEE SPECIFICATIONS, PANEL SCHEDULES AND ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
	DISTRIBUTION PANEL MOUNTED 6'-6" TO TOP. SEE SPECIFICATIONS, PANEL SCHEDULES AND ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
	PANELBOARD RECESSED MOUNTED 6'-6" TO TOP. SEE PANEL SPECIFICATIONS, PANEL SCHEDULES AND ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
	PANELBOARD SURFACE MOUNTED 6'-6" TO TOP. SEE SPECIFICATIONS, PANEL SCHEDULES AND ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
	DRY TYPE TRANSFORMER. SEE SPECIFICATIONS AND ONE-LINE DIAGRAM FOR ADDITIONAL INFORMATION.
	CONDUIT WITH WIRING RUN CONCEALED IN OR ABOVE CEILING OR WALL, OR RUN EXPOSED IN UNFINISHED AREAS. CROSS HATCHING INDICATES NUMBER OF CONDUCTORS (#12 AWG - MINIMUM). PROVIDE A CODE-SIZED GROUND WIRE IN ALL CONDUITS IN ADDITION TO THE CONDUCTORS SHOWN.
	CONDUIT WITH WIRING RUN CONCEALED BELOW FLOOR. CROSS HATCHING INDICATES NUMBER OF CONDUCTORS (#12 AWG - MINUMUM). PROVIDE A CODE-SIZED GROUND WIRE IN ALL CONDUITS IN ADDITION TO THE CONDUCTORS SHOWN.
	UNDERGROUND ELECTRICAL SERVICE.
	UNDERGROUND TELEPHONE SERVICE.
Φ	20A - 125V GROUNDING TYPE SIMPLEX RECEPTACLE MOUNTED 18" AFF TO TOP OF BOX, UNLESS NOTED OTHERWISE
Ф	20A - 125V GROUNDING TYPE DUPLEX RECEPTACLE MOUNTED 18" AFF TO TOP OF BOX, UNLESS NOTED OTHERWISE
<b>\</b>	20A - 125V GROUNDING TYPE QUADRAPLEX RECEPTACLE MOUNTED 18" AFF TO TOP OF BOX, UNLESS NOTED OTHERWISE
${\rm P}^{\rm GFI/WP}$	20A - 125V GROUND FAULT INTERRUPTING TYPE DUPLEX RECEPTACLE, WEATHER RESISTANT LISTED WITH DIE-CAST ALUMINUM "WHILE IN-USE COVER" AND MOUNTED 18" AFF TO TOP OF BOX, UNLESS NOTED OTHERWISE
	RECEPTACLE TYPE DESIGNATIONS:         C       -RECESSED MOUNTED FLUSH IN FINISHED CEILING, RECEPTACLE AND FACEPLATE FINISH TO MATCH FINISH OF CEILING         GFI       -GROUND FAULT INTERRUPTING TYPE         EM       -POWERED FROM EMERGENCY/ STAND-BY DISTRIBUTION SYSTEM. DEVICE FINISH SHALL BE RED, UNLESS NOTED OTHERWISE         H       -MOUNTED HORIZONTAL         T       -TAMPER RESISTANT LISTED         WP       -WEATHER RESISTANT LISTED WITH DIE-CAST ALUMINUM "WHILE IN-USE COVER"         WR       -WEATHER RESISTANT LISTED         USB       -WITH (2) USB CHARGING PORTS
0	J-BOX - TYPE AND SIZE AS REQUIRED BY NEC
EPC	UL924 LISTED EMERGENCY POWER CONTROL MODULE TO FORCE ON FIXTURES AT FULL BRIGHTNESS UPON LOSS OF NORMAL POWER. EPC-2-D OR APPROVED EQUAL.
DCS	DIGITAL DIMMING CONTROLLER WITH MINIMUM OF (3) ZONES/RELAYS AND INTEGRAL ASTRONOMICAL TIMECLOCK. STEINEL DCS OR APPROVED EQUAL. REFER TO DETAIL ON THIS SHEET.
\$	3 ZONE DIMMING SWITCH COMPATIBLE WITH RELAY/ZONE CONTROLLER. STEINEL DS3-DCS OR APPROVED EQUAL.
PC	COMBINATION PIR PRESENCE DETECTOR AND PHOTOCELL COMPATIBLE WITH DIGITAL DIMMING CONTROLLER. STEINEL IR QUATTRO OR APPROVED EQUAL.
	LIGHTING FIXTURE ON EMERGENCY CIRCUIT FED BY GENERATOR BACKUP POWER.
ELECTRICAL SYMBOL 1. NOT ALL SYMBOL 2. WHERE CEILINGS	L LEGEND NOTES: S SHOWN IN THIS LEGEND MAY APPEAR ON THE DRAWINGS. DO NOT EXIST TO STUB CONDUITS ABOVE FOR LOW VOLTAGE. CONDUITS SHALL BE STUBBED UP

BE ACCESSIBLE PER N.E.C. AND LOCAL CODE.



## OL LEGEND

## RIPTION

TO BOTTOM OF / ABOVE STRUCTURE ABOVE. IN FINISHED AREAS, PROVIDE COMPLETE CONDUIT PATHWAYS, INCLUDING PULL-BOXES, UNLESS OTHERWISE DIRECTED. CONDUIT, J-BOXES AND THE LIKE SHALL BE PAINTED TO MATCH AREA FINISHES. ALL CONDUIT SHALL BE ROUTED IN STRAIGHT RUNS WITH 90 DEGREE BENDS. WHERE HARD INACCESSIBLE CEILINGS EXIST, PROVIDE COMPLETE CONTINUOUS CONDUIT PATHWAYS, INCLUDING PULL-BOXES, AND ACCESS PANELS. FOR LOW VOLTAGE UNLESS OTHERWISE DIRECTED, PROVIDE CONDUIT SLEEVES TRAVERSING OVER INACCESSIBLE CEILINGS BETWEEN AREAS WITH ACCESSIBLE CEILINGS, AS REQUIRED. VERIFY J-BOXES ABOVE INACCESSIBLE CEILINGS ARE WITHIN REACH OF THE ACCESS PANEL AND CAN





BREAKER SERVING THE DEVICE(S) SHALL BE GROUND FAULT TYPE.

ELECTR	CAL ABBREVIATIONS
A	- AMPS
AC AFC	- AIR CONDITIONING UNIT - ABOVE FINISH COUNTER
AFF AFG	- ABOVE FINISH FLOOR - ABOVE FINISH GRADE
AHU AIC	- AIR HANDLING UNIT - ASYMMETRICAL INTERRUPTING CURRENT
ARCH ASTM	- ARCHITECTURAL - AMERICAN SOCIETY FOR TESTING AND MATERIALS
AT	
ATS	- AMERICAN WIRE GAGE
BKRBLDG	- BREAKER - BUILDING
C CATV	- CONDUIT - CABLE TELEVISION
CB CCTV	- CIRCUIT BREAKER - CLOSED CIRCUIT TELEVISION
CONTR	- CHILLER
CT	- COOLING TOWER
CU	- COPPER - CABINET UNIT HEATER
DE DN	- DUAL ELEMENT
DS DWG	- DISCONNECT SWITCH - DRAWING
(E) or EXIST	
EBB E.C	- ELECTRICAL CONTRACTOR
EF EH	- EXHAUST FAN - ELECTRIC HEATER
ELEC EM	- ELECTRICAL - EMERGENCY
EMT	- ELECTRICAL METALLIC TUBING
EUK	- EQUAL
EQUIP ETR	- EQUIPMENT - EXISTING TO REMAIN
EUH EWC	- ELECTRIC UNIT HEATER - ELECTRIC WATER COOLER
EWH	- ELECTRIC WATER HEATER
F	- FIRE ALARM
FACP FC	- FIRE ALARM CONTROL PANEL - FAN COIL UNIT
FLUOR FPB	- FLUORESCENT - FAN POWER BOX (VAV)
F.P.C	
FT	- FOOT/FEET
G.C GFI	- GENERAL CONTRACTOR - GROUND FAULT INTERRUPTING PROTECTION
GND HID	- GROUND - HIGH INTENSITY DISCHARGE
НОА	- HAND-OFF-AUTOMATIC
HPS	
IG	- ISOLATED GROUND
INCAND JB or J-BOX	- INCANDESCENT - JUNCTION BOX
KCMIL K.E.C	- ONE THOUSAND CIRCULAR MILS - KITCHEN EQUIPMENT CONTRACTOR
KVA KW	- KILOVOLT AMPERE - KILOWATT
LTG	LIGHTING MARTER ANTENNA TV
MAU or MUA	- MASTER ANTENNA TV - MAKE-UP AIR UNIT
MAX MCB	- MAXIMUM - MAIN CIRCUIT BREAKER
MCC M.C	- MOTOR CONTROL CENTER - MECHANICAL CONTRACTOR
MECH	- MECHANICAL
MH	- METAL HALIDE
MLO	- MINIMUM - MAIN LUGS ONLY
MOD MSB	- MOTOR OPERATED DAMPER - MAIN SWITCHBOARD
MTD NEC	- MOUNTED - NATIONAL ELECTRIC CODE
NF	- NON FUSED
N.I.C	- NOT IN CONTRACT
NL NRTL	- NIGTILIGHT - NATIONALLY RECOGNIZED TESTING LABORITORY
N.T.S O.C	- NOT TO SCALE - ON CENTER
Ø or PH P	- PHASE
PB	
PNL	- PANEL
PRE PVC	- POWER ROUF EXHAUSTER - POLYVINYL CHLORIDE
REC or RCPT	- RECEPTACLE - ROOF TOP UNIT
SPKR	- SPEAKER - SINGLE POLE SINGLE THROW
TIE	- MULTIPLE OUTLETS WIRED ON SAME BRANCH CIRCUIT
TR TS	- TAMPER RESISTANT - TAMPER SWITCH
TTB TV	- IELEPHONE TERMINAL BOARD - TELEVISION
ТҮР	- TYPICAL - GAS FIRED UNIT HEATER
UL	
UNO USB	- UNIVERSAL SERIAL BUS
UV V	- UNIT VENTILATOR - VOLTS
W WG	- WATTS - WIREGUARD
WP	- WEATHERPROOF TYPE DEVICE (NEMA 3R RATED)
AT 10117	

LOW VOLTAGE PLENUM RATED --- WIRING TO BUILDING BMS

CAT5e

6. LOW VOLTAGE WIRING IS NOT SHOWN ON PLANS AND NOT ALL LINE VOLTAGE WIRING IS SHOWN ON PLANS. PROVIDE ALL REQUIRED LINE AND LOW VOLTAGE WIRING FOR A COMPLETE, FUNCTIONAL

7. OCCUPANCY SENSOR SHALL TIE-IN TO BUILDING EMS SYSTEM. COORDINATE REQUIREMENTS WITH SYSTEM INSTALLER.

## TYPICAL CLASSROOM WIRING DIAGRAM

3030 West Streetsboro Road









1. General: furnish and mount on each panelboard, switchboard (including branch switches), large junction box, safety switch, starter, remote control, push button station, and all similar controls, a nameplate descriptive of the equipment or equipment controlled

2. Provide black and white nameplates constructed from laminated phenolic with a white center core. Letters shall be engraved in the phenolic to form white letters 3/8" high. Fasten the nameplates with an

plywood required to install, mount and support any electrical equipment or device called for on the plans. 2. Supporting material shall be complete with hangers, connectors, bolts, clamps and necessary accessories to make a complete installation. Supporting material shall be galvanized, painted or otherwise suitably finished. Products by Binkley, Steel City, or Raco will be acceptable. 3. All surface-mounted equipment on block walls shall be mounted on 3/4" plywood backboard. All floormounted equipment shall be installed on a 4" high concrete housekeeping pad.

