Whitefish School District

FY27 Network Infrastructure for High School Expansion

Form 470 RFP

Contact: Jacob Phillips, phillipsj@whitefishschools.org

Whitefish High School Expansion low voltage wiring

The Whitefish School District is seeking proposals for a comprehensive low-voltage and networking project for the High School Expansion. This project includes both E-Rate eligible and ineligible components. As this project includes new construction the installation window is not set yet but we anticipate a Summer 2027 timeline. The below information provides general information about the project but please see the attached documents (270000, 270100, 271116, 271323, 271513, 271700, 271800) for the full requirements including mandatory qualifications, hardware standards and testing and identification standards along with drawings.

Bidders must provide separate, itemized quotes for eligible vs. ineligible portions per drop and IDF to facilitate proper cost-allocation.

Scope of work:

- Installation of approximately 700 data drops across the school, approximately 400 eligible drops and 300 ineligible drops. See below for breakdown by IDF/MDF and eligibility.
- Vendor shall furnish and install one (1) 12-strand Single-Mode (OS2) fiber optic cable from the existing High School MDF to each of the four (4) new IDFs (A218, F338, A102, and MediaBox). This includes all necessary fiber enclosures, adapter panels, and LC-style termination/connectors at both ends. All fiber must be tested and certified to industry standards with PDF results provided.
- All ethernet cabling must be blue Plenum-rated Category 6A, 4-pair, AWG solid copper. Copper Clad Aluminum (CCA) is strictly prohibited.
- Service Loops: Ethernet cabling must include a 12-inch slack loop inside the wall at the faceplate end.
- Performance: Ethernet cabling must support 10GBASE-T up to 100 meters and be tested to 500 MHz (TIA/EIA 568-C.2 standards).
- The project includes drops to ceiling-mounted locations for Wireless Access Points. For ceiling drops, vendors shall provide a 15-foot service loop and a biscuit box/surface mount jack above the ceiling tile.
- Pathways: Where drops terminate in existing MDF/IDF closets use of the current J-hooks or existing conduit may be re-used. Current vertical and horizontal cable management

raceways may be reused. Vendor is responsible for providing and installing any additional J-hooks or support needed to prevent cable sag.
- For the four new fiber runs, the conduit the fiber will use will be provided by the electrical contractor. Cabling vendor will need to provide their own J-Hooks where the fiber is run in accessible ceiling space. The cabling vendor is responsible for the pull, termination, and testing.
- Termination: Vendor is responsible for all new cabling, jacks, terminations, faceplates, patch panels, patch cables between patch panels and switches, and labeling.
- Closet Configuration: Vendor to determine the most efficient 48 port patch panel configuration to accommodate the number of runs per closet. Angled patch panels or flat panels with D-ring management are acceptable. All ports must be machine-labeled to match the corresponding room/faceplate.
- The cabling vendor shall coordinate rack layout to accommodate a 2RU UPS at the bottom of each rack.
- For MDF/IDFs, the vendor must provide patch panels, patch cables, appropriate floor racks, wall stabilization for the racks, fiber enclosures, fiber adapter panels, and single mode fiber to connect to existing MDF. See breakdown below for needs per MDF/IDF.
- Testing and certification of all new drops with digital PDF test results must be provided upon completion.

Breakdown of needs per IDF/MDF:

IDF A116A: (Existing IDF)
- Eligible - 64 CAT 6A connections plus 10 PoE+ ethernet connections with all necessary patch panels and cable management.
- Ineligible - 59 PoE+ ethernet connections with all necessary patch panels and cable management.

IDF C008: (Existing IDF)
- Eligible - 16 CAT 6A connections plus 6 PoE+ ethernet connections with all necessary patch panels and cable management.
- Ineligible - 33 PoE+ ethernet connections with all necessary patch panels and cable management.

MDF D157B: (Existing MDF)
- Eligible - Provide and install four (4) new rack-mount fiber enclosures and adapter panels to terminate the incoming 12-strand fiber runs from the four new expansion IDFs.
- Ineligible - 57 PoE+ ethernet connections with all necessary patch panels and cable management.

IDF 203A: (Existing IDF)
- Eligible - 2 CAT 6A connections with all necessary patch panels and cable management.
- Ineligible - 27 PoE+ ethernet connections with all necessary patch panels and cable management.

IDF B017: (Existing IDF)
- Eligible - 24 CAT 6A connections plus 4 PoE+ ethernet connections with all necessary patch panels and cable management.
- Ineligible - 31 PoE+ ethernet connections with all necessary patch panels and cable management.

IT A218: (New IDF)
- Eligible - 102 CAT 6A connections, 14 PoE+ ethernet connections and 12-strand

single-mode fiber (OS2) backbone with all necessary patch panels, cable management, fiber enclosures/adapter panels
- Ineligible - 45 PoE+ ethernet connections with all necessary patch panels, cable management.
- Mixed eligibility - 2 - floor 2 post, 19" mounting rack, 45U, 1000lb minimum load rating. Racks will house both E-Rate eligible networking equipment and ineligible components. The District will perform a pro-rata cost allocation at the time of the Form 471 filing to ensure funding is only requested for the eligible portion of the equipment.

IDF F338: (New IDF)
- Eligible - 84 CAT 6A connections, 24 PoE+ ethernet connections and 12-strand single-mode fiber (OS2) backbone with all necessary patch panels, cable management, fiber enclosures/adapter panels
- Ineligible - 26 PoE+ ethernet connections with all necessary patch panels, cable management.
- Mixed eligibility - 2 - floor 2 post, 19" mounting rack, 45U, 1000lb minimum load rating. Racks will house both E-Rate eligible networking equipment and ineligible components. The District will perform a pro-rata cost allocation at the time of the Form 471 filing to ensure funding is only requested for the eligible portion of the equipment.

I.T. A102: (New IDF)
- Eligible - 14 CAT 6A connections, 4 PoE+ ethernet connections and 12-strand single-mode fiber (OS2) backbone with all necessary patch panels, cable management, fiber enclosures/adapter panels
- Ineligible - 8 PoE+ ethernet connections with all necessary patch panels, cable management.
- Mixed eligibility - 1 floor 2 post, 19" mounting rack, 45U, 1000lb minimum load rating. Racks will house both E-Rate eligible networking equipment and ineligible components. The District will perform a pro-rata cost allocation at the time of the Form 471 filing to ensure funding is only requested for the eligible portion of the equipment.

I.T. MediaBox: (New IDF)
- Eligible - 34 CAT 6A connections, 4 PoE+ ethernet connections and 12-strand single-mode fiber (OS2) backbone with all necessary patch panels, cable management, fiber enclosures/adapter panels
- Ineligible - 6 PoE+ ethernet connections with all necessary patch panels, cable management.
- Mixed eligibility - 1 wall mounted lockable 12U network cabinet that can support 300lbs and has a depth of 24 inches. Cabinet will house both E-Rate eligible networking equipment and ineligible components. The District will perform a pro-rata cost allocation at the time of the Form 471 filing to ensure funding is only requested for the eligible portion of the equipment.

Bidding Instructions:

- Bidders must provide a fixed unit price per ethernet drop that includes all items to create a "turn key" solution including labor, cabling, jacks, faceplates, and patch panel ports. In the EPC portal the quantity field represents drops not linear feet.
- Bidders must provide a uniform unit price for all ethernet drops. The distinction between 'Eligible' and 'Ineligible' counts is for E-rate cost-allocation purposes only; the physical installation and cable specification must be identical for all 700 drops.

- Bidders shall provide unit pricing for 600 Category 6A patch cables based on a 7-foot standard length for evaluation purposes. However, per specification Section 271513, final lengths for the project will be determined by field measurements after rack installation to ensure a 'slack-free' deployment. The awarded vendor will be required to provide the final quantity of 300 blue, 200 green, and 100 yellow patch cables required by the site conditions at the same unit price. For E-Rate purposes 300 of these patch cables are eligible and 300 are ineligible. In the EPC portal quantity field, 300 represents drops not linear feet.
- Bidders must provide a separate fixed cost for the fiber optic installation. In the EPC portal quantity field, 48 represents total strands (4 runs of 12-strand fiber) and not linear feet. This cost must be itemized by cost per linear foot of 12-strand OS2 fiber, cost per strand for LC-style termination, and all associated labor for testing and certification per Section 271800.
- Bidders must provide and install a total of eight (8) rack-mount fiber optic enclosures as part of the backbone installation. This includes one (1) enclosure for each of the four new IDFs (A218, F338, A102, and MediaBox) and four (4) enclosures for the existing MDF (D157B) to terminate the incoming 12-strand runs. Each enclosure must be sized appropriately for the strand count and include all necessary LC-style adapter panels and cable management hardware per Section 271323.
- Bidders will provide five (5) 2-post, 19-inch aluminum equipment racks, 45RU height, with a 1000lb minimum load rating. These racks will house both E-Rate eligible networking equipment and ineligible components; the District will perform pro-rata cost allocation. See Section 271116 for full specifications.
- Bidders will provide one (1) wall-mounted lockable 12U network cabinet, 24-inch depth, with a 300lb minimum load rating for the MediaBox IDF. This cabinet will house both E-Rate eligible and ineligible components. See Section 271116 for details.
- For MDF/IDFs bidders must provide an itemized list of equipment needed per MDF/IDF and eligibility.
- Any additional ineligible costs must be separated out and clearly labeled.
- The District reserves the right to reject any or all bids.
- Price of E-rate eligible goods and services will be the primary factor in the evaluation process.
- All bids must be submitted by 4pm on Friday, January 8th, 2027 to Jacob Phillips at phillipsj@whitefishschools.org.
- Bidders must have a valid SPIN (Service Provider Identification Number) and be in "Green Light" status with the FCC.

All Bids will be evaluated on the following criteria:

- Price of E-rate eligible goods and services (Primary factor)
- Price of Ineligible goods and services
- Ability to meet the needs of the District
- Proposed systems management ease of use
- Prior experience with the District
- Business Capability/Invoicing

Invoicing Preference: The District prefers the SPI (Service Provider Invoicing) method. Bidders should indicate their ability to provide discounted billing where the District is only responsible for

the non-discounted share of eligible costs. If a bidder only supports the BEAR (Billed Entity Applicant Reimbursement) method, this must be clearly stated in the proposal and may be considered during the evaluation in the "Business Capability/Invoicing" scoring category.

Implementation of all or part of the project is dependent on availability of local and E-rate funds. If partial implementation of the project would trigger different pricing tiers please note those in your proposal. The District may or may not proceed with the project solely at the discretion of the District.

The district reserves the right to cancel, delay, or modify the scope of this procurement, or proceed using local funds, if federal E-Rate funding commitments are delayed past the district’s required construction execution schedule.

ICT ABBREVIATIONS LEGEND

AFC	ABOVE FINISHED CEILING	MMF	MULTI-MODE FIBER
ACT	ACOUSTICAL CEILING TILE	MUTOA	MULTI-USER TELECOMMUNICATIONS OUTLET ASSEMBLY
AFF	ABOVE FINISHED FLOOR	(N)	NEW
AFG	ABOVE FINISHED GRADE	NEC	NATIONAL ELECTRIC CODE
AHJ	AUTHORITY HAVING JURISDICTION	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
AP	ACCESS POINT (WIRELESS, TYP.)	NIC	NOT IN CONTRACT
AV	AUDIO-VISUAL	NTS	NOT TO SCALE
AWG	AMERICAN WIRE GAUGE	O.C.	ON CENTER
BAS	BUILDING AUTOMATION SYSTEM	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
C.	CONDUIT	OFOI	OWNER FURNISHED, OWNER INSTALLED
CAT	CATEGORY	OH	OVERHEAD
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	OSP	OUTSIDE PLANT CABLE
CFOI	CONTRACTOR FURNISHED, OWNER INSTALLED	PB	PULLBOX
CMP	COMMUNICATIONS PLENUM (RATED)	PBB	PRIMARY BONDING BUSBAR
CMR	COMMUNICATIONS RISER (RATED)	PEX	PRESS TO EXIT
CU	COPPER	PoE	POWER OVER ETHERNET
(D)	DEMOLISHED	PP	PATCH PANEL
DIM	DIMENSION	QEL	QUIET ELECTRIFIED LATCH
DMARC	DEMARCATION	QTY	QUANTITY
DPS	DOOR POSITION SWITCH	REQ	REQUIREMENT
(E), EX.	EXISTING	RM	ROOM
EA	EACH	REX	REQUEST TO EXIT
EC	ELECTRICAL CONTRACTOR (DIV 26)	SBB	SECONDARY BONDING BUSBAR
EF	ENTRANCE FACILITY	SMF	SINGLE-MODE FIBER
E.L.	ELECTRIFIED LATCH	SP	SERVICE PROVIDER
EMT	ELECTRICAL METALLIC TUBING	SPEC	SPECIFICATION
EPT	ELECTRIC POWER TRANSFER	STP	SHIELDED TWISTED PAIR
ER	EQUIPMENT ROOM	TR	TELECOM ROOM
FACP	FIRE ALARM CONTROL PANEL	TTB	TELEPHONE TERMINAL BOARD
FLR	FLOOR	TYP	TYPICAL
GND	GROUND	UG	UNDERGROUND
HT	HEIGHT/HIGH	UPS	UNINTERRUPTIBLE POWER SUPPLY
I/O	INDOOR/OUTDOOR	UNO	UNLESS NOTED OTHERWISE
ICT	INFORMATION AND COMMUNICATIONS TECHNOLOGY	UTP	UNSHIELDED TWISTED PAIR
IDS	INTRUSION DETECTION SYSTEM	VIF	VERIFY IN FIELD
IMC	INTERMEDIATE METAL CONDUIT	W/	WITH
ISP	INTERNET SERVICE PROVIDER	W/O	WITHOUT
J-BOX	JUNCTION BOX	WAO	WORK AREA OUTLET
MFR	MANUFACTURER	WAP	WIRELESS ACCESS POINT
MH	MAINTENANCE HOLE	WP	WEATHERPROOF
MIN	MINIMUM		

ABBREVIATIONS AND SYMBOLS GENERAL NOTES

A. THE ABBREVIATIONS ON THIS SHEET COMPRISE A STANDARD LIST; NOT ALL ABBREVIATIONS APPEAR ON THIS PROJECT.
B. THE SYMBOLS ON THIS SHEET COMPRISE A STANDARD LIST; NOT ALL SYMBOLS APPEAR ON THIS PROJECT.
C. ALL MOUNTING HEIGHTS ARE TO CENTER OF DEVICE ABOVE FINISHED FLOOR, UNLESS NOTED OTHERWISE. MOUNTING HEIGHTS INDICATED ON ARCHITECTURAL WALL ELEVATIONS OR AS NOTED SPECIFICALLY ON THE DRAWINGS OR IN THE SPECIFICATIONS SHALL TAKE PRECEDENCE OVER MOUNTING HEIGHTS LISTED.