1. The electrical work for construction proposed shall conform to all federal (OSHA), state, all specific safety requirements and the requirements of the current edition of the NEC. 2. Check the HVAC and plumbing specifications for electrical requirements and include the same in the

3. Equipment connections, starters, disconnect switches, control transformers and pushbutton stations for the equipment furnished by the owner or under a separate contract shall be installed and connected

4. All cutting, patching, excavating, backfilling and concrete work related to this contract will be the responsibility of the electrical contractor. This contractor shall assume the responsibility of providing the sleeves, chases and openings necessary for the electrical installation and for their repair in an acceptable manner, as determined by the architect. All holes shall be core-drilled. Provide fire stop in all openings created through fire-rated walls, floors or ceilings. Contractor shall field verify slab on grade floor construction type prior to cutting. Under no circumstances shall the contractor cut a structural floor slab thicker than four (4") inches without prior written approval from Engineer of Record. Notify Engineer of Record of any slab thickness greater than four (4") inches prior to proceeding with any saw cutting. 5. This contractor shall be responsible for providing all required access panels necessary for his work,

1. All work shall be installed in a practical and workmanlike manner, by mechanics skilled in the several 2. All materials shall be new and free from defects and shall be the best of their several kinds unless

specified or indicated on the drawings to the contrary. 3. During each phase and at the completion of the construction, this contractor shall remove all debris and excess materials caused by his work. He shall leave the area of operation broom clean. 4. All electrical equipment shall bear the underwriters laboratories label or ETL label. 5. This contractor shall guarantee his workmanship and material (lamps excepted) for a period of one year from the date of building opening and leave his work in perfect order at the completion. Should defects

develop within the guarantee period, the contractor shall, upon notice of the same, remedy the defects and have all damages to other work or furnishings caused by the repairs corrected at his expense to the

. The electrical contractor shall provide all labor, material, storage, unpacking and placement; to include

b. Complete power and lighting distribution system including all panels, transformers and feeders. Complete branch circuit wiring system d. Complete power wiring for all air conditioning equipment, plumbing system, heating equipment,

e. Complete lighting fixture installation, including all incandescent, fluorescent and HID lamps. f. Complete telephone and communication conduit and wiring system including boxes, plates, jacks, etc., as specified, shown on the drawings and required by the local telephone company and/or Temporary electrical power and lighting as required for construction.

Testing of all cables and circuit wiring after installation.

1. The electrical contractor shall furnish, install and remove as required all temporary power and temporary lighting in all areas and individual rooms when needed by the individual trades in the performance of their work. This contractor shall provide a minimum of twenty (20) footcandles of illumination for temporary lighting. Any additional lighting required by individual trades shall be provided by the individual trades including power for the lighting. The electrical work for construction purposes shall conform to all federal (OSHA), state, specific safety requirements, as well as the requirements of the national electric code and national electrical safety code. The electrical contractor shall obtain and pay for all required applications, permits and inspections pertaining to this work. This cost shall be included in the contractor's price. . New light fixtures shall not be used for temporary lighting.

. Provide trenching and backfill to the power company specifications. Provide conduit for primary service where required by the power company.

Concrete encase conduits where required by the power company and where indicated on the plans. Provide metering to power company specifications.

5. Make provisions for the pad-mount transformer as required by the power company including the 6. Pay the cost of all power company charges connected with permanent electric service to the building.

. Coordinate all work with the power company and perform any work necessary to assure a complete, working installation. The entire service installation shall be in complete conformance with the power 8. Verify the exact routing of the primary and secondary services, and all service requirements, with the

Color code conductors (except control and instrumentation conductors) as follows:

208/120 480/277 System System Black Brown Red Orange Blue Yellow White Grey Green Green

1. #12 and #10 conductors shall have continuous insulation color, as listed above. 2. Color code conductors larger than above, which do not have continuous insulation color by application of at least two laps of colored tape on each conductor at all points of access including junction boxes. Color tape shall be the equal of 3M products Scotch #35. B. Conductors shall be soft annealed copper insulated for 600 volts unless specifically indicated otherwise.

B. Insulation type shall be type THWN for wire sizes #8 AWG and larger and THHN or THWN for #10 AWG and smaller. THHN shall not be used in wet or damp locations.

C. Flexible cord shall be heavy duty type so with an equipment ground conductor in addition to the current

1. Control conductors shall be #14 minimum for NEC class I and #16 for NEC class II.

H. Connect #10 and smaller wires with constant pressure expandable spring type connectors, "Scotchlok" by 3M

I. Connect #8 and larger wires with compression connectors or splices as manufactured by Burndy or T&B.

J. Insulate splicing connectors to at least 200% of the wire insulation. Use pre-stretched tubing connector

K. Pull conductors using recognized methods and equipment leaving at least 6" wire at all junction boxes for 1. Clean out each conduit system before pulling wire.

M. There shall be no wirenut joints or splices made inside switchboards/panelboards.

N. Branch circuit wire sizes (and conduits) shall be increased from those indicated on the plans to prevent excessive voltage drop. Branch circuits shall be installed with wires of sufficient size so that voltage drop between the panel and the loads does not exceed limit of 3%.

shall be determined from the 75°C conductor temperature ratings indicated in the NEC tables. Where equipment or devices are provided with terminals/lugs rated for 60°C, the ampacity rating of the 75°C conductor shall be limited to its associated 60°C rating as indicated in the NEC tables. The electrical contractor shall be responsible to increase the conductors and conduit size as required.

P. Circuits may be multi-plexed in conduit provided wire is properly derated and conduit sized per code. Under no circumstances shall more than six (6) current carrying conductors be run in a single conduit.

#### Section 16130 - Raceways and Boxes

A. Racewavs 1. All wire shall be run in accordance with code in corrosion resistant, rigid, threaded, metal conduit or

- electrical metallic tubing (E.M.T.) unless otherwise specifically stated herein. a. Conduit in exterior walls, below floor slab, or underground shall be rigid, threaded, galvanized, heavy b. Carlon PVC type 40 heavy wall conduit with ground wire may be used below floor slab or underground in lieu of rigid, threaded, galvanized conduit. PVC 40 conduit shall not be run in or above floor slab. PVC conduit shall terminate below floor slab with rigid, threaded metal conduit adapter. Conduit above slab shall be metal.
- c. Conduit run exposed to the weather shall be heavy wall, metal threaded type. . Conduit size shall be 3/4" minimum.
- Conduit shall be securely fastened in place.
- 4. All conduit shall be concealed in walls, floor and ceilings wherever possible. Exposed conduit in finished areas will not be permitted. Exposed conduit will be permitted in the unfinished areas with the specific approval of the architect. 5. Use flexible conduit for the connection to recessed or semi-recessed lighting fixtures (6' length
- maximum). Use liquid tight metal conduit for all connections to motors and other equipment subject to vibration and in areas subject to moisture. 6. Use watertight joints with buried and concrete encased conduit. All buried conduits outside of buildings shall have a minimum of 24" of cover. Metal conduits buried in earth shall be painted (two coats) with
- heavy asphaltum paint. . Support runs of conduit as detailed in the appropriate table of the national electrical code (NEC). 8. Installed exposed runs of conduit and conduit above lay-in ceilings parallel or perpendicular to the walls, structural members of intersections of vertical planes and ceilings. Provide right angle turns using fittings
- or symmetrical bends. Support conduits within 1" of all changes in direction. 9. If a conduit is suspended, it shall be supported on trapeze hangers which use "all-thread" rods from the structural steel. The use of ceiling support wire or similar material will not be accepted. 10. Install empty conduit for future use as indicated on the drawings. Conduit shall be complete with jetline or
- pull rope, junction/outlet boxes, tile rings and appropriate cover plates. 11. Provide pitchpockets where conduits penetrate the roof.
- 12. Thread lubrication/sealant is required on outdoor and underground threaded metal joints. 13. Install fire seal fittings where conduits penetrate concrete floor slabs or masonry walls required to be fire rated 14. Horizontal portion of conduit exposed on the roof and feeding equipment shall not be more than 5'-0"
- unless the written approval from architect or engineer is obtained. B. Pull and Junction Boxes
- 1. Install pull and junction boxes where shown on the drawings, and where required for changes in direction, at junction points, and to facilitate wire pulling. Furnish box sizes in accordance with NEC unless larger boxes are indicated. 2. Provide steel boxes and removable covers of code gauge, hot rolled sheet steel, hot dipped galvanized inside and outside, for above ground work. Furnish weatherproof boxes when installed above ground
- outside 3. Provide cast iron boxes, hot dipped galvanized inside and outside where shown on the drawings.
- Furnish removable covers with gaskets and stainless steel, brass or bronze screws. 4. Provide concrete boxes for underground work unless otherwise indicated on the drawings. Furnish steel frames and covers with the cover attached to the frame with hexagon head, brass or bronze cap screws, 3/8" in diameter. Provide a rubber gasket for sealing between the cover and the frame. Paint the cover with two coats of heavy asphaltum.

C. Outlet Boxes 1. Use sheet steel boxes, zinc coated or cadmium plated, for concealed interior work.

- 2. Use cast boxes, zinc-cadmium finish malleable iron, for exposed interior work, and for exposed or concealed work in wet, damp or exterior locations. Cast boxes shall be series FD by Crouse Hinds or Appleton 3. Wall box sizes (minimum) shall be 4" square X 2-1/2" deep where wall construction permits. Where wall
- construction dictates, the depth may be reduced to 2-1/8" or 1-1/2" under special conditions. 4. Fixture outlets in ceilings (minimum) shall be 4" octagonal X 1-1/2" deep (4-11/16" octagonal X 2-1/2" deep where required to accommodate larger conduit or larger number of wires).
- Ganded boxes shall be one piece (minimum), 2-1/8" deep. Provide cast iron, concrete-tite floor boxes with adjustable covers set flush and level with the finished floor, with outlets as indicated on the drawings. Provide Hubbell #B-2400, 4200, or 4300 series boxes
- with leveling screws. Flush type covers and openings to serve outlets used. Furnish flush caps for closing off box when not in use. 7. Flush mount boxes in all finished walls, install the plaster rings in drywalled plastered walls and raised covers as required in walls with other finishes so that the cover plates fit tightly against boxes or rings,
- 3/16" maximum gaps are allowed for noncombustible walls. 8. Adjust location of outlets in masonry or tile construction to occur in the nearest joint to the height
- specified. Heights shall meet A.D.A. requirements. 9. Support all boxes to maintain proper alignment and rigidity.
- 10. Clean boxes of all foreign matter prior to the installation or wiring of devices. 11. Mounting heights on the drawings are to the centerline of the box unless otherwise noted.

Section 16140 - Wiring Devices

- A. Wiring device color shall be selected by architect, unless otherwise indicated.
- B. Provide totally enclosed, 20 ampere, 120/277 volt, quiet A/C general use snap switches.
- C. Switches shall be specification grade as manufactured by Hubbel, P&S, or Leviton.
- D. Provide NEMA configuration 5-20R Duplex 125 volt grounding type receptacles rated for 20 amperes unless otherwise indicated on the drawings.
- E. Receptacles shall be specification grade as manufactured by Hubbell, P&S or Leviton.
- F. Receptacles requiring amperages, voltages or configurations different from the duplex convenience
- receptacles above shall be as indicated on the drawings. G. Provide other receptacles of a quality, material and workmanship equal to that specified for duplex convenience receptacles.
- H. Provide cover or device plates for outlet boxes as follows unless otherwise noted:
- 1. Finished areas: stainless color to match device. Unfinished areas: zinc coated sheet metal, aluminum, or cast metal as appropriate for the type of box. 3. Exterior areas: copper free aluminum with gray, powder epoxy finish, gasket, weatherproof, Crouse-Hinds "WLRD" for duplex receptacles and WLRS for single receptacles or equal. 4. Telephone, communication, and signal outlet plates, shall match those used for receptacles and switches. All outlet and/or junction boxes shall be complete with a cover plate by this contractor.
- 5. Where devices are ganged, they shall be installed under a common coverplate.
- I. Locate the switches approximately 4'-0" above the finished floor elevation or nearest block course (within A.D.A. requirements), unless otherwise indicated. The long dimension of the switches shall be vertical.
- J. Locate receptacles approximately 1'-6" above the finished floor elevation or nearest block course (within A.D.A. requirements), unless noted otherwise. The long dimension of receptacles shall be vertical.

Section 16410 - Safety Switches

- A. Safety switches shall be the enclosed heavy-duty type (type HD) with quick-make, quick-break mechanism and external pad lockable operating handle.
- B. Safety switches shall be rated for 240 or 600 volts as applicable. They shall be horsepower rated when used in motor circuits.
- C. Safety switches shall be fusible or non-fusible 2, 3, or 4 pole as indicated on the drawings.
- D. Safety switches shall be single throw unless otherwise indicated on the drawings.
- E. Enclosures shall be NEMA 1 indoors and NEMA 3R outdoors unless otherwise indicated on the drawings. F. Manufacturer shall be Square D, Siemens, G.E., or Cutler-Hammer. All safety switches shall be by one manufacturer
- G. Mount the safety switches securely between 3' X 6' levels above the floor unless otherwise indicated on the drawings
- H. Switches on block walls shall be mounted on a 3/4" plywood backboard, where located indoors.
- Section 16420 Motor Starters
- A. Provide motor starters (magnetic or fused combination) and control equipment where shown. Starters shall be provided with 120 volt coils, 3 overloads, control transformer with fused 120 volt secondary control circuit, (2) N.O. and (2) N.C. auxiliary contacts, hand-off-auto selector switch and running pilot light, unless otherwise noted. Wire thru control devices furnished by other trades. Since motor driven equipment is furnished by other trades, the control indicated on the drawings shall be considered as for bidding purposes only. Wire to conform to the actual equipment supplied and installed by the other trades. All fuses shall be dual element type. Provide "blownfuse" indicator lamps in cover.
- B. Starters shall be Square D, G.E., Cutler-Hammer, or Siemens.
- C. The exact number of normally open and normally close auxiliary contacts in each starter shall be determined by the temperature control contractor.
- D. Coordinate all equipment indicated on the electrical drawings with mechanical equipment schedules and specifications and provide motor starters for all equipment indicated as being interlocked or started from a remote location.
- E. Starters supplied as an integral part of equipment shall be furnished under the division providing the equipment. Wiring and disconnect shall be by this contractor. All other starters and auxiliary control equipment shall be supplied and wired by this contractor unless otherwise noted.

#### Section 16060 - Grounding and Bonding

#### A. Ground all equipment per N.E.C.

B. Ground each outside lighting pole separately with one ground rod and a #6 ground wire.

- C. Ground all dry type transformers as per drawings and NEC #450-10.
- D. All conduits shall contain a code-sized ground wire size per N.E.C. in addition to the conductors shown on the plans. Where circuit conductors are increased in size for any reason (i.e. voltage drop, derating, etc.), the ground wire size shall be increased proportionately (according to circular mil area).
- E. Where an isolated, insulated ground is required a separate isolated green ground shall be run from the panel isolated ground bus to the isolated ground connection of the device served. In no case shall the system ground (green wire and associated outlet boxes, conduit and building steel) be allowed to contact the isolate ground (green wire with white stripe).

#### Section 16511 - Lighting Fixtures

A. All lighting fixtures shall be furnished and installed by electrical contractor as indicated on the lighting fixture schedule.

- B. All fixtures shall bear the underwriter's laboratories label and shall be installed according to
- manufacturer'sinstructions and approved for the purpose intended.
- Each LED luminaire type shall be binned within a three-step MacAdam Ellipse to ensure color consistency among luminaires
- Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.
- E. Recessed fixtures: Comply with NEMA LE 4
- F. Bulb shape complying with ANSI C79.1
- G. Lamp base complying with ANSI C81.61.
- H. CRI of minimum 80. CCT as indicated on the fixture schedule.
- I. Rated lamp life of 50,000 hours, minimum at 70 percent lumen maintenance.
- J. Lamps dimmable from 100 percent to 10 percent of maximum light output.
- K. Integral driver. Driver power for factor shall be 40 percent or greater. Harmonic distortion shall be less than 10 percent THD. Drivers shall be equipped with automatic thermal protection and 20 KA surge protection with end of life LED indicator.
- L. Nominal Operating Voltage: 120 V ac
- M. Effciency minimum of 80 lumens per watt.
- N. Exit Sign
- 1. Comply with UL 924; for sign colors and lettering size, comply with authorities having jurisdiction. 2. Internally Lighted Signs: Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum of rated lamp life.
- 3. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.
- O. Fixtures: Set level, plumb, and square with ceilings and walls.
- P. Support for Fixtures in or on Grid-Type Suspended Ceilings:
- 1. Install a minimum four ceiling support system rods or wires for each fixture. Locate not more than 6 inches (150 mm) from fixture corners. 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixtures corner with clips
- that are UL listed for the application 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.
- Q. Suspended Fixture Support: Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.

#### Section 16860 - Low-Voltage Lighting Control System

#### A. Summary

- 1. Provide a complete low voltage lighting control system for the building as shown on the plans and specified herein 2. Lighting control system shall utilize networking technology based upon "Lonworks" networking technology. Lonworks products to be Lonmarked or Lonmark compliant to certification level 3.1. System shall be able to operate as a stand-alone entity or shall be able to be integrated with other Lonworks
- 3. All relay panel interiors shall be pre-assembled complete with the necessary relays, transformers and devices. Relay panel interiors are to be separate from enclosure so as to permit easy mounting, conduit installation and wire pull to enclosures. Interiors to be inserted last and connections made.

#### B. Definitions

- 1. Bacnet: a networking communication protocol that complies with Ashrae 135. BAS: building automation system.
- 3. HVACIC: heating, ventilating, and air-conditioning instrumentation and controls. 4. Lonworks: a control network technology platform for designing and implementing interoperable control devices and networks.
- 5. Monitoring: acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
- 6. PC: personal computer; sometimes plural as "PCS." 7. RS-485: a serial network protocol, similar to RS-232, complying with TIA/EIA-485-A.

#### C. Submittals

- 1. Product Data: for each type of product indicated. 2. Shop Drawings: detail assemblies of standard components, custom assembled for specific application on
- this project a. Outline Drawings: indicate dimensions, weights, arrangement of components, and clearance and access requirements.
- b. Block Diagram: show interconnections between components specified in this section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
- c. Wiring Diagrams: power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram. 3. Coordination Drawings: submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other sections.
- a. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs. b. For networked controls, list network protocols and provide statements from manufacturers that input and output devices meet interoperability requirements of the network protocol.
- Software and firmware operational documentation Software operating and upgrade manuals.
- b. Program software backup: on a magnetic media or compact disc, complete with data files. c. Device address list.

#### d. Printout of software application and graphic screens.

5. Software upgrade kit: for owner to use in modifying software to upgrade and to allow system expansion. Field quality-control test reports. 7. Operation and maintenance data: for lighting controls to include in emergency, operation, and maintenance manuals

#### D. Quality Assurance

- 1. Source limitations: obtain lighting control module and power distribution components through one source from a single manufacturer.
- 2. Electrical components, devices, and accessories: listed and labeled as defined in NFPA 70, article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- 3. Comply with 47 CFR, subparts A and B, for class A digital devices.

#### 4. Comply with NFPA 70. Coordination

1. Coordinate lighting control components to form an integrated interconnection of compatible components. a. Match components and interconnections for optimum performance of lighting control functions. 2. Coordinate lighting control components specified in this section with components specified in other sections.

#### Warranty

- 1. Special warranty: manufacturer's standard form in which manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship within specific warranty period. a. Failures include, but are not limited to, the following: Software: failure of input/output to execute switching or dimming commands.
- Failure of modular relays to operate under manual or software commands. Damage of electronic components due to transient voltage surges.
- b. Warranty period: cost to repair or replace malfunctioning parts for two years from date of substantial completion

## G. Extra Materials

- 1. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. • Electrically held relays: equal to ten percent of amount installed for each size indicated, but no fewer than ten relays.
- H. Manufacturers
- 1. Manufacturers: base bid shall include the use of equipment by the following manufacturer: a. Steinel Lighting.
- 2. Alternate manufacturers: subject to compliance with requirement of products by one of the following manufacturers may be submitted under an alternate bid: a. Douglas Lighting Controls

## b. Crestron

- I. System Requirements 1. Expansion capability: adequate to increase the number of control functions in the future by 25 percent more than those indicated. This expansion capability applies to equipment ratings, housing volumes,
- spare relays, terminals, number of conductors in control cables, and control software. 2. Line-voltage surge suppression: factory installed as an integral part of 120-V and 277-V AC, solid-state control panels. a. Alternative line-voltage surge suppression: field-mounting surge suppressors that comply with UL 1449 and with IEEE C62.41 for category A locations.

#### J. Functional System Description

- 1. Manual switch operation energizes and de-energizes one or more groups of lighting fixtures or other loads by closing and opening one or more relays in the power-supply circuits to the fixture groups. Switches are hard-wired to the relays they operate. 2. Manual switch operation sends a signal to programmable-system control module that processes the
- signal according to its programming and routes an open or close command to one or more relays in the power-supply circuits to groups of lighting fixtures or other loads. 3. Manual switch, an internal timing and control unit, or an external sensor or other control signal source sends a signal to programmable-system control module that processes the signal according to its programming and routes an open or close command to one or more relays in the power-supply circuits
- for groups of lighting fixtures or other loads. Contract closure from the network access control system shall send a signal to programmable system control module to turn on all building lights.
- 4. Contract closure from the network access control system shall send a signal to programmable system control module to turn on all building lights

#### Section 16860 - Cont'd.

- K. Relays 1. Two (2)-wire HID relay suited for all types of lighting loads: WR-6161: a. Lighting control relays mounted in relay panels shall be WR-6161 full load relays suitable for all types
  - of lamp loads up to 20 amperes. Load contacts shall be able to sustain 1500 amp fault currents for up to 20 milli-seconds
  - b. The relay shall be contained in a molded case containing both low and high voltage terminals and shall have a built-in operating lever marked on/off for manual switching at the relay panel. c. Switching the relay shall be accomplished with one signal wire and a common return. The signal
  - wire shall be able to signal on and off and shall also carry status current that indicates if the relay is
  - d. UL listing 20A: 120 and 277 VAC; CSA 20A: 120, 277 and 347 VAC.