ICT PROJECT GENERAL NOTES

1. THIS PROJECT IS TO CONFORM TO THE LATEST LOCALLY ADOPTED VERSION OF THE NATIONAL ELECTRICAL CODE AND THE LATEST REVISION OF:
   ANSI/TIA-526-7-A, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, and its published addenda.
   ANSI/TIA-526-14-C, Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant, and its published addenda.
   ANSI/TIA-568.0-E, Generic Telecommunications Cabling for Customer Premises, and its published addenda.
   ANSI/TIA-568.1-E, Commercial Building Telecommunications Infrastructure Standard, and its published addenda.
   ANSI/TIA-568.2-E, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, and its published addenda.
   ANSI/TIA-568.3-E, Optical Fiber Cabling and Components Standard, and its published addenda.
   ANSI/TIA-569-E, Telecommunications Pathways and Spaces, and its published addenda
   ANSI/TIA-598-D Optical Fiber Cable Color Coding
   ANSI/TIA-606-D, Administration Standard for Telecommunications Infrastructure, and its published addenda
   ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, and its published addenda.
   ANSI/TIA-758-C, Customer Owned Outside-Plant Telecommunications Infrastructure Standard, and its published addenda.
2. SEE SPECIFICATIONS FOR ADDITIONAL CONTRACTOR QUALIFICATIONS, PRODUCT INSTALLATION, AND QUALITY REQUIREMENTS.
3. ALL DIMENSIONS MUST BE VERIFIED IN THE FIELD AND ANY DEVIATIONS CAUSING CHANGES EXCEEDING 6 INCHES TO THE INTENDED LOCATION OF MAJOR TELECOMMUNICATIONS INFRASTRUCTURE COMPONENTS MUST BE COORDINATED WITH THE ARCHITECT AND DESIGNER PRIOR TO INSTALLATION.
4. ALL ICT DEVICES SHALL BE SECURELY MOUNTED PLUMB AND STRAIGHT TO WALLS, FLOORS, OR RACKS, PER THE MANUFACTURER'S RECOMMENDED MOUNTING PRACTICE, UNLESS OTHERWISE INDICATED IN THE ICT DRAWINGS.
5. ALL CABLES SHALL BE RATED FOR THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.
6. INSTALL FIRESTOP ASSEMBLIES IN ALL THROUGH-SLAB AND THROUGH-WALL PENETRATIONS FOR THE INSTALLATION OF ICT CABLING AS REQUIRED TO MAINTAIN FIRE RATING OF PENETRATED SLAB OR WALL. REVIEW DRAWINGS FOR PARTITION TYPE RATINGS. FIRESTOPPING SYSTEMS USED FOR ALL PENETRATIONS SHALL BE A UL LISTED ASSEMBLY AND APPROVED BY APPLICABLE AUTHORITIES HAVING JURISDICTION PRIOR TO INSTALLATION.
7. THE METHOD OF INSTALLATION FOR ALL ICT RELATED BACK BOXES IN WALLS AND THE METHOD FOR PASSAGE OF CONDUIT AND WIREWAYS THROUGH ACOUSTICALLY SENSITIVE WALLS SHALL BE COORDINATED WITH THE ACOUSTICAL CONSULTANT OR OWNER PRIOR TO INSTALLATION.
8. BOND ALL CONDUITS, CABLE TRAYS, AND JUNCTION BOXES PER ANSI/TIA-607-D IN ADDITION TO ANY APPLICABLE CODE REQUIREMENTS.
9. ALL ICT RELATED FLOOR BOXES, POKE THRU DEVICES, JUNCTION BOXES AND BACK BOXES SHOULD BE PROVIDED WITH AN EMPTY CONDUIT TO THE APPLICABLE TELECOMMUNICATIONS ROOM, CABLE TRAY PATHWAY OR PULL BOX. SEE ELECTRICAL DRAWINGS FOR ADDITIONAL DETAILS.
10. CONDUIT ROUTES ON THE ICT DRAWINGS SHOW ONLY INTERCONNECTION BETWEEN THE TERMINATION POINTS AND APPROXIMATE ROUTES. THE EXACT ROUTE OF CONDUIT AND CABLE PATHWAYS ARE DETERMINED BY FIELD CONDITIONS AND VERIFIED BY INSTALLING CONTRACTOR.
11. NOTIFY THE DESIGNER OF ANY DISCREPANCIES BETWEEN THE EXISTING CONDITIONS AND THE "T" (ICT) DRAWINGS. OBTAIN CLARIFICATION BEFORE PROCEEDING WITH WORK.
12. ALL PATHWAY AND RACEWAY INCLUDING CONDUIT SLEEVES, FLOOR BOXES, OUTLET BOXES AND CONDUIT BY ELECTRICAL, UNO.
13. ALL CABLES SHALL BE SUPPORTED EVERY 48" O.C. MAX. BY J-HOOKS, CABLE TRAY, OR IN CONDUIT.
14. ALL CABLES RUN IN CONDUIT UNDER SLAB SHALL BE INDOOR/OUTDOOR RATED CATEGORY 6A.
15. CABLE GAUGE AND NUMBER OF CONDUCTORS ARE SHOWN IN THE FORMAT: AWG/# (EX. 16/2 = 16 AWG / 2 CONDUCTOR)
16. CALL 811 PRIOR TO PERFORMING ANY EXCAVATION.

CABLE ROUTING LEGEND

- HORIZONTAL CABLE PATHWAY
- BACKBONE CABLE PATHWAY
- BELOW GRADE
- HDMI AND USB CONNECTION PATHWAY
- CONDUIT OR CONDUIT SLEEVE. EMT, UNO.
- LADDER RACK OR CABLE TRAY, SEE PLANS FOR ADDITIONAL INFORMATION.
- VERTICAL TRANSITION BETWEEN FLOORS OR GRADE
- HORIZONTAL TRANSITION BETWEEN SHEETS AND/OR DETAILS
- JUNCTION BOX. 4" x 4" x 2-1/8", UNO.

STRUCTURED CABLING LEGEND

- WORK AREA OUTLET - WALL MOUNT AT +18", UNO. "X" INDICATES NUMBER OF CATEGORY 6A JACKS, UNO. SEE NOTE 1.
- AV - "AV" - WORK AREA OUTLET - WALL MOUNT AT +18", UNO. PROVIDE EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE FROM AV WAO TO TV BOX IN ROOM. SEE NOTE 3. PROVIDE BRUSH FACEPLATE.
- AP - "AP" - WORK AREA OUTLET - WALL MOUNT WIRELESS ACCESS POINT. MOUNT AT +8' AFF, UNO. "X" INDICATES NUMBER OF CATEGORY 6A JACKS, UNO. SEE NOTE 1.
- TV - "TV" - WORK AREA OUTLET FOR TV BOX. WALL MOUNTED BOX PROVIDED BY ELECTRICAL CONTRACTOR."X" INDICATES NUMBER OF CATEGORY 6A JACKS, UNO.
- WORK AREA OUTLET - CEILING MOUNT. PROVIDE 15' SERVICE LOOP. "X" INDICATES NUMBER OF CATEGORY 6A JACKS, UNO. SEE NOTE 2.
- AP - "AP" - WORK AREA OUTLET - CEILING MOUNT WIRELESS ACCESS POINT. "X" INDICATES NUMBER OF CATEGORY 6A JACKS. SEE NOTE 2.
- WORK AREA OUTLET - FLOOR MOUNT. BOX AND CONDUIT PATHWAY PROVIDED BY ELECTRICAL CONTRACTOR. "X" INDICATES NUMBER OF CATEGORY 6A JACKS.

NOTE 1: PROVIDE 4" SQUARE BOX (2-1/8" DEEP) WITH SINGLE-GANG MUD RING & 1" EMT CONDUIT STUBBED TO NEAREST ACCESSIBLE CEILING SPACE.

NOTE 2: IN LOCATIONS ABOVE T-BAR CEILING, TERMINATE IN BISCUIT STYLE HOUSING ABOVE CEILING TILE. LABEL HOUSING AND T-BAR RAIL. IN HARD LID CEILINGS, STUB 1" EMT CONDUIT FROM OUTLET TO NEAREST ACCESSIBLE CEILING SPACE

NOTE 3: PROVIDE 4-11/16" SQUARE BOX (3-1/4" DEEP) WITH SINGLE-GANG MUD RING & 2" EMT CONDUIT STUBBED TO NEAREST ACCESSIBLE CEILING SPACE.

SECURITY LEGEND

- CR - CARD READER. MOUNT AT +46". SEE DETAIL 1-4/T9.1.2. SEE NOTE 1.
- DPS - DOOR POSITION SWITCH. SEE DETAILS 1-4/T9.1.2.
- AO - AUTO OPERATOR. MOUNT AT +46". SEE NOTE 1.
- DR - DOOR RELEASE BUTTON. SEE NOTE 1.
- LB - LOCKDOWN BUTTON. SEE NOTE 1.
- REX - REQUEST TO EXIT MOTION DETECTOR.
- AIM - PROVIDE DESK MOUNTED AIPHONE MASTER STATION. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. AIPHONE MASTER STATION TO USE ADJACENT WAO FOR ADMIN DESK.
- AIP - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR VIDEO INTERCOM. PROVIDE AIPHONE DOOR STATION. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. PROVIDE 20/2 CABLE RUN IN 3/4" CONDUIT FROM DOOR STATION TO DOOR POWER SUPPLY.
- C - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR IP CAMERA. PROVIDE DOME CAMERA, MINIMUM 5 MEGA PIXELS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.
- C - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR IP CAMERA. PROVIDE 2-SENSOR, 180° CAMERA, MINIMUM 5 MEGA PIXELS PER SENSOR. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.
- C - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR IP CAMERA. PROVIDE 4-SENSOR 360° CAMERA, MINIMUM 5 MEGA PIXELS PER SENSOR. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.

NOTE 1: PROVIDE 4" SQUARE BOX (2-1/8" DEEP) WITH SINGLE GANG MUD RING & 3/4" EMT CONDUIT STUBBED TO NEAREST ACCESSIBLE CEILING SPACE.

NOTE 2: SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. FOR EXTERIOR CAMERAS, TERMINATE INSIDE BUILDING ON BISCUIT BLOCK IN NEAREST ACCESSIBLE CEILING SPACE. PROVIDE 1" SLEEVE FLUSH w/ BUILDING TO BUILDING EXTERIOR AND WEATHERPROOF SLEEVE PENETRATION. FOR INTERIOR CAMERAS IN HARD LID CEILINGS, STUB 1" EMT CONDUIT FROM OUTLET TO NEAREST ACCESSIBLE CEILING SPACE. FOR INTERIOR CAMERAS IN T-BAR CEILINGS, TERMINATE ON BISCUIT BLOCK ABOVE T-BAR CEILING TILES. PROVIDE 15' SECURITY LOOP. MOUNT @ +8' AFF, UNO.

PAGING AND AV LEGEND

- S1 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR SPEAKER - ACOUSTICAL CEILING MOUNT, VALCOM, VIP-120A, WITH V-9914M METAL MOUNT BRIDGE.
- S2 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR SPEAKER - HARD LID CEILING MOUNT, VALCOM, VIP-120A, WITH V-9912M METAL MOUNT RING.
- S3 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR SPEAKER - WALL MOUNT (+9' AFF, UNO) VALCOM, VIP-428A, SURFACE MOUNTED WITH VB-R12 BACKBOX. PROVIDE KNOCKOUTS AS REQUIRED. RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE. TERMINATE IN BISCUIT STYLE HOUSING IN BACKBOX.
- S4 - INDICATES ATLASIED 8" DUAL CONE IN-CEILING SPEAKER (PROVIDE (1) PART # SD72W-KIT4 FOR EACH CLASSROOM) FOR CLASSROOM AMPLIFICATION SYSTEM. DAISY CHAIN SPEAKERS TOGETHER WITH 18/2 PLENUM RATED SPEAKER WIRE AND TERMINATE CABLING IN AMPLIFIER.
- S5 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR SPEAKER - WALL MOUNT (+9' AFF, UNO) VALCOM, VIP-48DAL, SURFACE MOUNTED WITH V-9809 HOUSING, OR APPROVED EQUAL. SEE NOTE 1.
- S - EXISTING CEILING MOUNTED SPEAKER.
- S - EXISTING WALL MOUNTED SPEAKER.
- A1 - INDICATES ATLASIED 50-WATT MIXER AMPLIFIER (PART # AA50PHD). SEE NOTE 1. PROVIDE BRUSH FACEPLATE. MOUNT BACKBOX WITH BRUSH FACEPLATE AT +18" AFF, UNO. PROVIDE 4"D x 11"W x 10"H CUSTOM SHEET METAL BRACKET TO WALL MOUNT AMPLIFIER. MOUNT BRACKET AT 27" AFF. PROVIDE BACKING TO SUPPORT AMPLIFIER AND BRACKET.
- PS1 - PROVIDE VALCOM # VIP-893-S PAGING STATION. PAGING STATION TO USE ADJACENT WAO IN ADMIN F308.
- PS2 - PROVIDE VALCOM # VIP-893 PAGING STATION. PAGING STATION TO USE ADJACENT WAO IN ADMIN F308.
- S/C 1 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR WALL MOUNTED SPEAKER CLOCK COMBINATION - MOUNT +8' AFF, UNO. PROVIDE VALCOM VL522BK-F IP COMPACT SPEAKER WITH TEXT. SEE NOTE 2.
- S/C 2 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR DOUBLE SIDED CEILING MOUNTED SPEAKER CLOCK COMBINATION. PROVIDE VALCOM VL522BK-F-SA IP TEXT SIGN WITH SPEAKER AND FLASHERS. PROVIDE VALCOM V-9914M METAL MOUNT BRIDGE.
- S/C 3 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR DOUBLE SIDED WALL MOUNTED SPEAKER CLOCK COMBINATION. MOUNT +10' AFF, UNO. PROVIDE VALCOM VL522BK-F-SA IP TEXT SIGN WITH SPEAKER AND FLASHERS. SEE NOTE 2.
- S/C 4 - INDICATES SIMPLEX CATEGORY 6A OUTLET FOR BOTH VALCOM VIP-580A FLEX HORN AND VALCOM VIP-A16A IP CLOCK. PROVIDE VALCOM V-WGACLK CAGE FOR CLOCK.
- C - EXISTING WALL MOUNTED CLOCK.

NOTE 1: PROVIDE 4" SQUARE BOX (2-1/8" DEEP) WITH SINGLE GANG MUD RING & 1" EMT CONDUIT STUBBED TO NEAREST ACCESSIBLE CEILING SPACE.

NOTE 2: PROVIDE 4" SQUARE BOX (2-1/8" DEEP) & 1" EMT CONDUIT STUBBED TO NEAREST ACCESSIBLE CEILING SPACE.