#### Pre-assembled relay panels: PWEX Series

- Where indicated on the drawings, provide a factor pre-assembled relay panel. The panel's enclosure shall be for surface of flush installation, with a screw-on cover or a hinged door assembly as required. The panel shall consist of a pre-assembled interior insert; UL/CSA approved Douglas cat. no.: CXXM or WXXM series with capacities for 12, 24, 36, 48 or 72 relays as indicated on plans. Panel enclosure must
- be UL/CSA approved.
- 3. Panel interior shall have the following pre-assembled and pre-wired: a. Suitable divider separating class 1 and class 2 compartments.
- b. Control transformer, UL/CSA approved for class 2 circuits, Douglas cat. no. WR-4075-120. c. Low voltage relays as required by switched circuits shown on plans or schedules. d. Control devices as required.
- M. Relay controls installed in relay panels
- 1. Programmable relay scanners: WRS-2224: a. When groups of relays are to be switched by master switches or time controls and it still must be
- possible to switch individual relays by local switches, provide programmable relay scanner WRS-2224. b. Each scanner shall be solid state and have 24-relay outputs. An output shall be capable of switching
- the connecting relay on and off and sensing if the connected relay is on or off. c. Each programmable relay scanner shall have 5-switch inputs to accommodate master group switches. Each switch input can be set with the keypad built into the scanner to switch some or all of
- the 24-relay outputs of the scanner. Each switch input must indicate an on state if any of the relay's in the group is on. If all relays are off, then indicate an off state to the master switch. d. The scanner shall be able to provide an optional flick warn option for each of the five (5) groups. After the flick warn, the occupant has five (5) minutes to prevent the local lights from switching off by
- activating the local switch. The programming of the scanner shall be user-friendly with instructions printed on the scanner label. The relay scanner shall accept a plug-in module, WNX-2624 network node. The network node shall
- use Lonworks technology and shall be Lonmark certified (V3.1). This node shall be capable of connecting to an FTT-10A data line to communicate with other scanners in different relay panels or with other vendors using Lonworks technology.

#### N. Relay panel network and Lonworks technology 1. Overview of network nodes: WNX-2624 node

- a. Relay panels that are networked together with Douglas scanners and network nodes shall be able to
- operate as a stand-alone system or it shall be able to be integrated as a part of a greater building automation system that includes other functions of the building such as HVAC and security. b. The network shall use Lonworks inter-operable technology and the network nodes attached to the relay scanners shall be Lonmark certified to the 3.X standard for lighting. The network data bus shall utilize Lonworks industry standard FTT-10 transceivers that can be connected directly to the integrated system or should isolation or expansion be required by the integrated system a Lonworks
- router can be used Stand-alone system a. The stand-alone system shall not require the services of an integrator or other software specialist to program the system. No PC or extra device is required for setting which relays are controlled by a
- group switch input. It shall be possible to view and edit which relays are controlled by a switch input with indicators and buttons built into the relay control devices. b. As a stand-alone system, the network of relay panels shall permit the following:
- Each input can control any group of relays located throughout the system. • A single group of relays can be operated by more than one input.
- When connected to an input, a pilot light switch shall indicate the state of the relay group. If any relay in the group is on, the switch shall indicate on. If all relays of the group are off, the switch shall indicate off.
- Group inputs shall be able to accept signals from other devices such as time clocks, photocells or contact closures from other system to provide automation of the lighting controls.
- Each relay group shall be able to support the flick-warn option. After the flick warn, the occupant has five minutes to prevent the local lights from switching on by activating the local switch. Integrated to building automation system (BAS)

be installed in a one-gang box. Use WN-3020 filler plugs where appropriate.

• Power loss protection: 48 hours for time and indefinite program memory.

a. Provide a time clock for timed automation with the following features:

• Eight (8) outputs, each individually programmable.

Automatic daylight savings adjustment (selectable).

• Thirty-two (32) holiday schedules per year.

Seven (7) assignable programs, 64 events per program.

- a. Provide WNX-2624 Lonworks nodes with the following standard features. Lonmark certified 3.1
- Transceiver type: FTT-10. Global switch grouping capability via scanner inputs.

mount up to three (3) switches per gang.

permit holding a paper identification label.

b. Rocker switches shall be WR-8001.

Flick warn option.

O. Wall Switches and Accessories

indicate state.

Switch Plates

P. Time-clocks

Q. Wiring Installation

indicated.

R. Identification

T. Adjusting

U. Demonstration

V. Low Voltage Wiring

per switch

W. Line Voltage Wiring

X. Security System Interface

low voltage areas.

testing. Report results in writing.

a. Test for circuit continuity.

architect.

and Methods."

S. Field Quality Control

gauges before installing.

1. 8-channel, time clock: WTP-4408

• Astronomic programming.

conduit size shall be 1/2 inch (13 MM).

do not have integral line-voltage surge protection.

equipment enclosure, and in junction, pull, and outlet boxes.

2. Perform the following field tests and inspections and prepare test reports:

For low voltage wiring, provide wire type as recommended by the manufacturer.

b. Verify that the control module features are operational.

c. Check operation of local override controls.

outside normal occupancy hours for this purpose.

3. Data line shall be #16 Twisted Pair Beldon #8471 or equal.

for most Douglas switches and outputs).

Switches



job number:

22019

(330) 659-6688 P

(330) 659-6675 Fax

3030 West Streetsboro Road

Richfield, Ohio 44286

![](_page_11_Figure_0.jpeg)

FIRE SPRINKLER CONTRACTOR TO VERIFY FLOW TEST INFORMATION IS CURRENT AND WATER PRESSURE ON SITE IS ADEQUATE TO MEET THE DEMAND OF THE FIRE SPRINKLER SYSTEM. IF PRESSURE IS NOT ADEQUATE. FIRE SPRINKLER CONTRACTOR SHALL PROVIDE AN ALTERNATE TO ADD A FIRE PUMP IN THE BIDDING PHASE AND NOTIFY THE ENGINEER ON RECORD IMMEDIATELY.

![](_page_11_Figure_2.jpeg)

# ARMOVER HEAD PIPING DETAIL (EXISTING PENDENT) N.T.S.

![](_page_11_Figure_7.jpeg)

![](_page_11_Picture_11.jpeg)

![](_page_12_Figure_0.jpeg)

VISUAL SYM	BOLS	ABBR	EVIATIONS
SECTION	DESCRIPTION	A ABO	AMPERES ALTERNATIVE BID OPTIONS
274100	PRESENTATION POINT OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	AC ACS	ABOVE COUNTER ACCESS CONTROL SYSTEM
274100	DISPLAY OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATIONIF P INDICATES OUTLET FOR INTERACTIVE FLAT PANEL, MOUNTED AT 60" AFF. COORDINATE WITH MOUNTING BRACKET AND ARCHITECTURAL.		ABOVE FINISHED FLOOR ABOVE FINISHED CEILING
274100	PRESENTATION POINT OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	AL ANNUN	AUMINUM ANNUNCIATOR
274100	DISPLAY OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATIONIF P INDICATES OUTLET FOR INTERACTIVE FLAT PANEL, MOUNTED AT 60" AFF. COORDINATE WITH MOUNTING BRACKET AND ARCHITECTURAL.	ARCH ATS	ARCHITECT AUTOMATIC TRANSFER SWIT
274100	AUDIO/VIDEO OUTLET. REFER TO THE KEY NOTES ON FLOOR PLAN SHEET FOR OUTLET INFORMATION.	AV AVOIP	AUDIO VISUAL AUDIO VISUAL OVER INTERNE
274100	SOUND FIELD AUDIO/VIDEO OUTLET. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	AWG	AMERICAN WIRE GUAGE
274100	WALL-MOUNTED ULTRA SHORT THROW PROJECTOR. REFER TO THE CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	BKBD BLDG	BACKBOARD BUILDING
274100	CEILING-MOUNTED PROJECTOR. REFER TO THE CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	BOTT	BOTTOM
115213	CEILING MOUNTED ELECTRIC PROJECTION SCREEN.	C CAB CAT	CONDUIT CABINET CATEGORY
115213	WALL MOUNTED ELECTRIC PROJECTION SCREEN.	CATV CCTV	COMMUNITY ANTENNA TELEV CLOSED CIRCUIT TELEVISION
274000	AUDIO VISUAL CAMERA W/BROADCASTING CAPABILITIES.	CFCI CKT	CONTRACTOR FURNISHED CO
274000	DISPLAY MONITOR. "X" INDICATES SIZE OF MONITOR EQUIPPED WITH MOUNTING BRACKET IFP INDICATES INTERACTIVE FLAT PANEL. COORDINATE WITH ARCHITECTUAL.	CLG CLST	CEILING CLOSET
275120	SSSOUND SYSTEM CABINET SUBSCRIPT; (G) GYM; (AG) AUX GYM; (D) DINING; (T) THEATER; (N) NATATORIUM; (M) MUSIC; (I) INSTRUMENTAL; (V) VOCAL ROOM.	COAX	COMMUNICATIONS OUTLET COAXIAL COMMUNICATIONS
274100, 275120, 275127	WALL MOUNTED SPEAKER. "S" INDICATES SOUND SYSTEM, OTHER SPEAKERS INCLUDE: (PA) PUBLIC ADDRESS; (CS) CLASSROOM SOUND FIELD. SUBSCRIPT "V" INDICATES THAT THE SPEAKER IS VOLUME CONTROLLED.	CT CU	CABLE TRAY COPPER
274100, 275120, 275127	CEILING MOUNTED SPEAKER. "S" INDICATES SOUND SYSTEM, OTHER SPEAKERS INCLUDE: (PA) PUBLIC ADDRESS; (CS) CLASSROOM SOUND FIELD. SUBSCRIPT "P" INDICATES PENDANT MOUNTED. SUBSCRIPT "V" INDICATES THAT THE SPEAKER IS VOLUME CONTROLLED.	C/B C/T	CIRCUIT BREAKER CURRENT TRANSFORMERS
274100, 275120, 275127	WALL MOUNTED MICROPHONE OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF MIC OUTLETS REQUIRED. (BLANK IMPLIES ONLY ONE).	Δ	
274100, 275120, 275127	MICROPHONE FLOOR OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF OUTLETS REQUIRED. (BLANK IMPLIES ONLY ONE) FLOOR BOX SPECIFIED ON THE POWER PLANS UNLESS	DEG DEMO	DEGREE DEMOLITION
274100 275120 275127		DEPT DIA	DEPARTMENT DIAMETER
275120		DISC DIST	DISCONNECT DISTRIBUTION
275120	SOUND SYSTEM WALL MOUNTED DIGITAL MEDIA INPUT PLATE (1) HDMI, (1) USB, (1) MINI STEREO, (1) DISPLAY PORT.	DN Dp DPT	DOWN DEEP OR DEPTH DOUBLE POLE DOUBLE TRAN
275120	WALL MOUNTED MONITOR SPEAKER OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF OUTLETS REQUIRED. (BLANK IMPLIES ONE)	DWG	DRAWING
275120	OTHERWISE NOTED.	EA EC	EACH ELECTRICAL CONTRACTOR
274000, 275120	TOUCH PANEL - WALL MOUNTED AUDIO VIDEO CONTROL INTERFACE.	EES EF	EARTH ELECTRODE SYSTEM ENTRANCE FACILITY
273123	TELEPHONE HANDSET - PLACED ON DESKTOP.	ELEC EMT FQUIP	ELECTRIC, ELECTRICAL ELECTRIC METALLIC TUBING EQUIPMENT
	THEATER INTERCOM SPEAKER STATION. (TICM); PRODUCTION INTERCOM MAIN CONTROL.	ER ESS	EQUIPMENT ROOM ELECTRONIC SAFETY & SECU
	PRODUCTION INTERCOM INPUT PLATE	EXIST	EXISTING
275116	PUBLIC ADDRESS HORN	FT	
275127	CLASSROOM SOUNDFIELD INFRARED RECEIVER.	GEN GEI	GENERATOR GROUND FAULT INTERRUPT
275313	WALL-MOUNTED DUAL FACE CLOCK.	HH	HANDHOLE
275313		IAW	IN ACCORDANCE WITH
275515		IDF	INTERNATIONAL BUILDING CC INTERMEDIATE DISTRIBUTION
275313	WALL-MOUNTED SINGLE FACE PUBLIC ADDRESS IP SPEAKER WITH DIGITAL CLOCK DISPLAY, LED FLASHERS, AND TALKBACK MICROPHONE.	IMC IP	INTERMEDIATE METAL COND INTERNET PROTOCOL
275313	WALL-MOUNTED DUAL FACE PUBLIC ADDRESS IP SPEAKER WITH DIGITAL CLOCK DISPLAY, LED FLASHERS, AND TALKBACK MICROPHONE.	JB	JUNCTION BOX
275313	WALL-MOUNTED SINGLE FACE DIGITAL CLOCK DISPLAY AND LED FLASHERS.	KVA	KILOVOLT - AMPERES
275313	WALL-MOUNTED DUAL FACE DIGITAL CLOCK DISPLAY AND LED FLASHERS.	LAN	LOCAL AREA NETWORK
		MAX	MAXIMUM
RITY SYMBOL	<u>S</u>	MC MCB	MAIN CROSS-CONNECT MAIN CIRCUIT BREAKER
		MCC MCM MFR	THOUSAND CIRCULAR MILS
SECTION	DESCRIPTION	MH MIN	MAINTENANCE HOLE MINIMUM
282300	SINGLE SENSOR FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	MISC MLO	MISCELLANEOUS MAIN LUGS ONLY
		MM MNS MON	MULTIMODE FIBER MASS NOTIFICATION SYSTEM MONITOR
282300	DUAL SENSOR FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	MTD MTG	MOUNTED MOUNTING
282300	SINGLE SENSOR PTZ IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	NC	NORMALLY CLOSED
		NEC NIC	NATIONAL ELECTRICAL CODE NOT IN CONTRACT
		NL NO NTS	NORMALLY OPEN
282300	QUAD SENSOR FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	OC	ON CENTER
282300	QUAD SENSOR 180 DEGREE FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	OFC OFOI	OPTIC FIBER CABLE OWNER FURNISHED OWNER
		OFCI OICF	OWNER FURNISHED CONTRA OWNER INSTALLED CONTRAC
282300	SINGLE SENSOR 360 DEGREE FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	OMS OS OSP	OCCUPANCY SENSOR
281523		PB	PULL BOX
281523	INTERCOM DOOR STATION	PET PR	PROTECTED ENTRANCE TERI
281523	MASTER INTERCOM DOOR STATION	PTZ PVC	POKE THRU PAN-TILT-ZOOM POLYVINYL CHOLRIDE
281523	EMERGENCY CALL STATION	PWR	POWER
281300	CARD READER	R RGS	RECESSED RIGID GALVANIZED STEEL
281300	CARD READER WITH PIN PAD	RM RMC	ROOM RIGID METAL CONDUIT
281300	BIOMETRIC READER DEVICE ("_" INDICATES F-FINGER, H-HAND, I-IRIS, S-SIGNATURE, V-VOICE)	KU	KAUK UNH SHORT CIRCUIT RATING
281300	ARM/DISARM KEYPAD	SCTP SF	SCREENED TWISTED PAIR SQUARE FEET
281300		SHT SPEC	SHEET SPECIFICATIONS
281300		STD SURF	STANDARD SURFACE
281300		TBD TFI	TO BE DETERMINED
201300		TER	