ICT SHEET INDEX

NUMBER	SHEET NAME
T0.0.1	ICT SYMBOLS AND ABBREVIATIONS
TD2.0.1A	ICT DEMO PLAN - LEVEL 1 - AREA A
TD2.0.1B	ICT DEMO PLAN - LEVEL 1 - AREA B
TD2.0.1C	ICT DEMO PLAN - LEVEL 1 - AREA C
TD2.0.1D	ICT DEMO PLAN - LEVEL 1 - AREA D
TD2.0.2A	ICT DEMO PLAN - LEVEL 2 - AREA A
TD2.0.2B	ICT DEMO PLAN - LEVEL 2 - AREA B
T2.0.0	ICT SITE PLAN
T2.0.1	BACKBONE PLAN - LEVEL 1 - OVERALL
T2.0.2	BACKBONE PLAN - LEVEL 2 - OVERALL
T2.1.1A	STRUCTURED CABLING PLAN - LEVEL 1 - AREA A
T2.1.1B	STRUCTURED CABLING PLAN - LEVEL 1 - AREA B
T2.1.1C	STRUCTURED CABLING PLAN - LEVEL 1 - AREA C
T2.1.1D	STRUCTURED CABLING PLAN - LEVEL 1 - AREA D
T2.1.2A	STRUCTURED CABLING PLAN - LEVEL 2 - AREA A
T2.1.2B	STRUCTURED CABLING PLAN - LEVEL 2 - AREA B
T2.1.2C	STRUCTURED CABLING PLAN - LEVEL 2 - AREA C
T2.1.2D	STRUCTURED CABLING PLAN - LEVEL 2 - AREA D
T2.2.1A	SECURITY PLAN - LEVEL 1 - AREA A
T2.2.1B	SECURITY PLAN - LEVEL 1 - AREA B
T2.2.1C	SECURITY PLAN - LEVEL 1 - AREA C
T2.2.1D	SECURITY PLAN - LEVEL 1 - AREA D
T2.2.2A	SECURITY PLAN - LEVEL 2 - AREA A
T2.2.2B	SECURITY PLAN - LEVEL 2 - AREA B
T2.2.2C	SECURITY PLAN - LEVEL 2 - AREA C
T2.2.2D	SECURITY PLAN - LEVEL 2 - AREA D
T2.3.1A	PAGING AND AV PLAN - LEVEL 1 - AREA A
T2.3.1B	PAGING AND AV PLAN - LEVEL 1 - AREA B
T2.3.1C	PAGING AND AV PLAN - LEVEL 1 - AREA C
T2.3.1D	PAGING AND AV PLAN - LEVEL 1 - AREA D
T2.3.2A	PAGING AND AV PLAN - LEVEL 2 - AREA A
T2.3.2B	PAGING AND AV PLAN - LEVEL 2 - AREA B
T2.3.2C	PAGING AND AV PLAN - LEVEL 2 - AREA C
T2.3.2D	PAGING AND AV PLAN - LEVEL 2 - AREA D
T9.0.0	CSE BUILDING PLAN
T9.0.1	ICT ENLARGED VIEWS - IT A218
T9.0.2	ICT ENLARGED VIEWS - IDF F338
T9.0.3	ICT ENLARGED VIEWS - MDF D157B
T9.0.4	ICT ENLARGED VIEWS - IDF A116A AND IDF C008
T9.0.5	ICT ENLARGED VIEWS - IDF 203A AND IDF B017
T9.1.1	ICT DETAILS
T9.1.2	ICT DETAILS

PROJECT IMPLEMENTATION NOTES

1. ALL CABLING, J-HOOKS, FACE PLATES, JACKS, PATCH PANELS, WIRE MANAGEMENT PANELS, RACKS, LADDER RACK, BONDING AND SYSTEM INSTALLATION IS NOT PART OF GENERAL CONTRACTOR SCOPE, AND IS PART OF OWNER E-RATE SOLICITATION.
2. ALL PATHWAY AND RACEWAY INCLUDING FISHING OF WALLS AND INSTALLATION OF PULL STRINGS, CONDUIT SLEEVES, FLOOR BOXES, OUTLET BOXES, CABLE TRAY AND CONDUIT BY GENERAL CONTRACTOR, AND IS NOT PART OF OWNER E-RATE SOLICITATION.

ICT RESPONSIBILITY MATRIX

RESPONSIBILITIES DEFINED	EFEI E	EFEI I	OFOI	OFCI	CFCI	CFOI
BACKBONE CABLING						
ROUGH-IN, CONDUITS, PATHWAYS, AND SLEEVES					■	
OPTICAL FIBER BACKBONE CABLING	■					
HORIZONTAL CABLING						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
COPPER HORIZONTAL CABLING	■					
TELEPHONE DEVICES			■			
WIRELESS ACCESS POINTS						
ACTIVE DEVICES	■					
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
CABLING	■					
TELECOMMUNICATIONS ROOMS						
HORIZONTAL CABLING:SWITCHING AND ROUTING EQUIPMENT	■					
BACKBONE CABLING: SWITCHING AND ROUTING EQUIPMENT	■					
RACKS, FRAMES, ENCLOSURES AND ACCESSORIES	■					
CABLE MANAGEMENT EQUIPMENT	■					
UNINTERRUPTIBLE POWER SUPPLIES (RACK MOUNTED)	■					
PLYWOOD BACKBOARDS					■	
PATCH CORDS	■					
BONDING BUSBARS					■	
ACCESS CONTROL						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
HEAD END EQUIPMENT AND COMPONENTS					■	
FIELD DEVICES (CARD READERS, DOOR CONTACTS, REQUEST TO EXITS,...					■	
CABLING					■	
VIDEO SURVEILLANCE						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
HEAD-END EQUIPMENT AND COMPONENTS (NVR)					■	
CAMERAS					■	
CABLING		■				
VIDEO SURVEILLANCE SWITCHING AND ROUTING EQUIPMENT					■	
OVERHEAD PAGING						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
HEAD-END EQUIPMENT AND COMPONENTS					■	
FIELD DEVICES (SPEAKERS, CALL SWITCHES, PAGING STATIONS, ETC.)					■	
CABLING		■				
OVERHEAD PAGING SWITCHING AND ROUTING EQUIPMENT					■	
CLASSROOM AUDIO-VISUAL SYSTEMS						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
AMPLIFIERS AND SPEAKERS					■	
AUDIO-VISUAL CABLING (HDMI, USB, ETC. AS INDICATED ON DRAWINGS)					■	

NOTES:

1. THE MATRIX IS TO BE USED IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATIONS. ANY CONFLICTING INFORMATION SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM IMMEDIATELY.

ICT RESPONSIBILITY MATRIX LEGEND:

EFEI - E-RATE CONTRACTOR FURNISHED, E-RATE CONTRACTOR INSTALLED
- E SUB-COLUMN REPRESENTS ELIGIBLE E-RATE ITEMS
- I SUB-COLUMN REPRESENTS IN-ELIGIBLE E-RATE ITEMS

OFOI - OWNER FURNISHED, OWNER INSTALLED

OFCI - OWNER FURNISHED, GENERAL CONTRACTOR INSTALLED

CFCI - GENERAL CONTRACTOR FURNISHED,GENERAL CONTRACTOR INSTALLED

CFOI - GENERAL CONTRACTOR FURNISHED, OWNER INSTALLED

MONTANA
KYLE J. WEBER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet: ICT SYMBOLS AND ABBREVIATIONS
project: WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner: WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A2	2-19-26

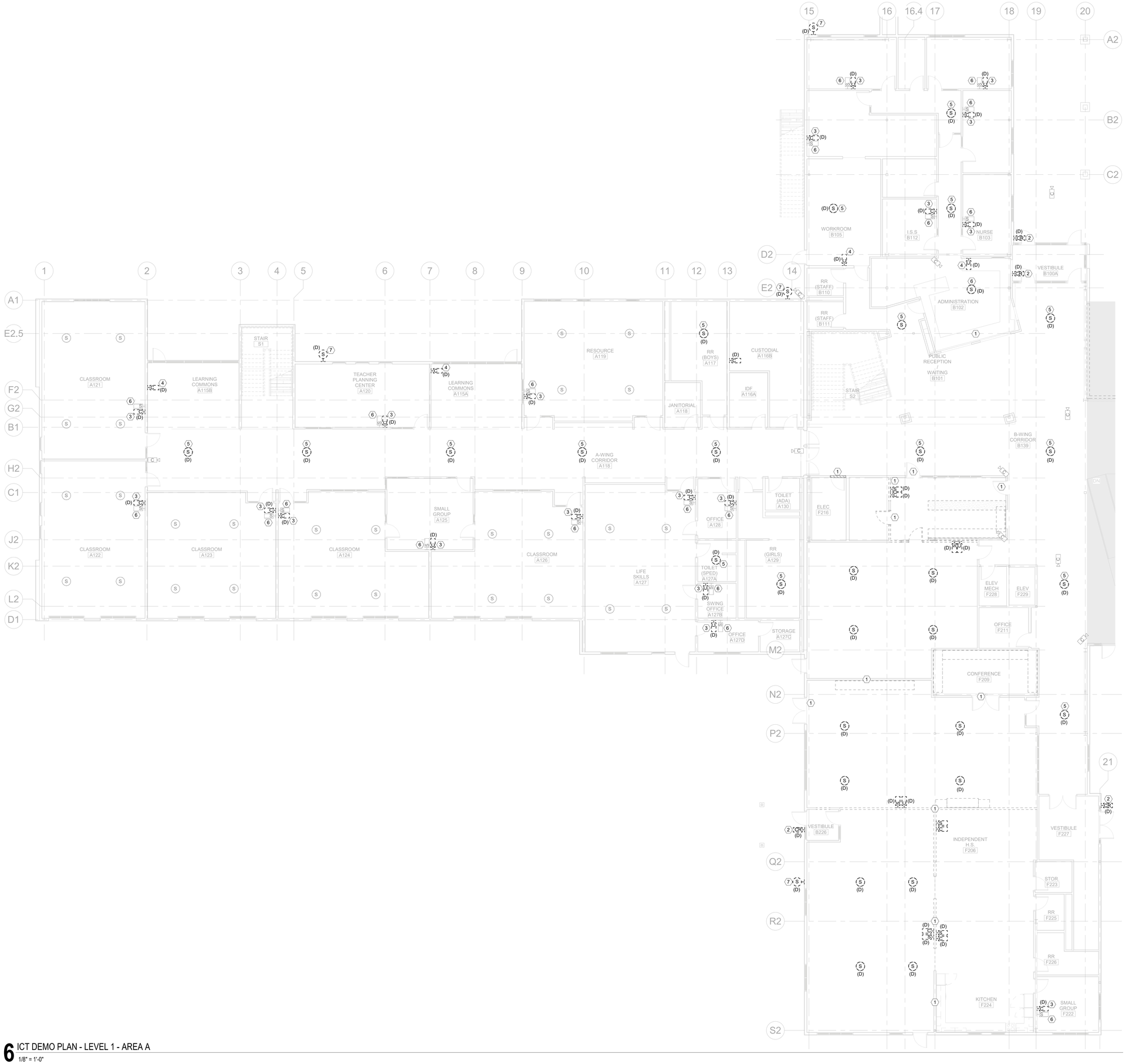
phase: BID DOCUMENTS

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GENERAL ICT DEMO NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
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E. THE DEVICE LAYOUT IN THESE DEMOLITION PLANS DOES NOT REFLECT ALL DEVICES OR CONDITIONS THE CONTRACTOR MAY FIND IN THE FIELD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEMOLTION OF DEVICES NOT SHOWN IN THE ICT DEMOLITION DRAWINGS. THE CONTRACTOR SHALL FIELD-VERIFY EXISTING CONDITIONS PRIOR TO BID.
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G. ALL CAMERAS, KEYPADS, CARD READERS, RACKS, CABINETS, SPEAKERS, AND ACTIVE EQUIPMENT IN HATCHED GRID REGION SHALL BE RETURNED TO OWNER, UNO.

KEY NOTES:

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2 DEMO CARD READER AND CARD READER CABLING. ALL OTHER CABLING AND DEVICES FOR DOOR FUNCTIONALITY TO REMAIN INCLUDING DOOR POSITION SWITCHES, REQUEST TO EXITS, AND LOCK CONTROL DEVICES.
3 DEMO AND LEGALLY DISPOSE OF EXISTING CLOCK. USE EXISTING CABLING AS PULL STRING FOR NEW SPEAKER/CLOCK COMBO UNIT CABLING.
4 PATCH HOLE AND PAINT TO MATCH EXISTING WALL.
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6 DISCONNECT CABLING AND DEMO BACK TO SOURCE. SPEAKER TO REMAIN.
7 DEMO AND LEGALLY DISPOSE OF EXISTING EXTERIOR WALL MOUNT SPEAKER. DEMO EXISTING CABLING BACK TO SOURCE. REUSE CONDUIT PATHWAYS FOR NEW SPEAKER.

MONTANA
Kyler J. Gallagher
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet ICT DEMO PLAN - LEVEL 1 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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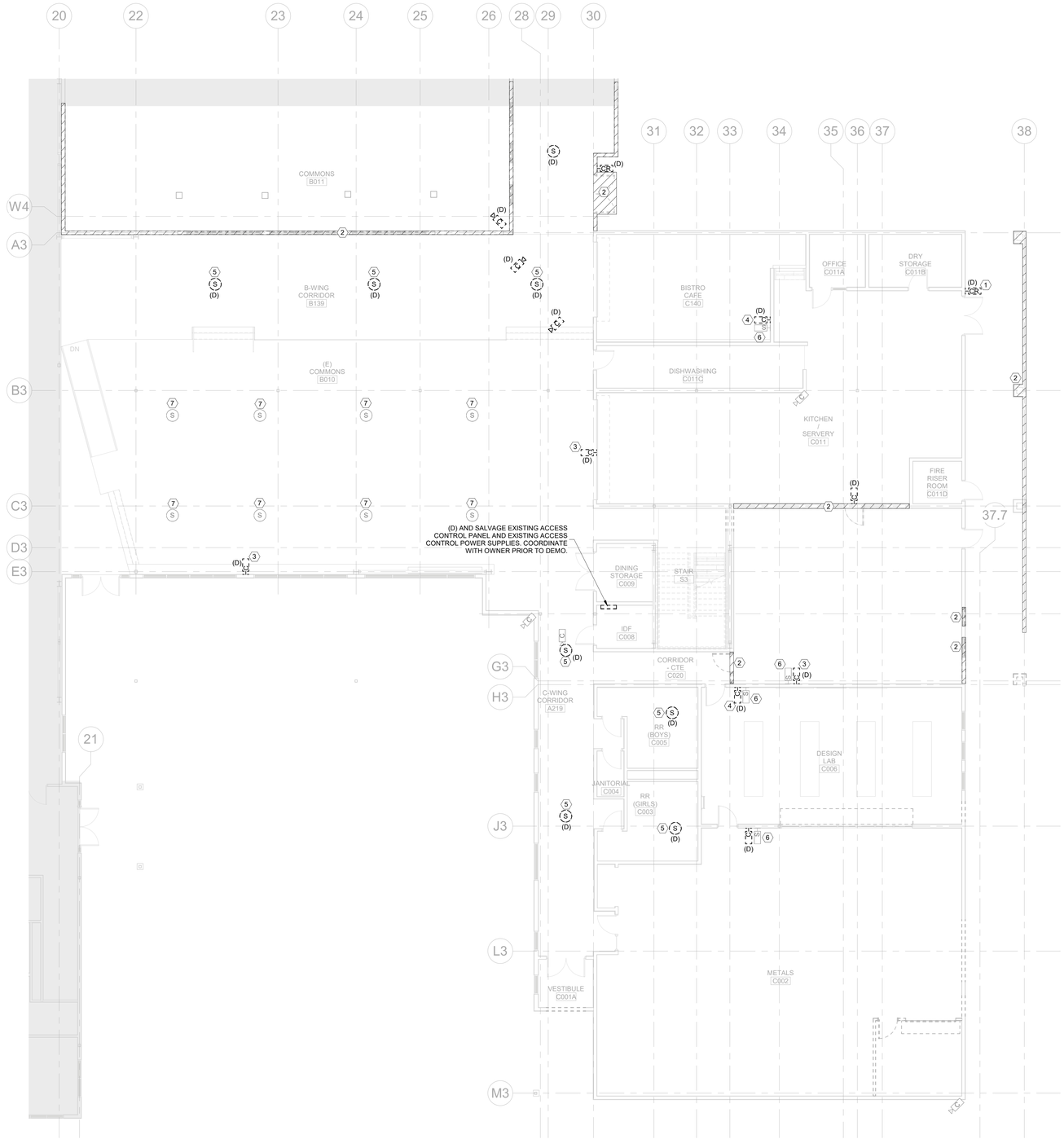
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16 ICT DEMO PLAN - LEVEL 1 - AREA A
1/8" = 1'-0"

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

NORTH

KEY PLAN



GENERAL ICT DEMO NOTES

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2 ALL WORK AREA OUTLETS, STRUCTURED CABLING, ACCESS CONTROL DEVICES, ACCESS CONTROL CABLING, AND ACTIVE EQUIPMENT IN THE DEMO'D WALLS WITHIN HATCHED GRID REGION SHALL BE DEMO'D TO SOURCE AND RETURNED TO OWNER, UNO. ALL EXISTING DEVICES LOCATED IN NON-DEMO'D WALLS SHALL REMAIN. STRUCTURED CABLING PASSING THROUGH DEMO'D AREAS AND FEEDING EXISTING DEVICES NOT LOCATED IN DEMO'D AREAS SHALL BE RELOCATED TO A NEW PERMANENT PATHWAY.
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6 DISCONNECT CABLING AND DEMO BACK TO SOURCE. SPEAKER TO REMAIN.
7 EXISTING SOUND SYSTEM SPEAKERS TO REMAIN.

MONTANA
KYLER J. KUHLMANN
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet ICT DEMO PLAN - LEVEL 1 - AREA B
project WHITEFISH HIGH SCHOOL
ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

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16 ICT DEMO PLAN - LEVEL 1 - AREA B
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN

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MONTANA
KYLER J. GUNNARSON
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

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project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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16 ICT DEMO PLAN - LEVEL 1 - AREA C
1/8" = 1'-0"

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

NORTH

KEY PLAN

GENERAL ICT DEMO NOTES

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4 DISCONNECT CABLING AND DEMO BACK TO SOURCE. SPEAKER TO REMAIN.



16 ICT DEMO PLAN - LEVEL 1 - AREA D
1/8" = 1'-0"

2/25/2026 3:45:32 PM

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

NORTH

KEY PLAN

MONTANA
KYLER J. GUNNARSON
NO. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet ICT DEMO PLAN - LEVEL 1 - AREA D
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

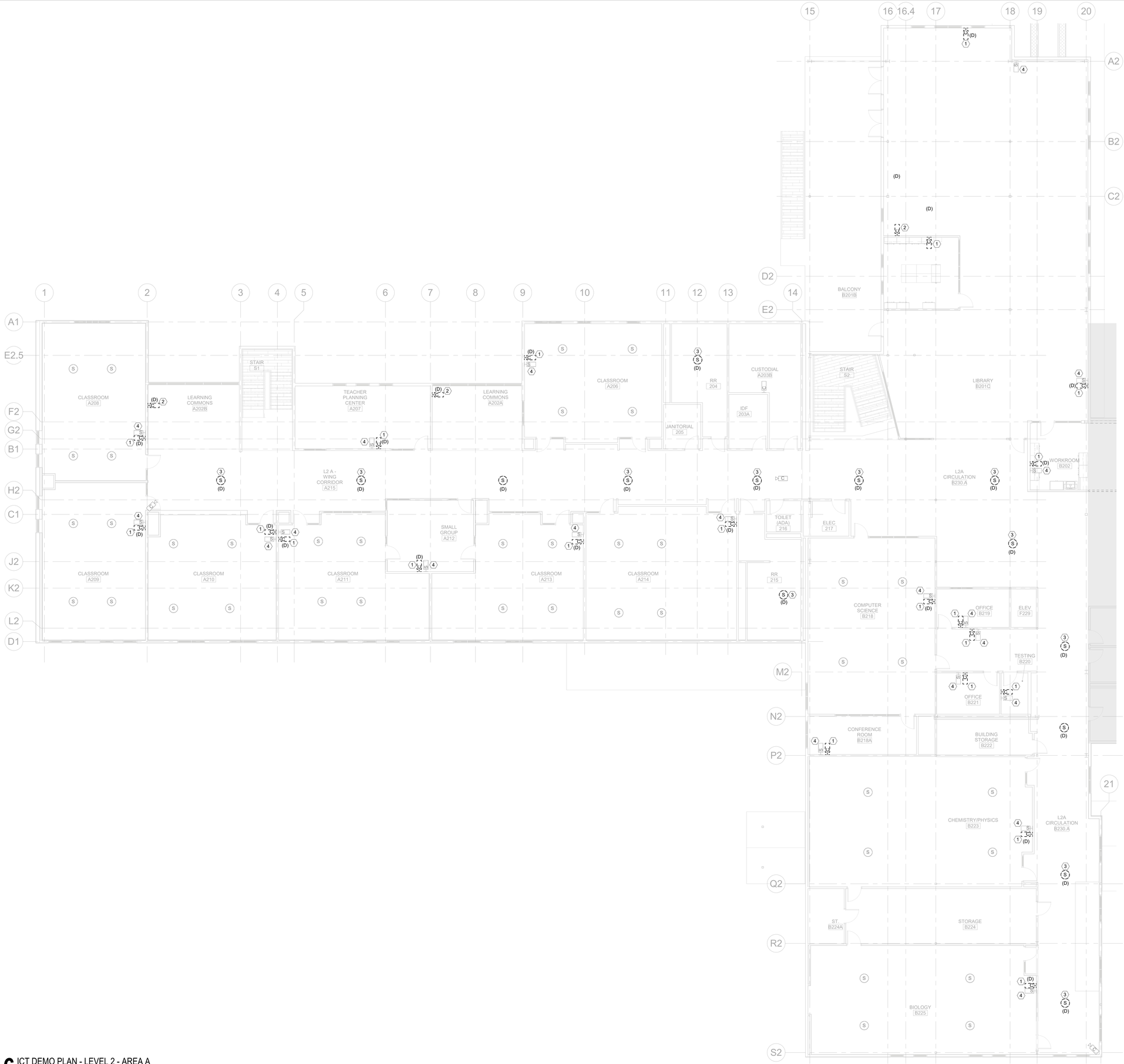
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KEY NOTES:

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MONTANA
KYLER J. WARNER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet ICT DEMO PLAN - LEVEL 2 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase BID DOCUMENTS

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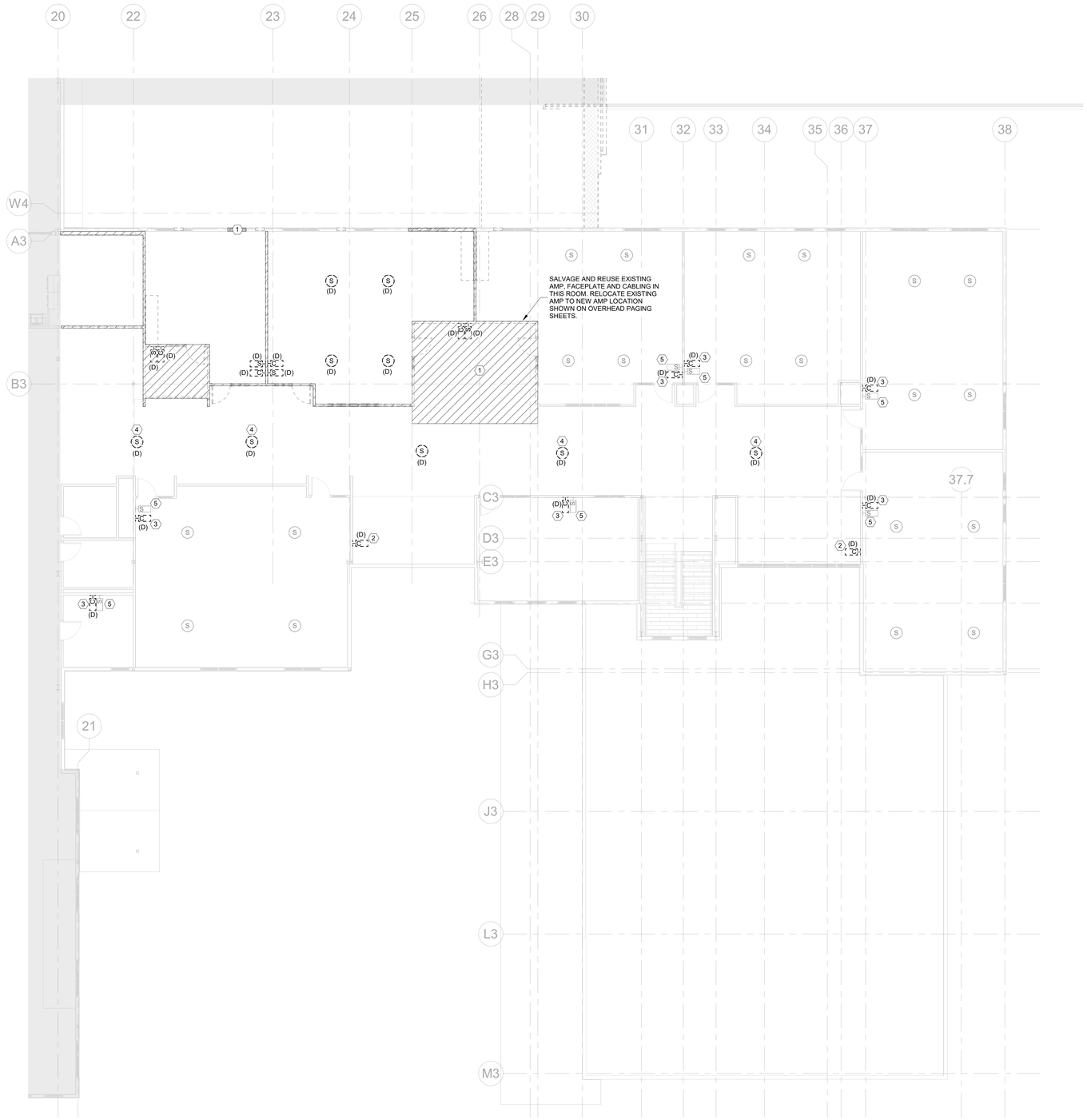
2/25/2026 3:45:35 PM

16 ICT DEMO PLAN - LEVEL 2 - AREA A
1/8" = 1'-0"

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

NORTH

KEY PLAN



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1 ALL WORK AREA OUTLETS, STRUCTURED CABLING, ACCESS CONTROL DEVICES, ACCESS CONTROL CABLING, AND ACTIVE EQUIPMENT IN THE DEMO'D WALLS WITHIN HATCHED GRID REGION SHALL BE DEMO'D TO SOURCE AND RETURNED TO OWNER, UNO. ALL EXISTING DEVICES LOCATED IN NON-DEMO'D WALLS SHALL REMAIN. STRUCTURED CABLING PASSING THROUGH DEMO'D AREAS AND FEEDING EXISTING DEVICES NOT LOCATED IN DEMO'D AREAS SHALL BE RELOCATED TO A NEW PERMANENT PATHWAY.
2 PATCH HOLE AND PAINT TO MATCH EXISTING WALL.
3 DEMO AND LEGALLY DISPOSE OF EXISTING CLOCK. USE EXISTING CABLING AS PULL STRING FOR NEW SPEAKER/CLOCK COMBO UNIT CABLING.
4 DEMO AND LEGALLY DISPOSE OF EXISTING SPEAKER. DEMO EXISTING CABLING BACK TO SOURCE. REUSE CEILING CUTOUT FOR NEW SPEAKER.
5 DISCONNECT CABLING AND DEMO BACK TO SOURCE. SPEAKER TO REMAIN.

MONTANA
KYLER J. KRAMMER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet: ICT DEMO PLAN - LEVEL 2 - AREA B
project: WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner: WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A2	2-19-26

phase: BID DOCUMENTS

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issue date: Feb 06, 2026

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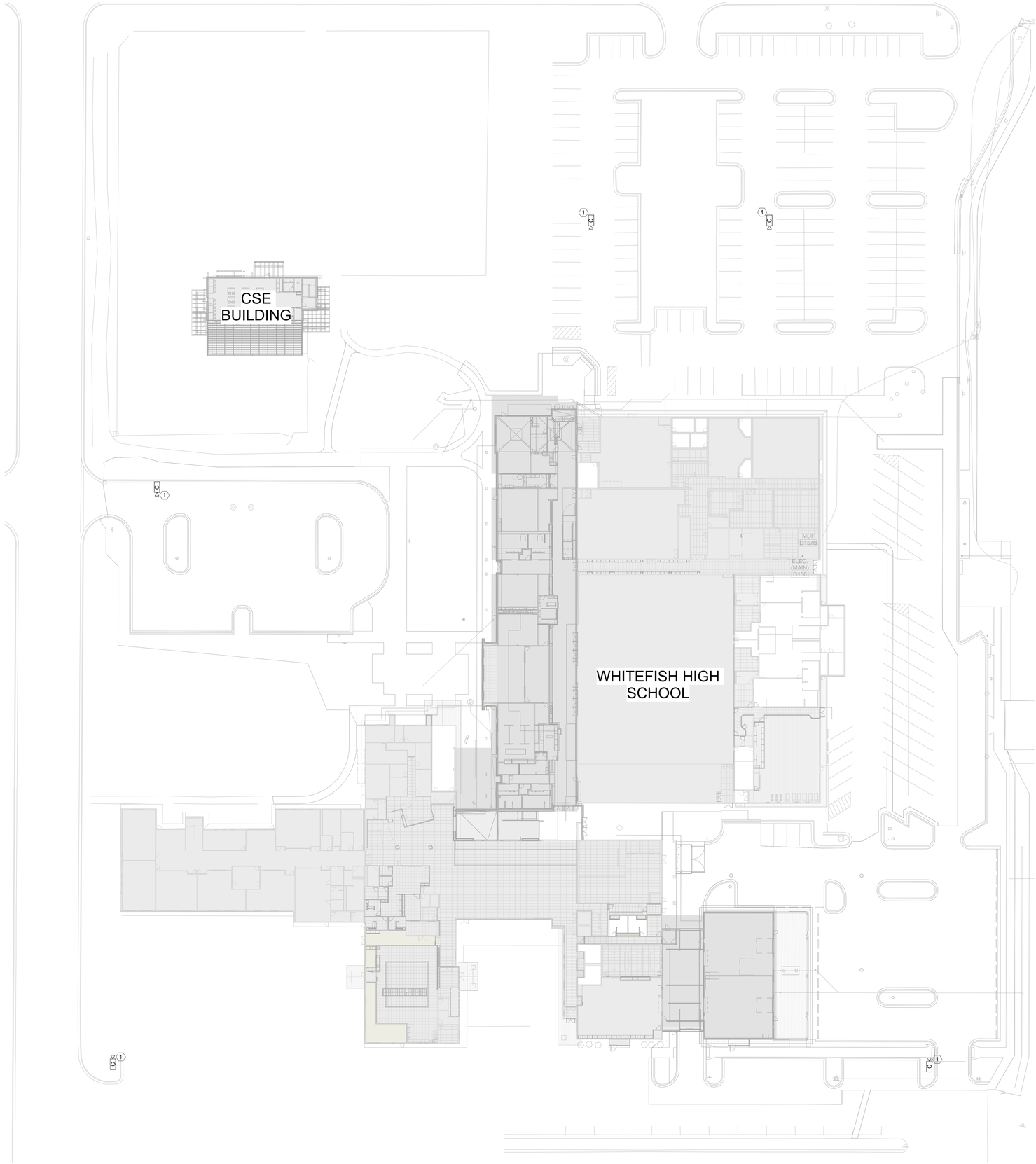
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16 ICT DEMO PLAN - LEVEL 2 - AREA B
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN



16 ICT SITE PLAN
1" = 30'-0"

GENERAL ICT SITE NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.
F. LINES SHOWN ON THE PLAN FROM ICT BASED DEVICES TO THE BUILDING REPRESENT THE PROPOSED ROUTING PATH FOR PATHWAYS. CONTRACTOR SHALL SELECT BEST PATH WHEN ROUTING FOR THE LEAST IMPACT ON SITE OR BUILDING.
G. PRIOR TO ANY TRENCHING, CONTACT 811 'CALL BEFORE YOU DIG' AND COORDINATE WITH OWNER AND UTILITIES TO LOCATE ALL BURIED POWER, COMMUNICATIONS, GAS, WATER, SEWER, IRRIGATION PIPING, ETC. FROM THIS INFORMATION, ESTABLISH THE BEST ROUTING AND PLAN FOR AREAS THAT WILL REQUIRE HAND DIGGING.
H. ALL PATHWAYS ON SITE SHALL HAVE A MINIMUM OF 36" OF CLEAN, PROPERLY COMPACTED COVER.
I. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF SIDEWALKS, PAVEMENT, FLOORS, WALLS, CEILINGS, ROOFS, ETC. TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
J. CAREFULLY CUT AND RETAIN SOD ALIVE FOR REINSTALLATION. SAW CUT, REMOVE, AND LEGALLY DISPOSE OF CONCRETE AND ASPHALT.
K. INSTALL MOLDED PLASTIC INTERMEDIATE (HORIZONTAL) SPACERS EVERY SIX FEET WHENEVER TWO OR MORE CONDUITS ARE INSTALLED IN A TRENCH. MAINTAIN A MINIMUM 12-INCH SEPARATION BETWEEN POWER AND COMMUNICATIONS CONDUITS. WHERE TRENCH IS SHARED WITH OTHER UTILITIES, A MINIMUM 24-INCH SEPARATION SHALL BE MAINTAINED FROM WATER, GAS, OR SEWER LINES. ALL CONDUIT SEPARATIONS ARE MEASURED SURFACE-TO-SURFACE AND NOT CENTER-TO-CENTER.
L. FILL TRENCH AND COMPACT TO MATCH ADJACENT UNDISTRUBED SOIL. REPLACE SOD TO MATCH EXISTING. POUR CONCRETE AND REPLACE ASPHALT TO MATCH ADJACENT SURFACES.
M. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO EXISTING BURIED POWER, COMMUNICATIONS, GAS, WATER, SEWER, IRRIGATION PIPING, ETC. AND SHALL HIRE TRAINED AND CERTIFIED CRAFTSMEN TO PERFORM THE REPAIRS AND BRING THEM BACK TO 'LIKE EXISTING CONDITIONS'. REPARI WORK WILL NOT BE CONSIDERED COMPLETE UNTIL ALL SYSTEMS ARE ONCE AGAIN FUNCTIONING PROPERLY AND OWNER IS SATISFIED WITH THE REPAIRS.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.