VISUAL SYM	BOLS	ABBR	EVIATIONS
SECTION	DESCRIPTION	A ABO	AMPERES ALTERNATIVE BID OPTIO
274100	PRESENTATION POINT OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	AC ACS AFF	ABOVE COUNTER ACCESS CONTROL SYST ABOVE FINISHED FLOOR
274100	DISPLAY OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATIONIF P INDICATES OUTLET FOR INTERACTIVE FLAT PANEL, MOUNTED AT 60" AFF. COORDINATE WITH MOUNTING BRACKET AND ARCHITECTURAL.	AFC AHJ	ABOVE FINISHED CEILING AUTHORITY HAVING JUR
274100	PRESENTATION POINT OUTLET LOCATION. REFER TO THE FACEPLATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	AL ANNUN	ALUMINUM ANNUNCIATOR
274100	AT 60" AFF. COORDINATE WITH MOUNTING BRACKET AND ARCHITECTURAL.	ATS AV	AUTOMATIC TRANSFER S AUDIO VISUAL
274100	SOUND FIELD AUDIO/VIDEO OUTLET. REFER TO THE REPORTED ATE DETAILS AND CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	AVOIP AWG	AUDIO VISUAL OVER INT AMERICAN WIRE GUAGE
274100	WALL-MOUNTED ULTRA SHORT THROW PROJECTOR. REFER TO THE CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	BFG	BELOW FINISHED GRADE
274100	CEILING-MOUNTED PROJECTOR. REFER TO THE CONNECTIVITY DETAILS FOR ADDITIONAL INFORMATION.	BLDG BOTT	BUILDING BOTTOM
	SINGLE POLE DOUBLE THROW WALL SWITCH	С	CONDUIT
115213	CEILING MOUNTED ELECTRIC PROJECTION SCREEN.	CAB CAT	CABINET CATEGORY COMMUNITY ANTENNA T
115213	WALL MOUNTED ELECTRIC PROJECTION SCREEN.	CCTV CFCI	CLOSED CIRCUIT TELEVI CONTRACTOR FURNISHE
274000	AUDIO VISUAL CAMERA W/BROADCASTING CAPABILITIES.	CKT CLG	CIRCUIT CEILING
274000		CLST CO	CLOSET COMMUNICATIONS OUTL
275120	WALL MOUNTED SPEAKER. "S" INDICATES SOUND SYSTEM, OTHER SPEAKERS INCLUDE: (PA) PUBLIC ADDRESS; (CS) CLASSROOM SOUND FIELD. SUBSCRIPT "V" INDICATES THAT	COMM CT	COMMUNICATIONS CABLE TRAY
274100, 275120, 275127	THE SPEAKER IS VOLUME CONTROLLED.	CU C/B	COPPER CIRCUIT BREAKER
274100, 275120, 275127	MOUNTED. SUBSCRIPT "V" INDICATES THAT THE SPEAKER IS VOLUME CONTROLLED.	C/T	
274100, 275120, 275127	WALL MOUNTED MICROPHONE OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF MIC OUTLETS REQUIRED. (BLANK IMPLIES ONLY ONE).	DC DEG	DELTA DIRECT CURRENT DEGREE
274100, 275120, 275127	MICROPHONE FLOOR OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF OUTLETS REQUIRED. (BLANK IMPLIES ONLY ONE) FLOOR BOX SPECIFIED ON THE POWER PLANS UNLESS OTHERWISE NOTED.	DEMO DEPT	DEMOLITION DEPARTMENT
274100, 275120, 275127	HANGING MIC FROM CEILING.	DIA DISC	DIAMETER DISCONNECT
275120	SOUND SYSTEM WALL MOUNTED DIGITAL MEDIA INPUT PLATE (1) HDMI, (1) USB, (1) MINI STEREO, (1) DISPLAY PORT.	DIST DN Dn	DISTRIBUTION DOWN DEEP OR DEPTH
275120	WALL MOUNTED MONITOR SPEAKER OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF OUTLETS REQUIRED. (BLANK IMPLIES ONE)	DPDT DWG	DOUBLE POLE DOUBLE 1 DRAWING
275120	MONITOR SPEAKER FLOOR OUTLET. SUBSCRIPT NUMBER INDICATES QUANTITY OF OUTLETS REQUIRED (BLANK IMPLIES ONLY ONE). FLOOR BOX SPECIFIED ON THE POWER PLANS UNLESS OTHERWISE NOTED.	EA	EACH
274000, 275120	TOUCH PANEL - WALL MOUNTED AUDIO VIDEO CONTROL INTERFACE.	EC EES	ELECTRICAL CONTRACT EARTH ELECTRODE SYS
273123	TELEPHONE HANDSET - PLACED ON DESKTOP.	ELEC EMT	ELECTRIC, ELECTRICAL ELECTRIC METALLIC TUE
	THEATER INTERCOM SPEAKER STATION. (TICM): PRODUCTION INTERCOM MAIN CONTROL.	EQUIP ER	EQUIPMENT EQUIPMENT ROOM
		ESS EXIST	ELECTRONIC SAFETY & S EXISTING
075440		FT	FEET
275116	PUBLIC ADDRESS HORN	GND GEN	GROUND GENERATOR
275127	CLASSROOM SOUNDFIELD INFRARED RECEIVER.	GFI	GROUND FAULT INTERRI
275313	WALL-MOUNTED DUAL FACE CLOCK.	HH	
275313	WALL-MOUNTED SINGLE FACE CLOCK.	IBC IDF	INTERNATIONAL BUILDIN
275313	WALL-MOUNTED SINGLE FACE PUBLIC ADDRESS IP SPEAKER WITH DIGITAL CLOCK DISPLAY, LED FLASHERS, AND TALKBACK MICROPHONE.	IG IMC	ISOLATED GROUND INTERMEDIATE METAL C
275313	WALL-MOUNTED DUAL FACE PUBLIC ADDRESS IP SPEAKER WITH DIGITAL CLOCK DISPLAY, LED FLASHERS, AND TALKBACK MICROPHONE.	IP	
275313	WALL-MOUNTED SINGLE FACE DIGITAL CLOCK DISPLAY AND LED FLASHERS.	JB	
275313	WALL-MOUNTED DUAL FACE DIGITAL CLOCK DISPLAY AND LED FLASHERS	KW	KILOWATTS
210010			
RITY SYMBOL	5	MAX MC MCB	MAXIMUM MAIN CROSS-CONNECT MAIN CIRCUIT BREAKER
		MCC MCM	MOTOR CONTROL CENT
SECTION	DESCRIPTION	MER MH	MAIN EQUIPMENT ROOM MAINTENANCE HOLE
282300	SINGLE SENSOR FIXED IP-CCTV SECURITY CAMERA PROVIDE (1) LITP CABLE AND OUTLET	MIN MISC MI O	MINIMUM MISCELLANEOUS MAIN LUGS ONLY
202000		MM MNS	MULTIMODE FIBER MASS NOTIFICATION SYS
282300	DUAL SENSOR FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	MON MTD	MONITOR MOUNTED
282300	SINGLE SENSOR PTZ IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	MTG	
		NEC	NORMALLY CLOSED NATIONAL ELECTRICAL ( NOT IN CONTRACT
		NL NO	NIGHT LIGHT CIRCUIT NORMALLY OPEN
282300	QUAD SENSOR FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	NTS	NOT TO SCALE
000000		OFC	OPTIC FIBER CABLE OWNER FURNISHED OW
282300	QUAD SENSOR 180 DEGREE FIXED IP-CCTV SECURITY CAMERA. PROVIDE (1) UTP CABLE AND OUTLET.	OFCI OICF	OWNER FURNISHED CON OWNER INSTALLED CON
282200		OM3 OS	LASER OPTIMIZED MULTI OCCUPANCY SENSOR
282300	SINGLE SENSOR 300 DEGREE FIXED IF-CCTV SECORITY CAWERA. PROVIDE (1) OTF CADLE AND OUTLET.	PB	
281523		PET PR	PROTECTED ENTRANCE PAIR
281523	MASTER INTERCOM DOOR STATION	PT PTZ	POKE THRU PAN-TILT-ZOOM
281523	EMERGENCY CALL STATION	PVC PWR	POLYVINYL CHOLRIDE POWER
281300	CARD READER	R RGS	RECESSED RIGID GALVANIZED STEE
281300	CARD READER WITH PIN PAD	RM RMC	ROOM RIGID METAL CONDUIT
281300	BIOMETRIC READER DEVICE ("_" INDICATES F-FINGER, H-HAND, I-IRIS, S-SIGNATURE, V-VOICE)	RU	
281300	ARM/DISARM KEYPAD	SCTP SF	SCREENED TWISTED PA
281300	ELECTRIC LOCK	SHT SPEC	SHEET SPECIFICATIONS
281300		SID SURF	STANDARD SURFACE
281300		TBD TEL	TO BE DETERMINED TELEPHONE
281300	REQUEST TO EXIT PUSH BUTTON	TER TR	TELECOMMUNICATIONS TELECOMMUNICATIONS
281300	DURESS BUTTON	TV TYP	TELEVISION TYPICAL
281300	DOOR RELEASE STATION	U/G UI	UNDERGROUND UNDERWRITERS LABOR
281300	LOCK DOWN BUTTON		UNIVERSAL UNLESS OTHERWISE NO
281300	AREA OF REFUGE	UTP	UNSHIELED TWISTED PA
281300	SCREENING DEVICE	V VIF	VOLIS VERIFY IN FIELD
281300	KEY SWITCH	VSS	VIDEO SURVELLANCE SY
281300		W W/	WATTS WITH
281300 281300	GLASS BREAK SENSOR		WIRELESS ACCESS POIN WEATHERPROOF
281300	VIBRATION SENSOR	XFMR	TRANSFORMER
281300	WIRELESS LOCK	XP	EXPLOSION PROOF
		Y	WYE