MONTANA
KYLER J. KLINGER
NO. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet ICT SITE PLAN
project WHITEFISH HIGH SCHOOL
ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase
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issue date
Feb 06, 2026

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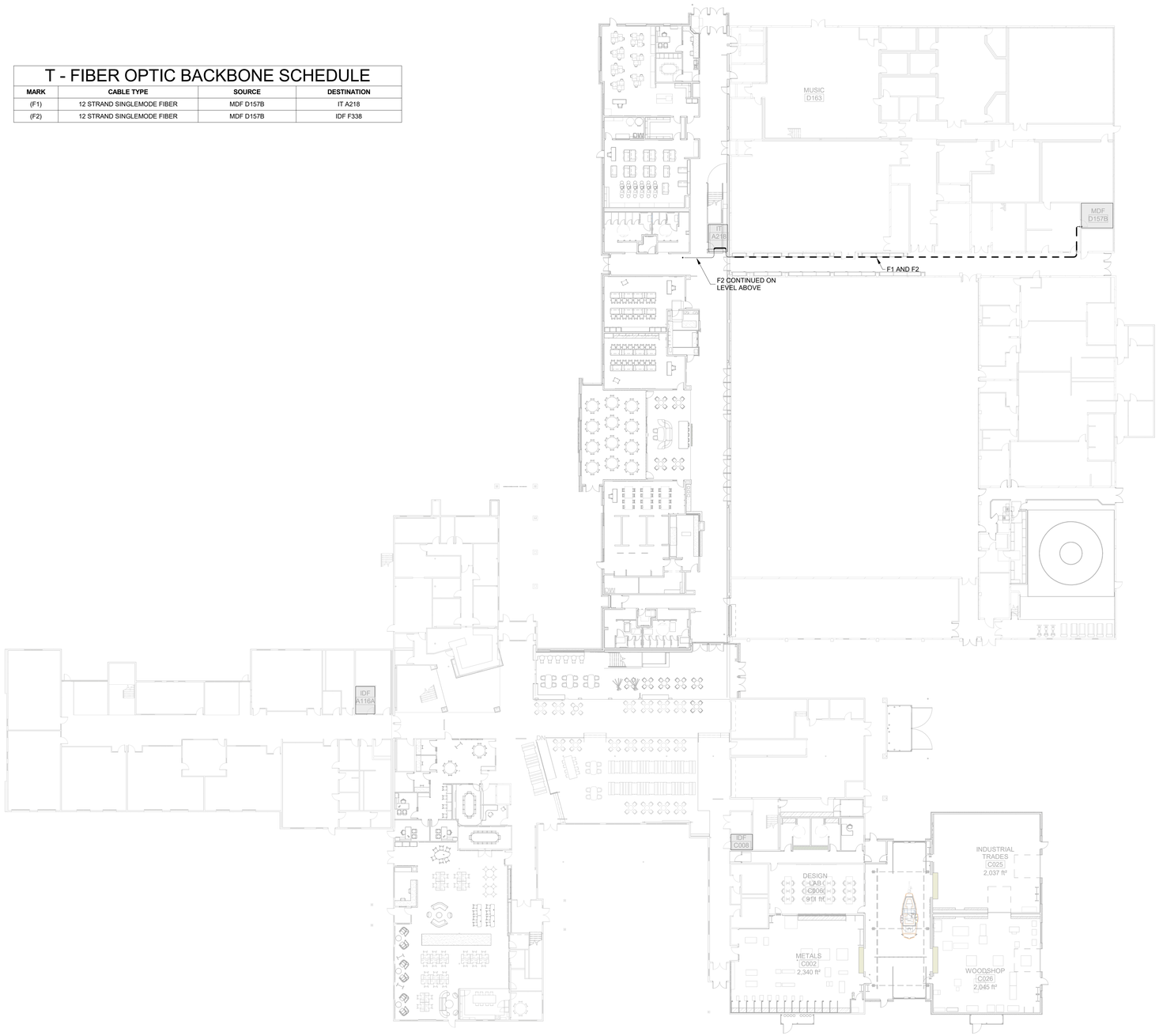
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GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

T - FIBER OPTIC BACKBONE SCHEDULE

MARK	CABLE TYPE	SOURCE	DESTINATION
(F1)	12 STRAND SINGLEMODE FIBER	MDF D157B	IT A218
(F2)	12 STRAND SINGLEMODE FIBER	MDF D157B	IDF F338



16 BACKBONE PLAN - LEVEL 1 - OVERALL
3/64" = 1'-0"

2/25/2026 3:45:50 PM

NORTH

KEY PLAN

MONTANA
KYLE J. GUNNARSON
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet BACKBONE PLAN - LEVEL 1 - OVERALL
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

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GENERAL ICT NOTES

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B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

T - FIBER OPTIC BACKBONE SCHEDULE

MARK	CABLE TYPE	SOURCE	DESTINATION
(F1)	12 STRAND SINGLEMODE FIBER	MDF D157B	IT A218
(F2)	12 STRAND SINGLEMODE FIBER	MDF D157B	IDF F338



16 BACKBONE PLAN - LEVEL 2 - OVERALL
3/64" = 1'-0"

NORTH

KEY PLAN
D
C
A
B

MONTANA
KYLE J. GUNNARSON
No. 25920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet BACKBONE PLAN - LEVEL 2 - OVERALL
project WHITEFISH HIGH SCHOOL
ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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GENERAL ICT NOTES

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B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

#	
1	MOUNT WORK AREA OUTLET ABOVE COUNTER, MATCH ADJACENT ELECTRICAL RECEPTACLE HEIGHT.
2	RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND TV LOCATION SHOWN. PROVIDE BRUSH FACEPLATES ON EACH END.
3	SWEEP CONDUIT TO +2' ABOVE FINISHED CEILING IN OFFICE F221.
4	RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
5	FOR FACP, COORDINATE LOCATION WITH CONTRACTOR PRIOR TO ROUGH-IN.
6	EXISTING CONDUIT TO REMAIN. REUSE CONDUIT FOR NEW PATHWAYS. CONDUIT LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY EXACT LOCATION.

MONTANA
KYLE J. GRANGER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN - LEVEL 1 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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16 STRUCTURED CABLING PLAN - LEVEL 1 - AREA A
1/8" = 1'-0"

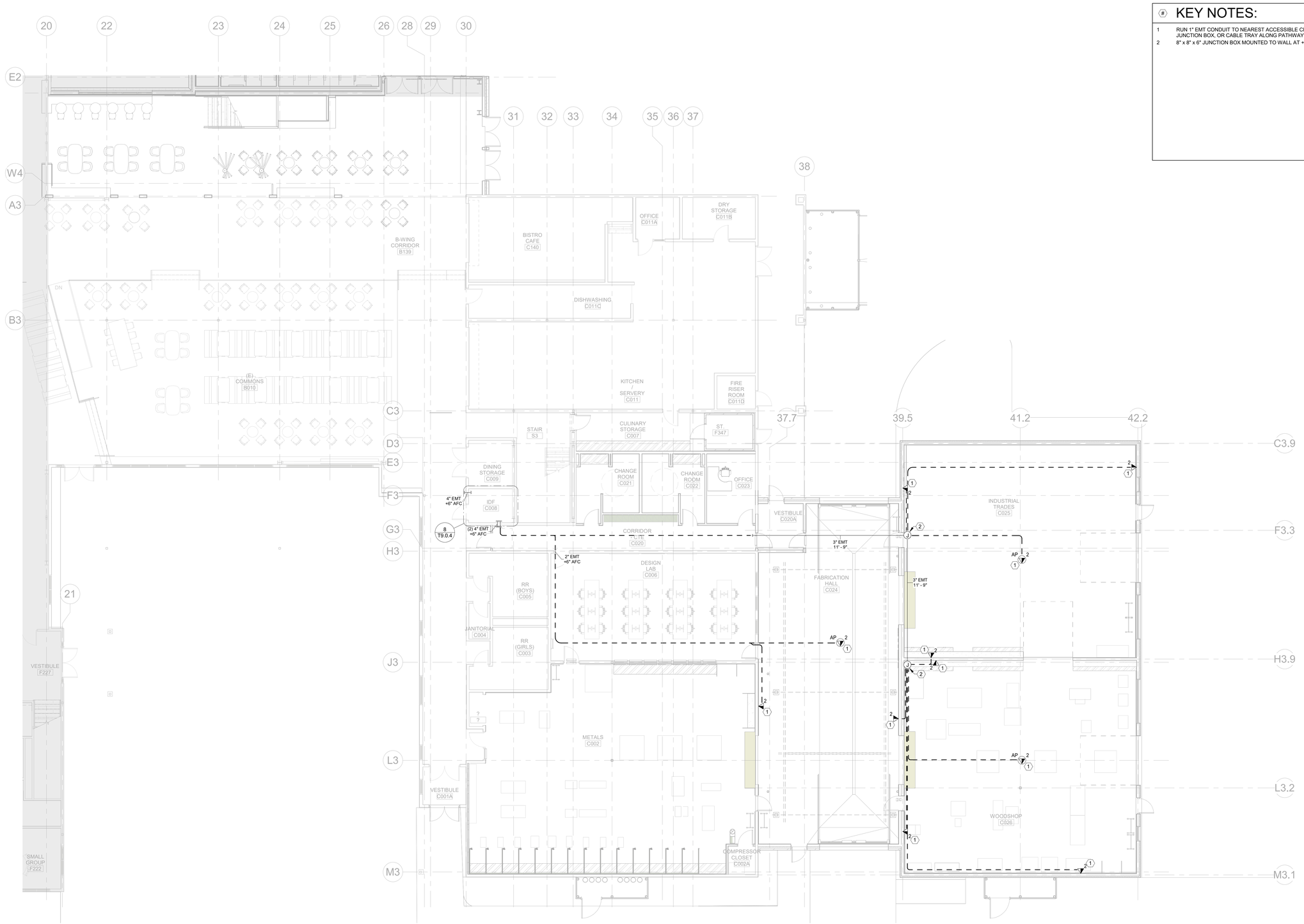
SCALE : 1/8" = 1'-0"
NORTH
KEY PLAN

GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
2 8" x 8" x 6" JUNCTION BOX MOUNTED TO WALL AT +11'-9" AFF.



MONTANA
KYLER J. GUNNARSON
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN - LEVEL 1 - AREA B
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase BID DOCUMENTS

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issue date Feb 06, 2026

T2.1.1B

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16 STRUCTURED CABLING PLAN - LEVEL 1 - AREA B
1/8" = 1'-0"

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

NORTH

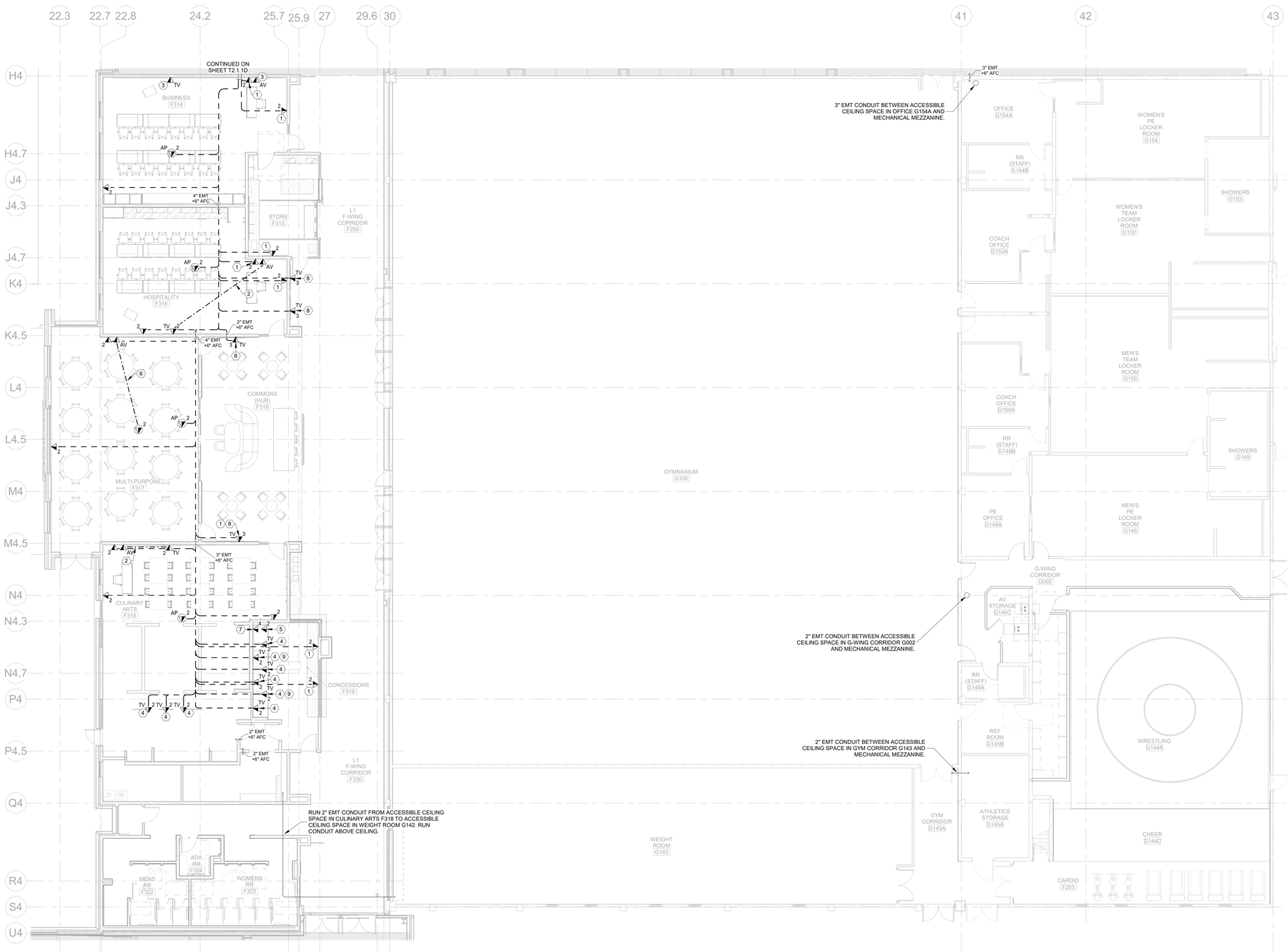
KEY PLAN

GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
2 RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND TV LOCATION SHOWN. PROVIDE BRUSH FACEPLATES ON EACH END.
3 PROVIDE ROUGH-IN ONLY.
4 PROVIDE BRUSH FACEPLATE IN AV GANG, AND RUN 1-1/4" EMT CONDUIT FROM TV BACKBOX TO NEAREST ACCESSIBLE CEILING SPACE.
5 RUN (1) CATEGORY 6A CABLE FROM BOTH CAMERAS LOCATED IN GYM TO HEAD END OF OWNER FURNISHED CAMERA SYSTEM LOCATED IN CONCESSIONS F319. COORDINATE EXACT LOCATION WITH OWNER PRIOR TO ROUGH-IN.
6 RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND PROJECTOR LOCATION SHOWN. PROVIDE BRUSH FACEPLATE AT AV BOX.
7 PROVIDE KANEXPRO SP-1X8HD150M HDMI 1X8 PREMIUM EXTENDER SPLITTER. RUN (1) SHIELDED CATEGORY 6A CABLE FROM SPLITTER TO EACH TV OUTSIDE OF CONCESSIONS F319 THAT REQUIRES A RECEIVER. TVS REQUIRING A RECEIVER ARE DENOTED BY KEYNOTES. PROVIDE JACKS AND PATCH CABLES AT EACH END, UNO.
8 RUN (2) CATEGORY 6A CABLES TO NEAREST IDF. RUN (1) SHIELDED CATEGORY 6A CABLE TO WAO FOR HDMI SPLITTER LOCATED IN CONCESSIONS F319. PROVIDE RECIEVER FOR HDMI SPLITTER.
9 PROVIDE RECIEVER FOR HDMI SPLITTER. RUN PATCH CORD FROM HDMI SPLITTER TO RECIEVER.



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16 STRUCTURED CABLING PLAN - LEVEL 1 - AREA C
1/8" = 1'-0"

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

NORTH

KEY PLAN

issue date
Feb 06, 2026

T2.1.1C

sheet STRUCTURED CABLING PLAN - LEVEL 1 - AREA C
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision A3
date 2-26-26

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MONTANA
Kyler J. Wilmarth
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

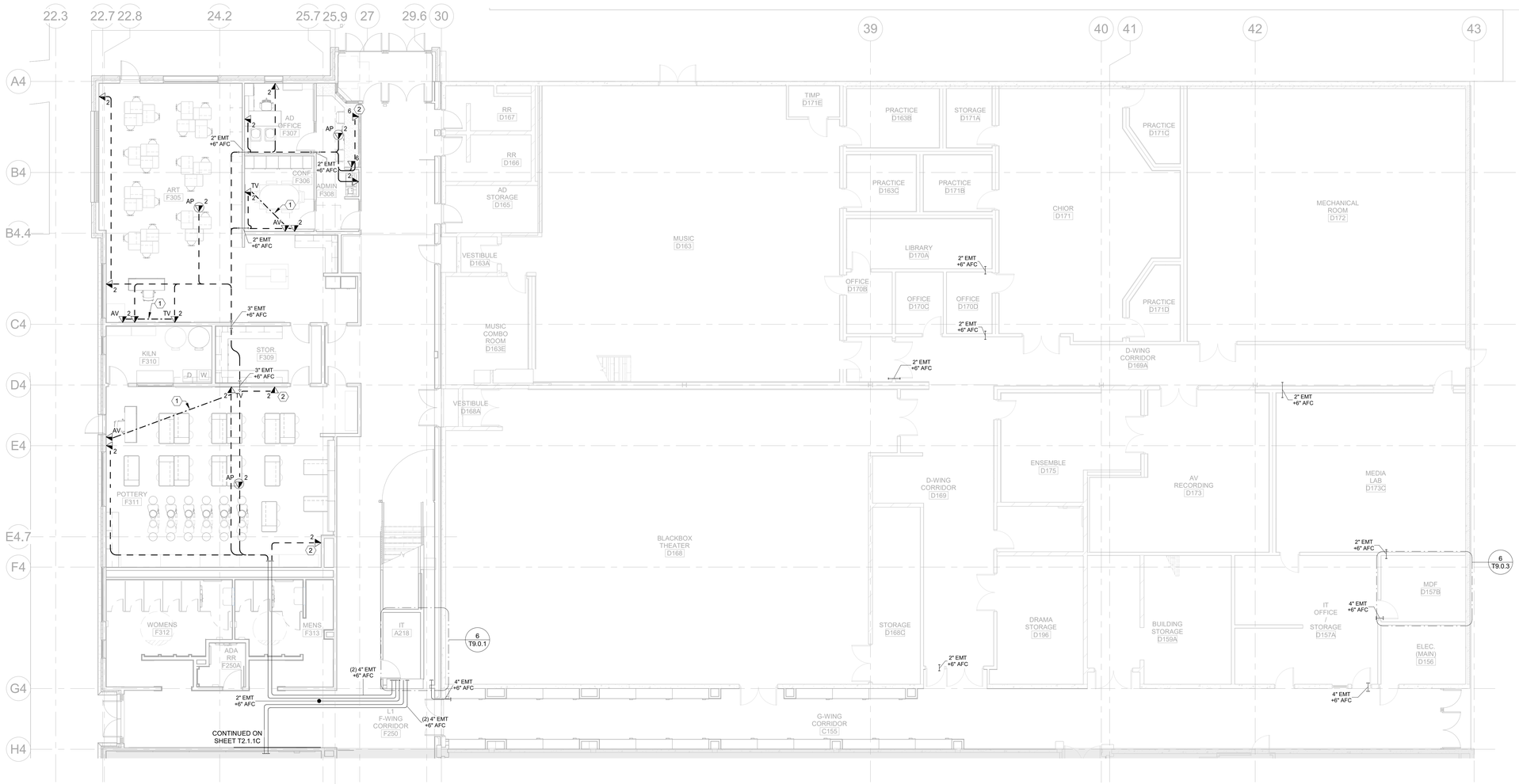
REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

GENERAL ICT NOTES

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B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

(#) KEY NOTES:

1 RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND TV LOCATION SHOWN. PROVIDE BRUSH FACEPLATES ON EACH END.
2 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.



16 STRUCTURED CABLING PLAN - LEVEL 1 - AREA D
1/8" = 1'-0"

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

NORTH

KEY PLAN

2/25/2026 3:46:26 PM

MONTANA
KYLER J. GUNNARSON
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN - LEVEL 1 - AREA D
project WHITEFISH HIGH SCHOOL
ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase
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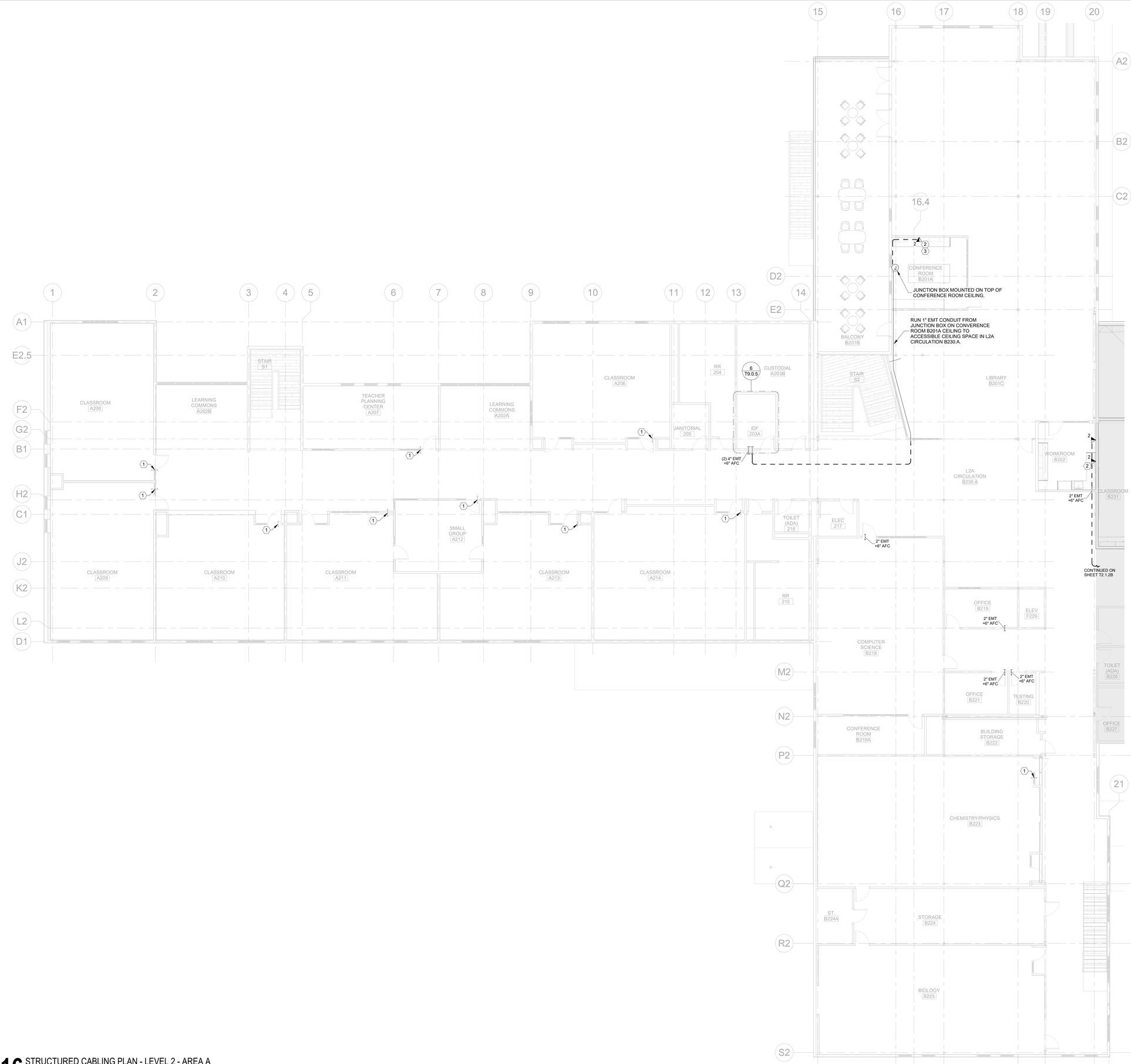
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GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CONDUIT TO REMAIN. REUSE CONDUIT FOR NEW PATHWAYS. CONDUIT LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY EXACT LOCATION .
2 MOUNT WORK AREA OUTLET ABOVE COUNTER, MATCH ADJACENT ELECTRICAL RECEPTACLE HEIGHT.
3 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.



16 STRUCTURED CABLING PLAN - LEVEL 2 - AREA A
1/8" = 1'-0"

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

KEY PLAN

2/25/2026 3:46:29 PM

MONTANA
KYLE J. GRAHAM
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN - LEVEL 2 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

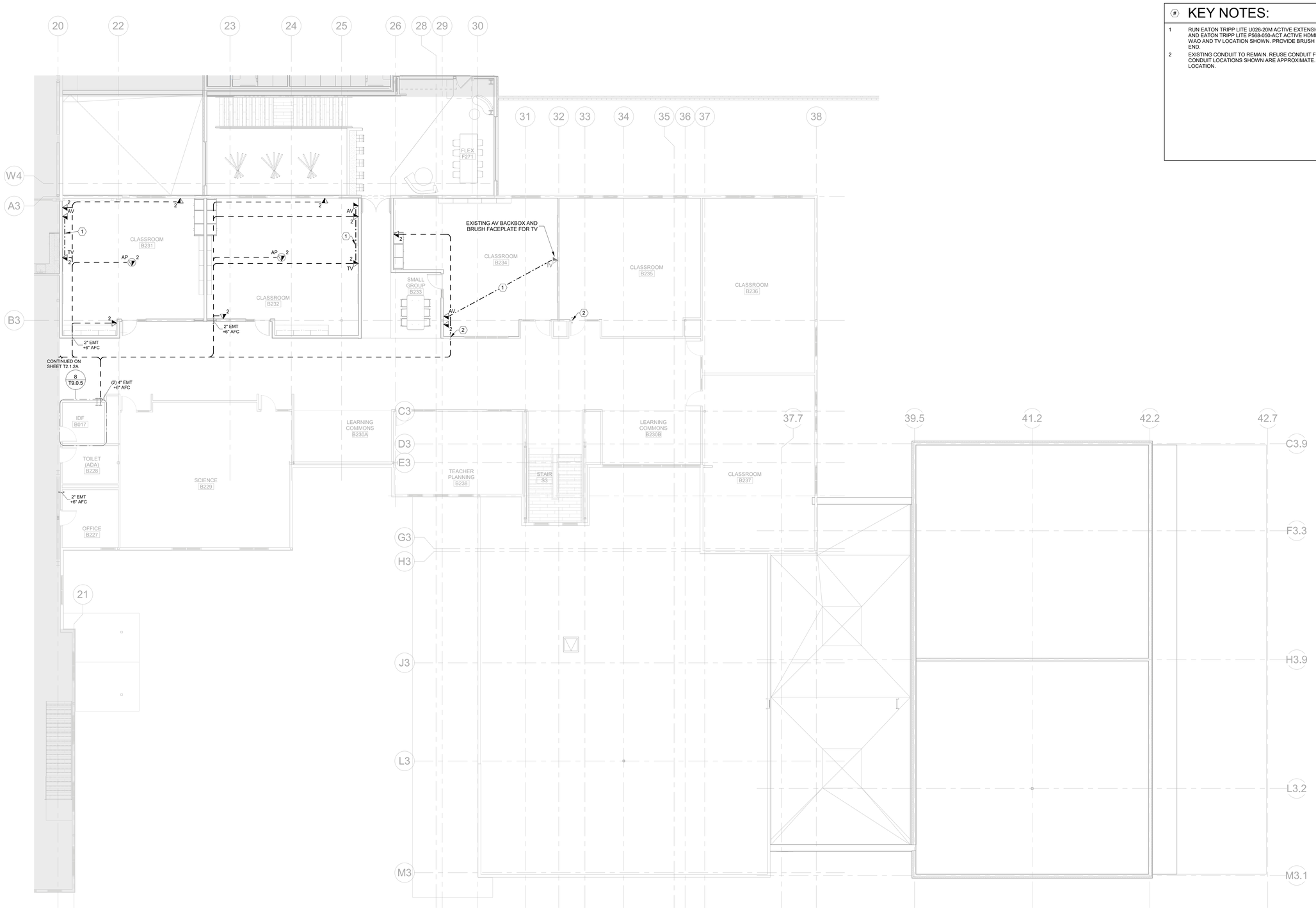
revision	date
A2	2-19-26

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BID DOCUMENTS

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issue date
Feb 06, 2026

T2.1.2A



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND TV LOCATION SHOWN. PROVIDE BRUSH FACEPLATES ON EACH END.

2 EXISTING CONDUIT TO REMAIN. REUSE CONDUIT FOR NEW PATHWAYS. CONDUIT LOCATIONS SHOWN ARE APPROXIMATE. FIELD VERIFY EXACT LOCATION.