	SECURITY			
EXT CAM $+$ $1F$ $\rightarrow$ 1F $+$ $144"IC$ $ES$ $CR$ $CP48"$ $IM$ $ES$ $48"$ $42"$ $42"$	EL ML DC TOP OF DOOR 48" KP 42"	RX 42" DB DR DESKTOP LD 48"	SD 48" KS 42" CW DESKTO	

# FN

RISDICTION

SWITCH FERNET PROTOCOL

TELEVISION /ISION IED CONTRACTOR INSTALLED

ERS

# TRANSFER

STEM BING

SECURITY

# RUPT

NG CODE JTION FRAME CONDUIT

# STEM

CODE

#### VNER INSTALLED NTRACTOR INSTALLED VTRACTOR FURNISHED FIMODE, CLASS 3

TERMINAL

## EQUIP. ROOM ROOM

RATORIES DTED

#### PROTOCOL YSTEM

GROUND

NEMA 3R ENCLOSURE

NEMA 4X ENCLOSURE

3R

- ABOVE CEILING/EXTERIOR HEIGHTS 

 	- TOP OF DOOR
 	— 60" AFF — 48" AFF

![](_page_12_Picture_38.jpeg)

## GENERAL NOTES

- NOT ALL NOTES INDICATED ON THIS SHEET MAY BE APPLICABLE FOR ALL PROJECT CONDITIONS. NOTES APPEARING ON VARIOUS DRAWINGS FOR DIFFERENT SYSTEMS AND MATERIALS ARE TO BE REVIEWED, COORDINATED AND ARE TO BE APPLIED TO ALL RELATED DRAWINGS AND DETAILS.
- THE DRAWINGS INDICATE THE QUANTITY, TYPE AND GENERAL LOCATION OF VOICE/DATA/CATV/AUDIO/VIDEO OUTLETS REQUIRED IN EACH SPACE. THE CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, AND PROJECT MANAGEMENT NECESSARY FOR A TURNKEY SYSTEM.
- ALL MATERIALS SPECIFIED OR NOTED SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS 3 RECOMMENDATIONS.
- THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS, LICENSES, AND ALL UTILITY CHARGES, AND ARRANGE FOR ALL REQUIRED INSPECTIONS.
- REFER TO THE ARCHITECTURAL INTERIOR ELEVATIONS FOR DEVICE LOCATIONS AND MOUNTING HEIGHTS FOR ADDITIONAL DETAILS. COORDINATE EXACT DEVICE LOCATIONS PRIOR TO ROUGH-IN.
- ALL BIDDERS SHALL VISIT AND EXAMINE THE SITE. ANY DISCREPANCIES BETWEEN DRAWINGS AND SPECIFICATIONS SHALL BE PROMPTLY BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION DURING THE BIDDING PERIOD. NO ALLOWANCE SHALL BE MADE TO THE CONTRACTOR FOR FAILURE TO IDENTIFY DISCREPANCIES DURING THE BIDDING PERIOD.
- THE CONTRACTOR SHALL INCLUDE ALL OVERTIME AND PREMIUM TIME WORK THAT MUST BE PERFORMED DURING THE PERIOD OF PERFORMANCE. NO ADDITIONAL COMPENSATION WILL BE AWARDED FOR OVERTIME WORK COORDINATE EXACT LOCATIONS OF EQUIPMENT WITH OTHER TRADES. VERIFY EXACT WIRING AND CONNECTION REQUIREMENTS WITH SUBMITTAL DOCUMENTS BEFORE INSTALLATION. SPECIALTY OUTLET TYPES SHALL BE VERIFIED BEFORE ORDERING. ALL ELECTRICAL AND COMMUNICATION WORK SHOWN HERE MUST BE VERIFIED AND COORDINATED IN FIELD BEFORE INSTALLATION
- THE CONTRACTOR SHALL PROTECT ALL EXISTING AND NEW CONSTRUCTION FROM DAMAGE. EXISTING CEILINGS, WALLS, FLOORS AND ALL OTHER BUILDING COMPONENTS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION IF DAMAGED. ALL DAMAGES TO THE BUILDING OR IT'S CONTENTS SHALL BE REPAIRED OR REPLACED BY THE CONTRACTOR RESPONSIBLE FOR THE DAMAGE TO THE OWNERS SATISFACTION.
- ALL NEW CONSTRUCTION SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG) 10 AND CHAPTER 11 OF THE INTERNATIONAL BUILDING CODE.
- ALL WORK REQUIRING POWER OR COMMUNICATION OUTAGES OR DISRUPTION OF OWNER FUNCTIONS SHALL BE 11 COORDINATED WITH THE PROJECT ENGINEER, OWNER AND OWNER ITS DEPARTMENT. REQUESTS FOR, NOTIFICATIONS OF, AND APPROVALS FOR OUTAGES AND DISRUPTIONS SHALL BE MADE TO OWNER AND THE ENGINEER IN WRITING, 2 WEEKS PRIOR TO THE REQUESTED OUTAGE DATE. OUTAGES SHALL NORMALLY OCCUR DURING THE OWNER'S "OFF" HOURS. ALL COMMUNICATION WORK SHALL BE INSTALLED BY CERTIFIED CONTRACTORS AND THEIR EMPLOYEES PER THE 12
- CONTRACT DOCUMENTS. THE CONTRACTOR SHALL COORDINATE ALL EQUIPMENT INSTALLATION TO MAINTAIN HEADROOM AND KEEP OPENINGS AND 13 PASSAGEWAYS CLEAR. THE CONTRACTOR SHALL COORDINATE SYSTEMS INSTALLATION TO MINIMIZE CONFLICT WITH EXISTING BUILDING UTILITIES AND OTHER TRADES WORK.
- THE CONTRACTOR SHALL VERIFY EQUIPMENT RACK AND CABINET PLACEMENT AND LAYOUT WITH OWNER AND OWNER'S 14 REPRESENTATIVE PRIOR TO INSTALLATION.
- ANY LOW VOLTAGE CABLING IN AN OPEN-CEILING AREA (EXAMPLE GYMNASIUM) SHALL BE INSTALLED IN CONDUIT TO THE 15 NEAREST ACCESSIBLE CABLE TRAY OR TELECOM ROOM (TR) UNLESS NOTED OTHERWISE
- ALL INSTALLATIONS OF EXPOSED EQUIPMENT SHALL BE COORDINATED WITH ASSOCIATED ARCHITECTURAL DETAILS TO 16 MEET INTENDED AESTHETIC APPEARANCE. ALL WIRING, CONDUITS, BACK BOXES AND OTHER ASSOCIATED CONNECTIONS SHALL BE CONCEALED BEHIND EQUIPMENT OR WITHIN EXPOSED MOUNTED BRACKETS. EXPOSED WIRING IS PROHIBITED. THE COLOR AND FINISH OF ALL EXPOSED DEVICES IN PUBLIC AREAS SHALL BE REVIEWED AND APPROVED BY THE 17 ARCHITECT PRIOR TO INSTALLATION.
- ALL CONDUIT FRAMING SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. CONDUITS SHALL BE INSTALLED PARALLEL 18 OR PERPENDICULAR TO WALLS. ANGLED CONDUITS ARE PROHIBITED.
- INCLUDE ALL REQUIRED JUNCTION AND PULL BOXES REGARDLESS OF INDICATION ON THE DRAWINGS (WHICH DUE TO THE 19 SYMBOLIC METHODS OF NOTATION, MAY BE OMITTED). 20 PULL-BOXES SHALL BE PROVIDED WHERE THE COMBINED SUM OF THE BENDS EXCEEDS 180 DEGREES AND/OR EVERY 100
- LINEAR FEET. THE BEND RADIUS FOR CONDUITS SHALL BE 10X THE OUTSIDE DIAMETER FOR OPTICAL FIBER AND 4X THE OUTSIDE DIAMETER FOR MULTIPAIR COPPER.
- PROVIDE LONG SWEEPING BENDS FOR AL COMMUNICATIONS CONDUITS 2-INCHES AND LARGER. LB FITTINGS FOR 21 COMMUNICATION CONDUITS ARE PROHIBITED. 22 PROVIDE PULL TAPE IN ALL EMPTY CONDUIT AND INNERDUCT. PULL TAPE SHALL BE RATED FOR 200 LBS IN ALL CONDUIT.
- 23 CABLE TRAY SHALL BE TRAPEZE OR CANTILEVER MOUNTED ONLY. BOND ALL SECTIONS OF TRAY TOGETHER WITH MANUFACTURER APPROVED BONDING METHOD PER NEC. ALL CABLE TRAY TO BE 12-INCHES WIDE, UON. CABLE TRAY SHALL BE PROVIDED WITH 25 PERCENT SPARE CAPACITY.
- PROVIDE A MINIMUM OF FOUR (4) CONDUITS BETWEEN STACKED CLOSETS ON SUCCESSIVE FLOORS. 24 25 ALL COMMUNICATIONS OUTLET BOXES SHALL BE A 4 11/16-INCH SQUARE BY 2 1/2-INCH DEEP WITH A MUD RING UON. PROVIDE A MINIMUM OF ONE (1) 1-INCH CONDUIT FOR ALL COMMUNICATIONS OUTLET BOXES. REFER TO COMMUNICATIONS DETAILS FOR SPECIFIC OUTLET BOX AND CONDUIT QUANTITY AND SIZE INFORMATION. ALL EQUIPMENT SHALL BE NEW, UON. 26
- 27 BOND ALL METALLIC EQUIPMENT, RACKS, CABINETS, CABLE TRAY, CONDUITS, SLEEVES, ETC. TO THE TELECOMMUNICATIONS MAIN GROUND BUS WITH 2-HOLE NON-TWISING LUGS. ALL CONDUITS SHALL BE REAMED WITH BUSHINGS INSTALLED.
- PROVIDE ALL CORE DRILLING, CUTTING, AND PATCHING AND RESTORATION OF ALL FINISHED AREAS REQUIRED TO INSTALL 28 ALL CONDUITS, SLEEVES, BOXES, ETC. SEAL ALL CORE DRILLS AFTER RACEWAY, CONDUITS, ETC. ARE INSTALLED. PLACEMENT OF UNAUTHORIZED CABLING IN THE COMMUNICATIONS PATHWAYS I.E. CABLETRAY, J HOOKS, RACEWAY, ETC. 29 IS PROHIBITED.
- ALL SLEEVES AND PENETRATIONS SHALL BE ACOUSTICALLY AND FIRE TREATED TO MEET WALL RATING. FIRESTOPPING 30 ASSEMBLIES SHALL BE PROVIDED AT PENETRATIONS OF CONDUITS. BUS DUCTS. CABLES. CABLE TRAYS AND OTHER COMMUNICATIONS ITEMS. REFER TO THE THROUGH PENETRATION FIRESTOPPING SPECIFICATION FOR COMPLETE REQUIREMENTS.