MONTANA
KYLE J. GALLAGHER
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet: STRUCTURED CABLING PLAN - LEVEL 2 - AREA B

project: WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS

owner: WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A3	2-26-26

phase: BID DOCUMENTS

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issue date: Feb 06, 2026

T2.1.2B

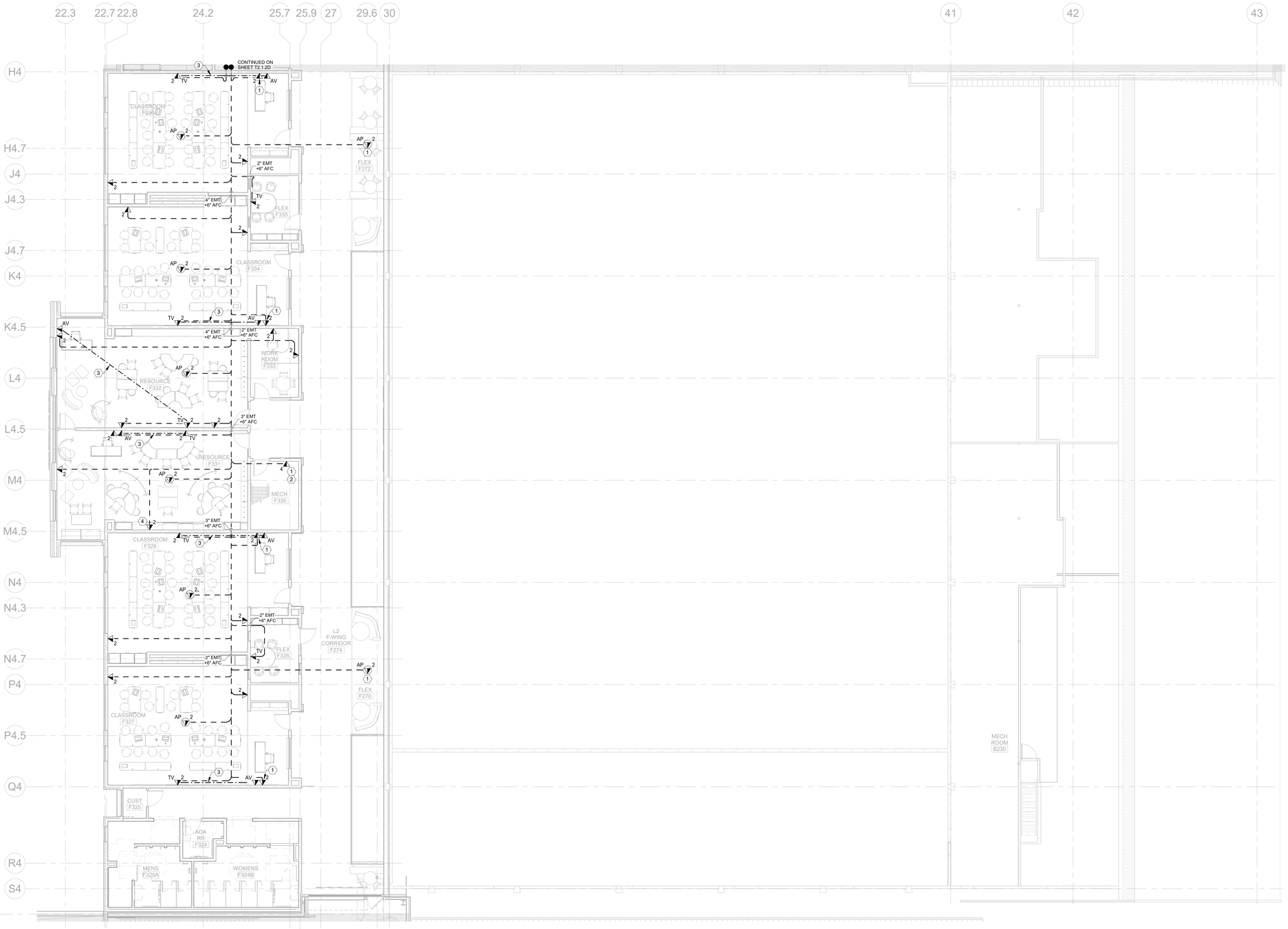
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16 STRUCTURED CABLING PLAN - LEVEL 2 - AREA B
1/8" = 1'-0"

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

NORTH

KEY PLAN



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
2 OUTLET FOR TEMPERATURE CONTROLS. COORDINATE LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH IN.
3 RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND TV LOCATION SHOWN. PROVIDE BRUSH FACEPLATES ON EACH END.
4 MOUNT WORK AREA OUTLET ABOVE COUNTER, MATCH ADJACENT ELECTRICAL RECEPTACLE HEIGHT.

MONTANA
KYLER J. WILLIAMSON
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN - LEVEL 2 - AREA C
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A1	2-12-26

phase
BID DOCUMENTS

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issue date
Feb 06, 2026

T2.1.2C

2/25/2026 3:46:42 PM

16 STRUCTURED CABLING PLAN - LEVEL 2 - AREA C
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

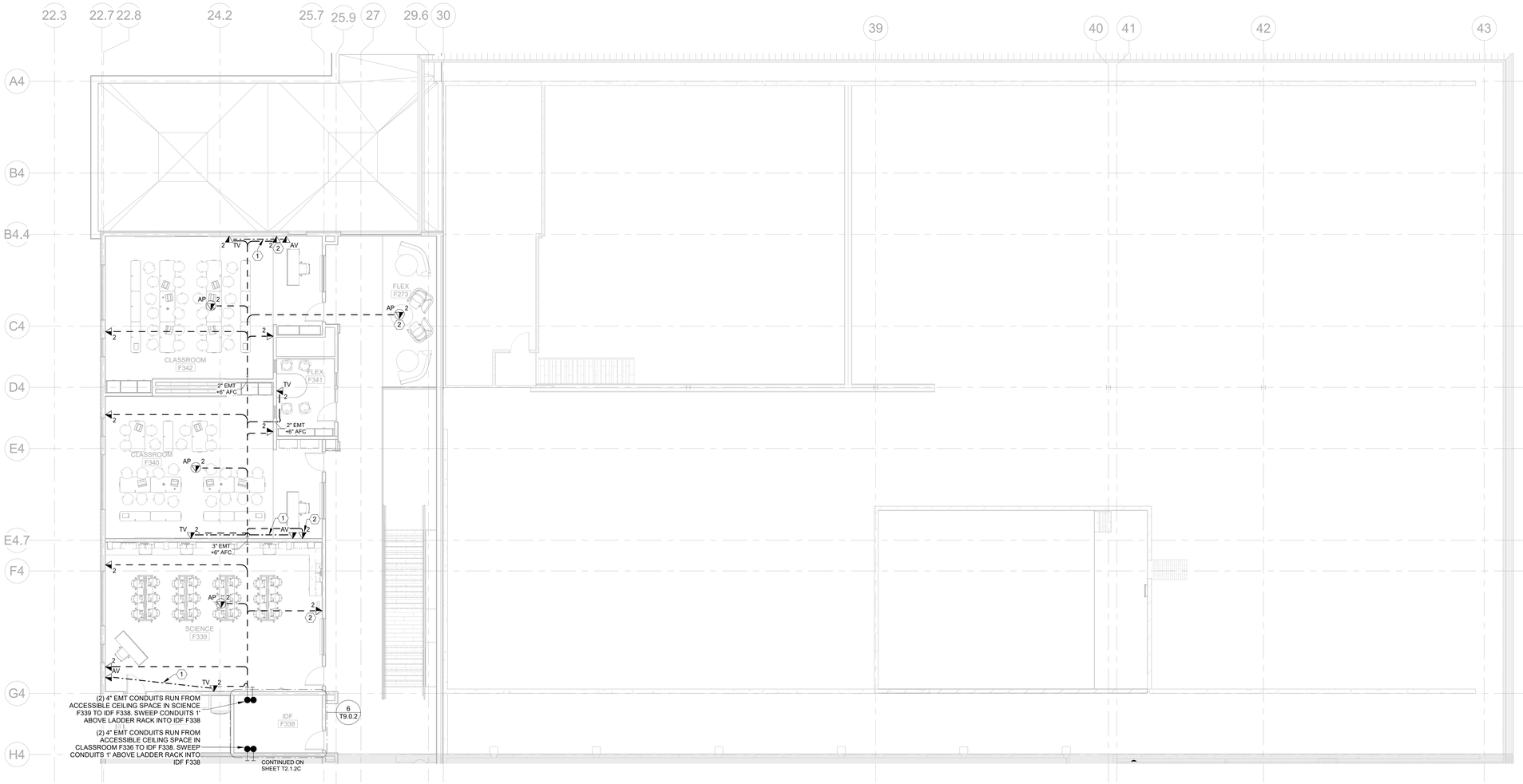
KEY PLAN
D
C
A
B

GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN EATON TRIPP LITE U026-20M ACTIVE EXTENSION REPEATER CABLE AND EATON TRIPP LITE P568-050-ACT ACTIVE HDMI CABLE BETWEEN AV WAO AND TV LOCATION SHOWN. PROVIDE BRUSH FACEPLATES ON EACH END.
2 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.



16 STRUCTURED CABLING PLAN - LEVEL 2 - AREA D
1/8" = 1'-0"

SCALE : 1/8" = 1'-0"
NORTH
KEY PLAN

2/25/2026 3:47:03 PM

MONTANA
KYLER J. KLINGER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN - LEVEL 2 - AREA D
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

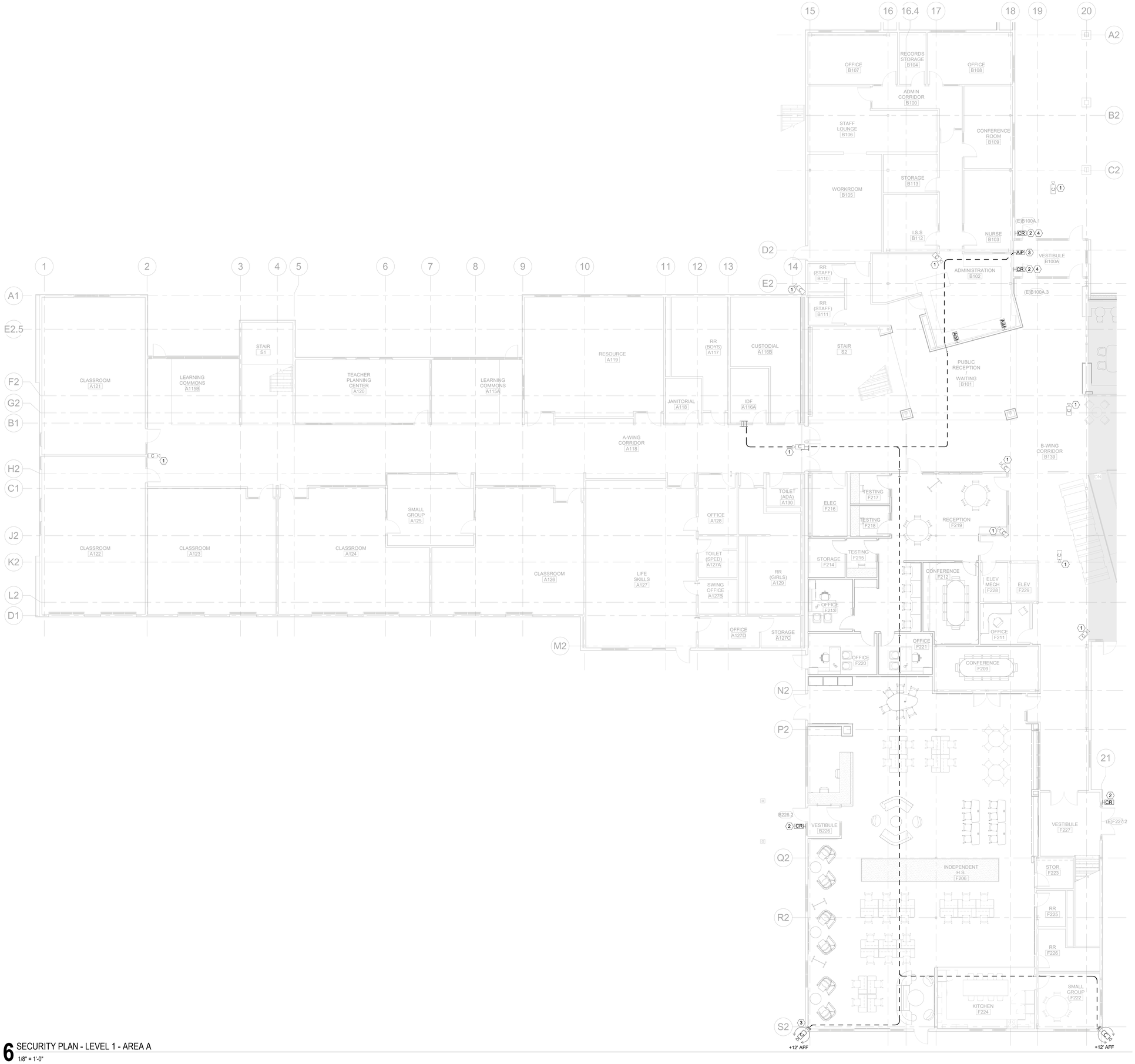
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A2	2-19-26

phase
BID DOCUMENTS

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issue date
Feb 06, 2026

T2.1.2D



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.
2 EXISTING ACCESS CONTROL DOOR TO BE PROVIDED WITH (N) CARD READER AND OSDP COMPLIANT CABLE. ALL EXISTING ACCESS CONTROL DOORS TO TERMINATE IN IDF C008. REUSE EXISTING PATHWAY. SEE DETAILS 11/T9.1.2 AND 13/T9.1.2 FOR ADDITIONAL INFORMATION.
3 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
4 INTEGRATE CARD READER WITH EXISTING AUTO OPERATORS.