## GENERAL DEMOLITION NOTES

- CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS WITH RESPECT TO MATERIALS AND DIMENSIONS TO DETERMINE THE EXACT EXTENT OF DEMOLITION WORK.
- AREAS INDICATED FOR DEMOLITION ARE APPROXIMATE. THERE MAY BE CONDITIONS WHERE DEMOLISHED UTILITIES ARE NOT WHERE INDICATED ON DRAWINGS. FULL EXTENT OF DEMOLITION SHALL BE DETERMINED AT THE JOB SITE BY THE CONTRACTOR.
- ALL NECESSARY CARE SHALL BE TAKEN DURING DEMOLITION AND CONSTRUCTION TO PREVENT DAMAGE TO ADJACENT - 3 MATERIALS AND CONCEALED MECHANICAL, ELECTRICAL, PLUMBING, AND OTHER ITEMS. PRIOR TO COMMENCING DEMOLITION WORK, VERIFY ALL UTILITIES HAVE BEEN TURNED OFF AND/OR CAPPED AS REQUIRED
- IN AREAS WHERE DEMOLITION IS TO OCCUR. DISCREPANCIES BETWEEN THE CONSTRUCTION DOCUMENTS AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.
- SEE ARCHITECTURAL, FIRE PROTECTION, PLUMBING, MECHANICAL, ELECTRICAL, AND STRUCTURAL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL DEMOLITION REQUIREMENTS.
- ALL WORK AND EQUIPMENT SHALL CONFORM TO NEC. THE MEANS AND METHODS USED BY THIS CONTRACTOR SHALL CONFORM TO NEC SECTION 110-3 (a AND b).
- WHERE INDICATED, ALL FIBER CABLE, DATA CABLE, RF CABLE, AND AUDIO-VISUAL CABLING SHALL BE DISCONNECTED AND 8 REMOVED FROM THE OUTLET BOXES TO THEIR SOURCE ENDPOINTS.
- CONTRACTOR SHALL REMOVE TELECOMMUNICATIONS DATA OUTLETS, EQUIPMENT, CABLING AND ALL RELATED ITEMS. PROPERLY DISPOSE OR RECYCLE ALL DEMOLISHED ITEMS PER LOCAL CODE AND AHJ REQUIREMENTS IN EXISTING COMMUNICATIONS ROOMS. THE CONTRACTOR SHALL COORDINATE THE EXTENT OF COMMUNICATIONS 10 DEMOLITION WITH THE OWNER.

GENERAL TELECOM NOTES ALL WORK SHALL COMPLY WITH APPLICABLE TIA/EIA/BICSI STANDARDS FIELD COORDINATE THE LOCATION OF COMMUNICATIONS EQUIPMENT IN ALIGNMENT WITH APPLICABLE CODES THE CONTRACTOR SHALL COORDINATE DEVICE OUTLET LOCATIONS WITH ARCHITECTURAL AND CASEWORK DRAWINGS PRIOR TO ROUGH-IN. REPORT ANY CONFLICTS TO THE CM, ARCHITECT, AND ENGINEER FOR RESOLUTION. ALL COMMUNICATIONS CABLING SHALL BE INSTALLED IN CONDUITS, CABLE TRAY, OR AN APPROVED RACEWAY SYSTEM. WHERE CABLE TRAY, CONDUIT, OR RACEWAY IS NOT AVAILABLE ALL CABLES SHALL BE INSTALLED IN J-HOOKS SUPPORTED EVERY 5-FEET, SUFFICIENT IN SIZE TO HANDLE ALL BUNDLED CABLES WHILE MINIMIZING CRUSHING. COPPER AND FIBER OPTIC CABLES WILL BE DIVIDED INTO SEPARATE BUNDLES AND INSTALLED IN SEPARATE J-HOOKS. IF CABLE SLACK EXCEEDS 12-INCHES BETWEEN SUPPORTS, ADDITIONAL SUPPORTS WILL BE INSTALLED TO TAKE UP SLACK AND RELIEVE CABLE STRESS. CATEGORY 6A CABLES SHALL BE CONTINUOUS FROM TELECOM ROOM TO WORK AREA OUTLET AND FREE FROM SPLICES. REVERSES, GROUNDS, OR OTHER CONNECTIONS. PROVIDE A 5-FOOT SERVICE LOOP IN THE CEILING (AT THE WORK AREA) END) FOR EACH HORIZONTAL CABLE. DO NO INSTALL CATEGORY 6A HORIZONTAL CABLES THAT EXCEED 90 METERS. ALL COPPER TERMINATION HARDWARE SHALL BE 110 STYLE IDC, UON. COMMUNICATIONS CABLING SHALL NOT BE SPLICED, UON. COMMUNICATIONS CONDUIT FILL CAPACITIES ARE GOVERNED BY THE NFPA-70 (NEC) AND SHALL BE FOLLOWED. DO NOT EXCEED 40 PERCENT FILL ON ANY COMMUNICATIONS CONDUIT. 10 CAREFULLY LAY ALL CABLE WITH APPROPRIATE RADIUS OF CURVATURE AND PROTECT AT BENDS AND CORNERS. OBSERVE MINIMUM BEND RADIUS AND TENSION LIMITATIONS AS SPECIFIED BY TIA. ANY ADDITIONAL SLEEVES AND/OR PENETRATIONS REQUIRED FOR THE INSTALLATION OF COMMUNICATIONS SYSTEM CABLING NOT SHOWN ON THESE DRAWINGS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. 11 THE CONTRACTOR SHALL ENSURE THAT ALL INSTALLED CABLES ARE FREE FROM TWISTS, KINKS, SHARP BENDS, CUTS, GOUGES OR ANY OTHER PHYSICAL DAMAGE MONITOR CABLE PULL TENSION TO ENSURE MANUFACTURER'S RECOMMENDATIONS AND INDUSTRY STANDARDS ARE NOT 12 EXCEEDED. ALL CATEGORY 6A CABLING MAY BE ROUTED IN THE SAME PATHWAY 13 THE CONTRACTOR SHALL ENSURE ALL CATEGORY 5E/6/6A CABLING IS SEPERATED FROM LIGHTING, POWER, 70-VOLT 14 AUDIO, MICROPHONE LEVEL, RF, AND SPEAKER LEVEL CIRCUITS IAW TIA-568 GENERIC TELECOMMUNICATIONS CABLING FOR CUSTOMER PREMISES. 15

CABLING ASSOCIATED WITH THE WIRELESS ACCESS POINTS SHALL BE PROVIDED WITH A COIL OF CABLE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ADJUST THE LOCATIONS OF THE WIRELESS ACCESS POINTS, AS REQUIRED, AFTER CONDUCTING A SITE VERIFICATION SURVEY TO ENSURE COVERAGE THROUGHOUT THE FACILITY. ALL HORIZONTAL AND BACKBONE COMMUNICATIONS CABLING SHALL BE PLENUM RATED, UON. ANY LOW VOLTAGE DEVICE 16

INSTALLED IN A PLENUM-RATED ENVIRONMENT MUST BE RATED FOR PLENUM USE ALL COMMUNICATIONS CABLING INSTALLED UNDER THE FLOOR SLAB SHALL BE WET-LISTED. CONCEAL CABLING WITHIN 17

- CONDUIT BACK TO THE TERMINATION LOCATION OR TRANSITION TO PLENUM RATED CABLING ABOVE THE CEILING. ALL COMMUNICATIONS CABLING SHALL BE PROTECTED FROM EXPOSURE TO PAINT OR ANY OTHER FOREIGN MATERIAL 18 THAT WOULD NEGATIVELY IMPACT THE VALIDITY OF THE MANUFACTURER'S PERFORMANCE WARRANTY. IF ANY CABLE IS EXPOSED TO PAINT AT ANY POINT, REGARDLESS OF THE AMOUNT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING THE CABLE(S) AFFECTED AND WILL REPLACE THE CABLE(S) AT NO COST TO THE OWNER PER THE INSTALLATION SPECIFICATIONS INCLUDING TESTING.
- PROVIDE ALL COPPER PATCH CORDS AND OPTICAL FIBER JUMPERS AT BOTH THE WORK AREA AND TELECOM ROOM ENDS. 19 REFER TO THE SPECIFICATIONS FOR ADDITIONAL DETAILS.
- ALL LABELING SHALL COMPLY WITH TIA-606 ADMINISTRATION STANDARD FOR TELECOMMUNICATIONS INFRASTRUCTURE 20 PROVIDE LABELING FOR ALL MODULAR OUTLETS, FACEPLATES, PATCH PANELS, CABLES, PATCH CABLES, FIBER SPLICE TRAYS, RACKS, CABINETS, TMGB/TGBS, ETC. REFER ELSEWHERE IN THE DRAWINGS AND SPECIFICATIONS FOR THE **OWNER'S EXACT REQUIRMENTS**
- TELECOMMUNICATIONS FACEPLATES SHALL MATCH ELECTRICAL SWITCH AND ELECTRICAL RECEPTACLE PLATE FINISHES 21 22 EQUIPMENT CABINETS AND PATCH PANELS SHALL BE ARRANGED TO ALLOW FOR A NATURAL WIRING PROGRESSION IN FUNCTIONAL FIELDS. MINIMIZE CROSSING OF WIRES AND ALLOW FOR EASY ACCESS TO ALL COMPONENTS. SURFACE MOUNTED RACEWAY SHALL BE USED BELOW LAY-IN CEILING IN REMOLDED AREA WHERE CONDUIT, WIRING 23 AND DEVICES CANNOT BE CONCEALED. PROVIDE WIREMOLD 4000 SERIES OR EQUAL, UON. PROVIDE COMPLETE WITH ALL FITTINGS, BARRIERS, COVERS AND MOUNTING ACCESSORIES AS RECOMMENDED BY THE MANUFACTURER

COORDINATE ROUTING OF RACEWAY WITH ARCHITECT PRIOR TO ROUGH-IN.

## **GENERAL AUDIO VISUAL NOTES**

12

- SUPPLY ALL JACKS, RACKS, WIRE, CABINETRY, CONNECTORS, MATERIALS, PARTS, EQUIPMENT AND LABOR NECESSARY FOR THE COMPLETE INSTALLATION OF THE SYSTEMS. IN FULL ACCORDANCE WITH THE RECOMMENDATIONS OF THE EQUIPMENT MANUFACTURERS AND WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.
- REFER TO FLOW DIAGRAMS, RISERS, AND SPECIFICATIONS FOR COMPLETE OPERATIONAL REQUIREMENTS. CONTRACTOR IS TO PROVIDE A COMPLETE AND OPERATIONAL SYSTEM.
- WHERE SIGNAL TYPES ARE PROVIDED AND NO CABLE TYPE INDICATED THE CONTRACTOR SHALL PROVIDE THE APPROPRIATE INTERCONNECT CABLE BASED ON THE SIGNAL TYPE REQUIREMENTS. ALL JUNCTION BOXES IN WALLS AND CEILINGS SHALL BE FLUSH MOUNTED. CONDUITS SHALL BE CONCEALED, UON.
- STRUCTURAL SUPPORT FOR AUDIOVISUAL EQUIPMENT SHALL BE PROVIDED BY OTHERS AT LOCATIONS DESIGNATED ON THESE DRAWINGS. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO, BLOCKING FOR WALL MOUNTED DEVICES AND OVERHEAD SUPPORT FOR CEILING MOUNTED PROJECTORS AND PROJECTION SCREENS. REFER TO ARCHITECTURAL DRAWINGS FOR SUPPORT DETAILS AND REQUIREMENTS.
- CEILING MOUNTED SPEAKER ENCLOSURES SHALL BE SUPPORTED FROM OVERHEAD STRUCTURE. ALL EXPOSED INTERCONNECT CABLES SHALL BE MOLDED CONNECTOR TYPE. FIELD TERMINATED INTERCONNECT CABLES ARE PROHIBITED.
- FURNITURE LAYOUT INDICATED ON DRAWINGS IS NOT FINAL AND MAY DIFFER. COORDINATE FINAL FURNITURE CONFIGURATION WITH OWNER PRIOR TO FABRICATION/CONSTRUCTION.
- TERMINAL BLOCK, BOARDS, STRIPS, OR CONNECTORS SHALL BE FURNISHED FOR ALL CABLES, WHICH INTERFACE WITH RACKS, CABINETS, CONSOLES, OR EQUIPMENT MODULES.
- ROUTE ALL CABLE AND WIRING WITHIN EQUIPMENT RACKS ACCORDING TO FUNCTION, SEPARATING WIRES OF DIFFERENT SIGNAL LEVELS (MICROPHONE, LINE LEVEL, AMPLIFIER OUTPUT, AC, ETC.) BY AS MUCH DISTANCE AS POSSIBLE. NEATLY ARRANGE AND BUNDLE ALL CABLE LOOSELY WITH HOOK-N-LOOP TIES. 11
- POWER CABLES, CONTROL CABLES, AND HIGH-LEVEL CABLES SHALL BE INSTALLED ON THE LEFT SIDE OF AN EQUIPMENT RACK, AS VIEWED FROM THE REAR. ALL OTHER CABLES SHALL BE INSTALLED ON THE RIGHT SIDE OF THE EQUIPMENT RACK. AS VIEWED FROM THE REAR.
- CABLING WITHIN RACKS SHALL BE CONTAINED IN "FINGER TRAY" OR HOOK-N-LOOP TIED TO THE SIDE OF THE RACK IN A NEAT AND ORDERLY FASHION.
- ALL CABLES ROUTED OUTSIDE OF RACKS AND CONDUIT SHALL BE CONTAINED IN A SUITABLE HARNESS OR WIREWAY TO 13 MAINTAIN A NEAT AND CLEAN INSTALLATION. OBSERVE PROPER CIRCUIT POLARITY AND LOUDSPEAKER WIRING POLARITY. NO CABLES SHALL BE WIRED WITH A POLARITY
- REVERSAL BETWEEN CONNECTIONS, AT EITHER END. ALL CABLES SHALL BE CONTINUOUS LENGTHS WITHOUT SPLICES. ALL SYSTEM WIRE (EXCEPT SPARE WIRE, AFTER BEING 15 CUT AND STRIPPED) SHALL HAVE THE WIRE STRAND TWISTED BACK TO THEIR ORIGINAL LAY AND BE TERMINATED BY
- APPROVED SOLDERED OR MECHANICAL MEANS. CLEARLY AND PERMANENTLY LABEL ALL JACKS. CONTROLS. CONNECTIONS. AND SO FORTH. ALL LABELING SHALL BE
- COMPLETED PRIOR TO FINAL SYSTEM EQUALIZATION. HAND LABELING IS PROHIBITED. ALL EQUIPMENT SHALL BE HELD FIRMLY IN PLACE WITH APPROPRIATE MOUNTING HARDWARE. ALL EQUIPMENT SHALL BE 17 INSTALLED TO PROVIDE REASONABLE SAFETY TO THE OPERATOR. SUPPLY ADEQUATE VENTILATION FOR ALL ENCLOSED EQUIPMENT ITEMS WHICH PRODUCE HEAT.
- A MOCK-UP AND MEETING SHALL OCCUR FOR TYPICAL PRESENTATION WALL TECHNOLOGY WHERE INTERACTIVE PROJECTORS AND/OR INTERACTIVE FLAT PANELS OCCUR. WALL SHALL BE FINISHED AND PROJECTOR MARKERBOARD AND/OR VISUAL WALL DISPLAY WALLCOVERING, INTERACTIVE PROJECTOR AND/OR INTERACTIVE FLAT PANEL, DATA AND AV CONNECTIVITY, ELECTRICAL AND ALL ACCESSORIES SHALL BE INSTALLED. CONSTRUCTION MANAGER, ARCHITECT, PROJECTOR MARKERBOARD AND/OR VISUAL DISPLAY WALLCOVERING INSTALLER/CONTRACTOR, TECHNOLOGY INSTALLER/CONTRACTOR, AND ELECTRICAL INSTALLER/CONTRACTOR SHALL BE PRESENT TO REVIEW MOCK-UP, PURPOSE OF MOCK-UP IS TO CONFIRM INTERACTIVE TECHNOLOGY IS FUNCTIONING AS INTENDED, THAT THERE IS PROPER COORDINATION BETWEEN THE WALL SURFACE, THE PROJECTOR MARKERBOARD OR VISUAL DISPLAY WALLCOVERING AND THE INTERACTIVE PROJECTOR AND/OR INTERACTIVE FLAT PANEL. ALL FINAL MOUNTING HEIGHTS FOR DIFFERENT ROOMS AND SPACES SHALL BE CONFIRMED AT THE MOCK-UP REVIEW.

## AUDIO VISUAL SYSTEM ROUGH IN AND INFRASTRUCTURE RECOMMENDATIONS

LARGE DISPLAYS (70"AND UP): BACK BOX WITH AC RECEPTACLES AND SURGE PROTECTION WITH FLANGE AND COVER CHIEF PAC525FBP2; PROVIDE A MINIMUM OF ONE NETWORK DATA DROP FOR DISPLAY. (ONE NETWORK DROP FOR WIRELESS GATEWAY) DIGITAL SIGNAGE DISPLAYS: BACK BOX WITH FLANGE AND COVER CHIEF PAC525FCW OR CHIEF PAC525FBP2 AC RECEPTACLES AND SURGE PROTECTION WITH FLANGE AND COVER; PROVIDE A MINIMUM OF TWO NETWORK DATA DROPS ONE FOR DISPLAY ONE FOR SIGNAGE PLAYER. DISPLAYS (70" AND BELOW): BACK BOX WITH FLANGE AND COVER CHIEF PAC525FCW OR CHIEF PAC525FBP2 AC RECEPTACLES AND SURGE PROTECTION WITH FLANGE AND COVER; PROVIDE A MINIMUM OF ONE NETWORK DATA DROP FOR DISPLAY. (ONE NETWORK DROP FOR WIRELESS GATEWAY).

AUDIO INPUT PLATE: (PASSIVE) 2 GANG BOX WITH PLASTER RING TOTAL DEPTH OF AT LEAST 3 1/2". DIGITAL MEDIA PLATE: (ACTIVE) MIDDLE ATLANTIC EVOLUTION 4-GANG WALL BOX OR 8-GANG WALL BOX. DANTE I/O PLATE: (ACTIVE) MIDDLE ATLANTIC EVOLUTION 4-GANG WALL BOX OR 8-GANG WALL BOX. SDI CAMERA: SINGLE OR 2 GANG BOX WITH PLASTER RING TOTAL DEPTH OF AT LEAST 3 1/2".

AV CONTROL TOUCH PANEL: 2 GANG BOX WITH PLASTER RING TOTAL DEPTH OF AT LEAST 3 1/2". AUDIO VISUAL FLOOR POKE THRU MIDDLE ATLANTIC EVOLUTION 8"" OR 10" POKE THRU WITH RECEPTACLES, COVER AND INTERIOR PLATE OPTIONS.

![](_page_13_Figure_93.jpeg)

![](_page_14_Figure_0.jpeg)

TECHNOLOGY AND SECURITY FIRST FLOOR 1/8" = 1'-0"

# **GENERAL SHEET NOTES**

A REFER TO SHEET T-002 FOR ALL GE

# **KEYED NOTE**

1	CONTRACTOR TO PROVIDE 75" IFP DISPLAY SO THE BOTTOM OF THE D MOUNTED AT @ 54" AFF. COORDINA DISPLAY MOUNT AND ELECTRICAL (
2	(SF) SOUND REINFORCEMENT AND LOCATED IN COMMAND CABINET OI BESIDE EACH OTHER. CONTRACTO LIGHTSPEED 975 WITH CORRESPON COORIDNATE LOCATION WITH ELEO
3	(MDF) MAIN TECH ROOM LOCATED THE MECHANICAL SHAFT ROOM. AI CABLING TO BE ROUTED TO THE MI THE 2ND FLOOR.
4	CONTRACTOR TO PROVIDE WIRELE CISCO 9100/MERAKI OR EQUAL. INT WIRELESS ACCESS POINT WITH EX LOCATED IN THE MDF.

- 5 CONTRACTOR TO PROVIDE QUAM, B PAGING SPEAKERS. INTEGRATE NEW WITH EXISTING SYSTEM LOCATED IN
- 6 CONTRACTOR TO PROVIDE POLYCO INTEGRATE NEW HANDSETS WITH E LOCATED IN THE MDF.

NOTES ENERAL NOTES	WUNICATIONS DIST AL
S	Christy A Miller BICSI ID # 109630
DISPLAY. MOUNT DISPLAY IS 36" AFF. AV1 ATE LOCATION WITH CONTRACTOR.	RCDD
(AV1) DATA WILL BE N THE SIDE @ 18" AFF OR TO PROVIDE NDING SPEAKERS.	ecture
CTRICAL CONTRACTOR. ON 2ND FLOOR ABOVE LL TECHNOLOGY DF ROOM LOCATED ON	archite
ESS ACCESS POINT. EGRATE NEW ISTING SYSTEM	ndesign
BOGEN, OR EQUAL, W PAGING SPEAKERS IN THE MDF.	the second secon
OM VVX 201 HANDSETS. EXISTING SYSTEM	SBCC
	14114
	AND, O
	VATIO _EVEL
	RENO VE., CI
	SIDE I
	LAKE AKES
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	no. description date Sheet Revisions
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![](_page_15_Figure_0.jpeg)

![](_page_15_Figure_6.jpeg)

![](_page_16_Figure_0.jpeg)

- TO, THIS SYSTEM. ALL NETWORK COPPER AND FIBER TERMINATIONS SHALL BE IN FULL COMPLIANCE WITH THE STRUCTURED CABLING SPECIFICATIONS AND SHALL MATCH

GENERAL NOTES FOR ROUGH-IN DETAILS

- A. GROUT AROUND ALL PENETRATIONS OF MASONRY OR DRYWALL SURFACES SO THERE ARE NO GAPS BETWEEN CONDUIT AND/OR BACK BOXES AND WALL PENETRATIONS.
- B. PULL STRING SHALL BE INSTALLED BETWEEN ALL PORTIONS OF THE BACK BOX AND CONDUIT RUN.
- C. ALL CONDUIT CONNECTIONS TO BACK BOXES SHALL BE CONDUIT TO BOX CONNECTORS.
- D. ALL CONDUITS SHALL BE RUN PARALLEL AND PERPENDICULAR TO BUILDING STRUCTURE.

![](_page_16_Figure_12.jpeg)

3 LOUD SPEAKER TERMINATION

![](_page_16_Figure_16.jpeg)