KYLER J. WARNOCK
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER
MONTANA

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
Pete Weber
BICSI ID # 335372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN - LEVEL 1 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

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T2.2.1A

2/25/2026 3:47:10 PM

16 SECURITY PLAN - LEVEL 1 - AREA A
1/8" = 1'-0"

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

NORTH

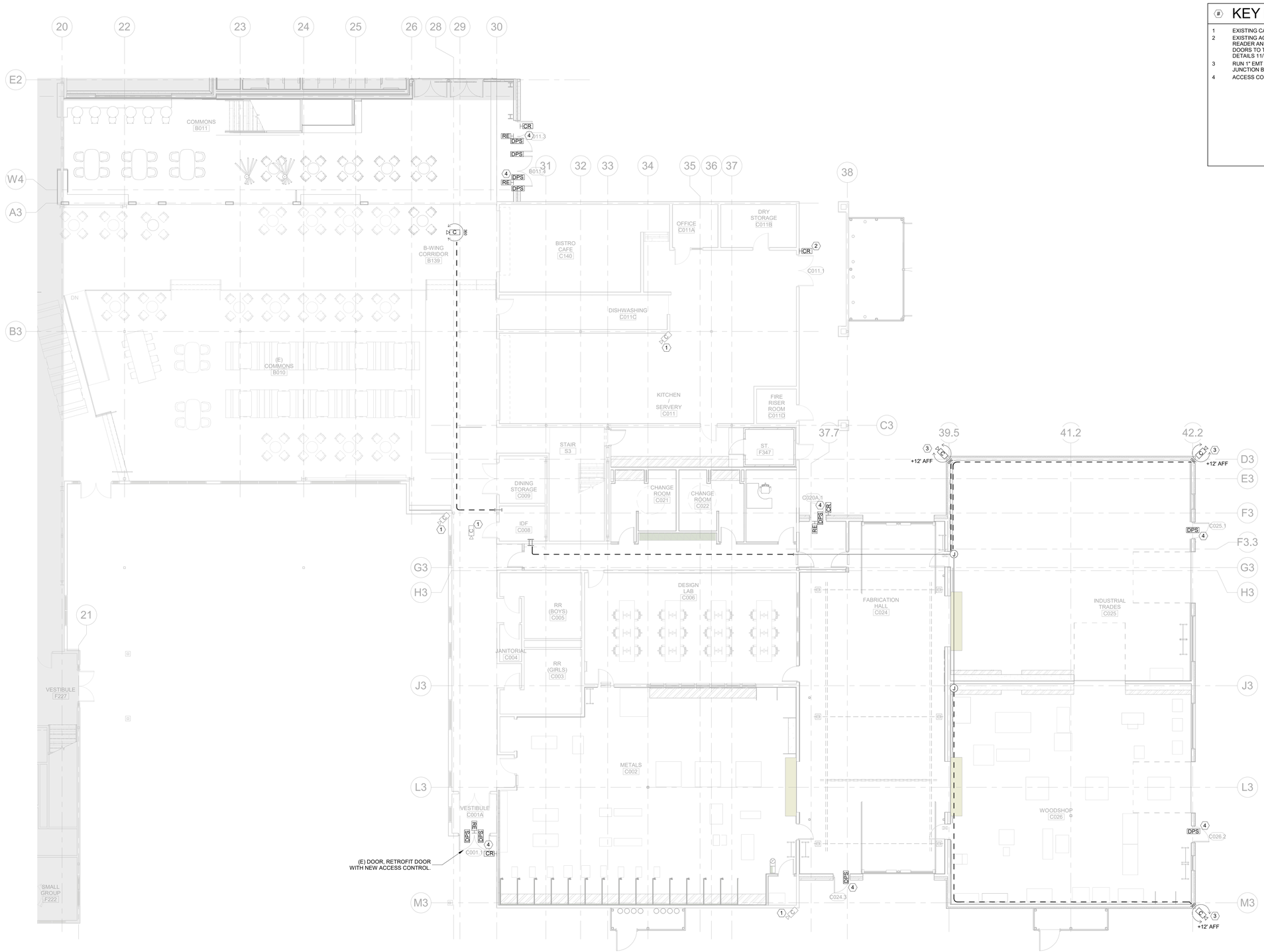
KEY PLAN

GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.
2 EXISTING ACCESS CONTROL DOOR TO BE PROVIDED WITH (N) CARD READER AND OSDP COMPLIANT CABLE. ALL EXISTING ACCESS CONTROL DOORS TO TERMINATE IN IDF C008. REUSE EXISTING PATHWAY. SEE DETAILS 11/T9.1.2 AND 13/T9.1.2 FOR ADDITIONAL INFORMATION.
3 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
4 ACCESS CONTROL CABLING TO TERMINATE IN IDF C008.



MONTANA
KYLER J. KNUDSEN
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN - LEVEL 1 - AREA B
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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T2.2.1B

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16 SECURITY PLAN - LEVEL 1 - AREA B
1/8" = 1'-0"

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

NORTH

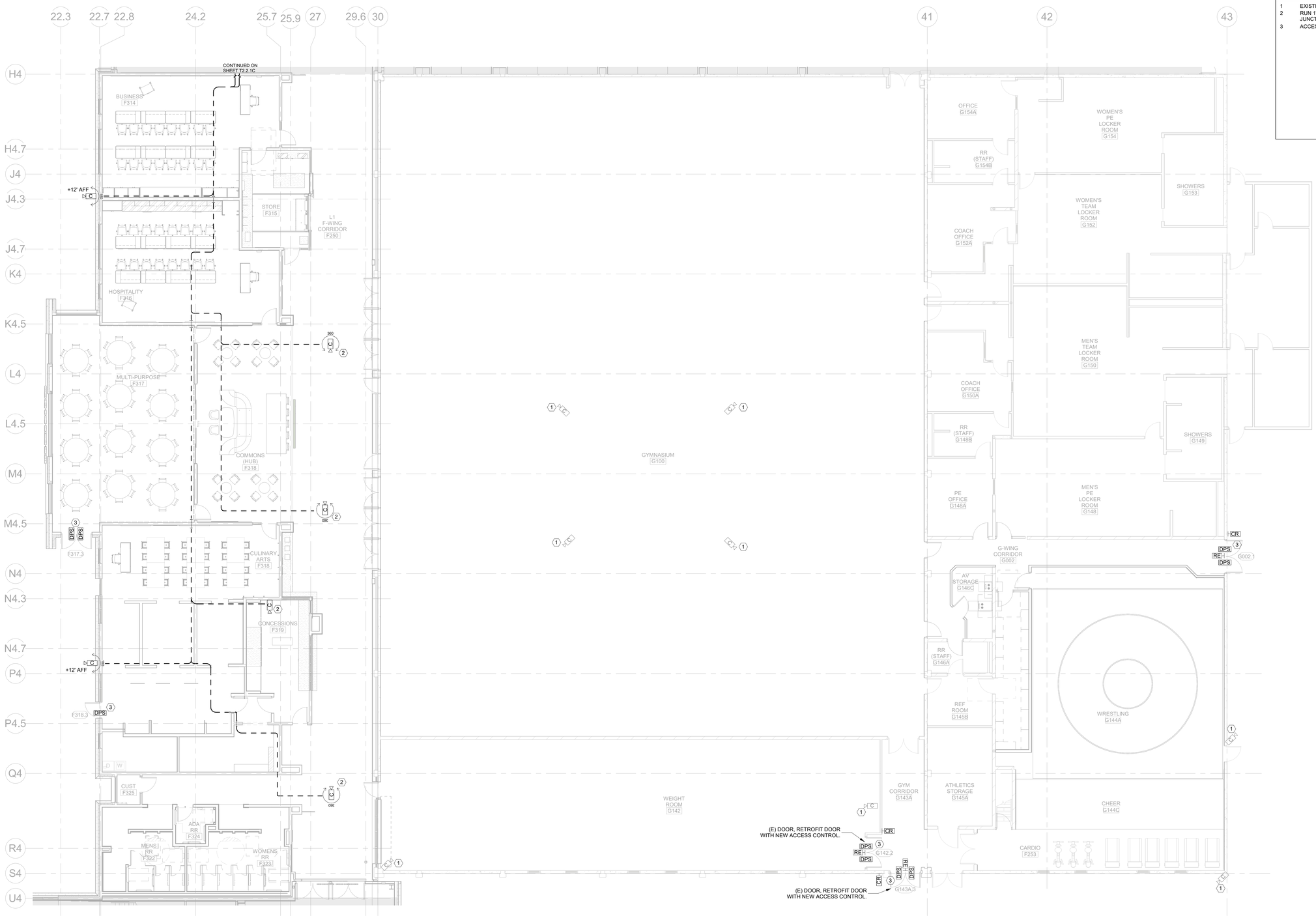
KEY PLAN

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.
2 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
3 ACCESS CONTROL CABLING TO TERMINATE IN IT A218.



16 SECURITY PLAN - LEVEL 1 - AREA C
1/8" = 1'-0"

2/25/2026 3:47:24 PM

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

NORTH

KEY PLAN

MONTANA
KYLER J. KRAMMES
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN - LEVEL 1 - AREA C
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

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issue date Feb 06, 2026

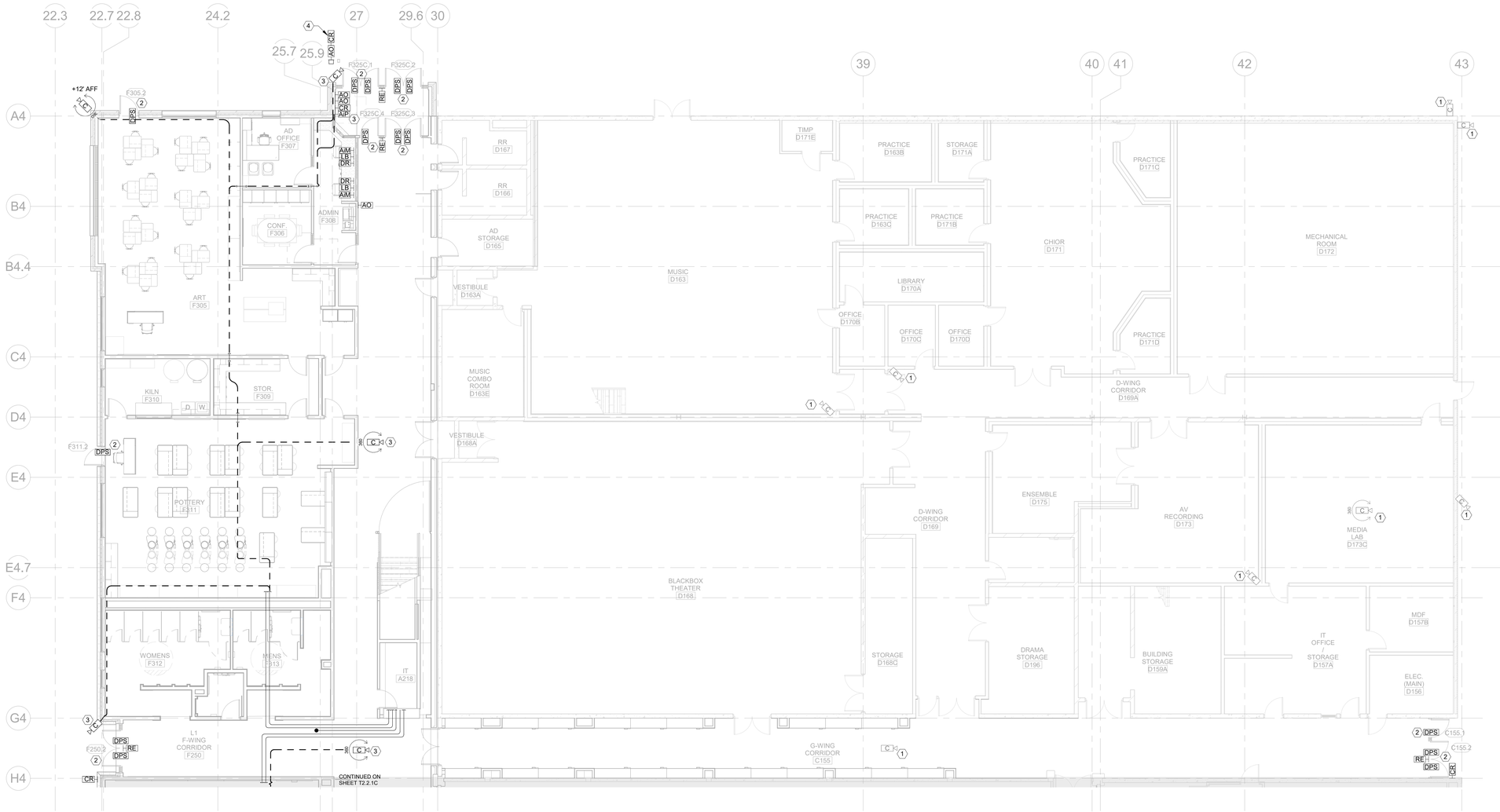
T2.2.1C

GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.
2 ACCESS CONTROL CABLING TO TERMINATE IN IT A218.
3 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
4 DEVICES MOUNTED ON PEDESTAL. PROVIDE 1" SCHEDULE 40 PVC CONDUIT FROM PEDESTAL BASE TO NEAREST ACCESSIBLE CEILING SPACE. PEDESTAL BY OTHERS.



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16 SECURITY PLAN - LEVEL 1 - AREA D
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN
D
C
A
B

MONTANA
KYLER J. KLINGER
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN - LEVEL 1 - AREA D
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

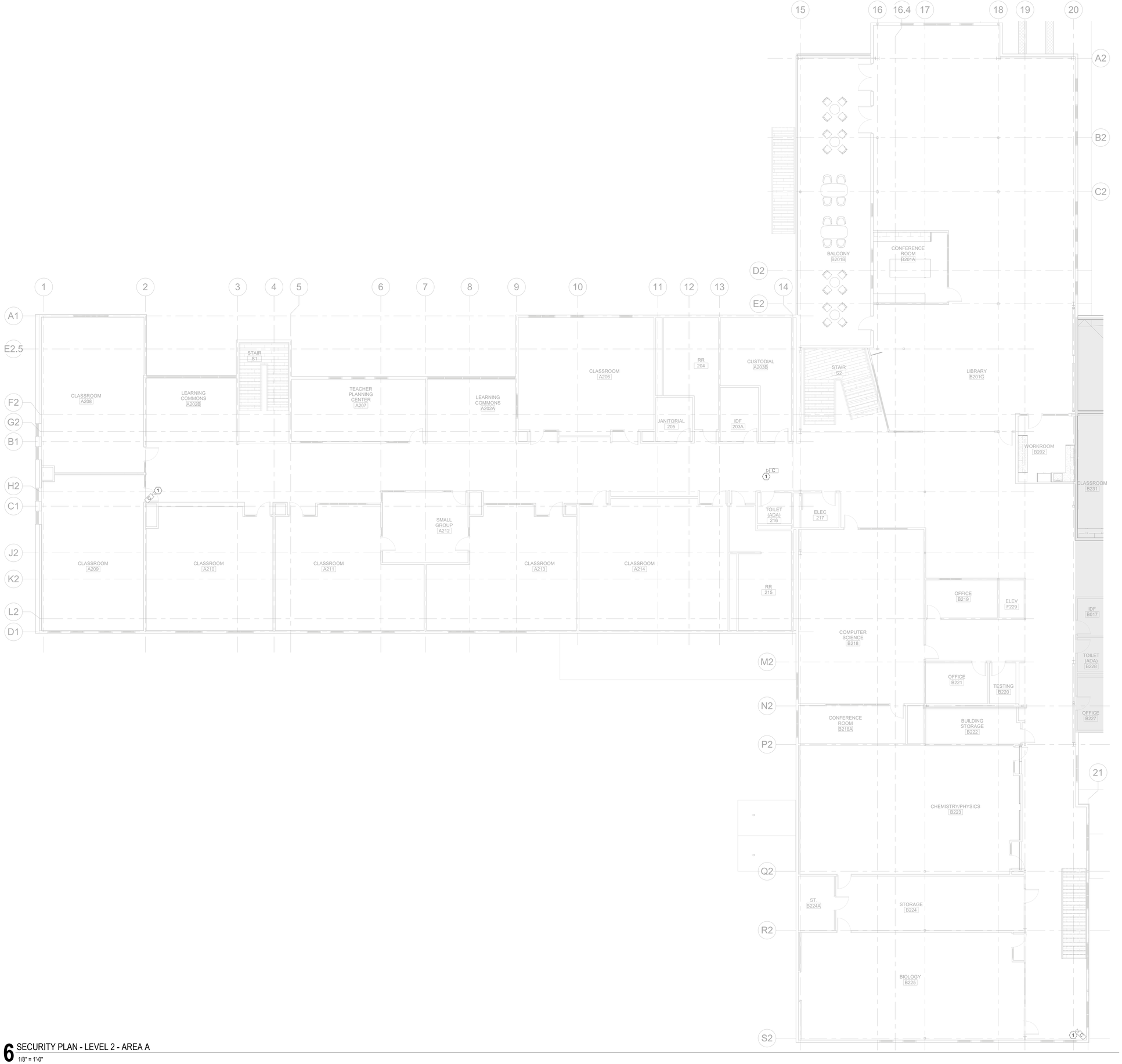
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phase
BID DOCUMENTS

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issue date
Feb 06, 2026

T2.2.1D



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.

MONTANA
KYLE J. WEBER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN - LEVEL 2 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase BID DOCUMENTS

NOT FOR CONSTRUCTION

issue date Feb 06, 2026

T2.2.2A

2/25/2026 3:47:33 PM

16 SECURITY PLAN - LEVEL 2 - AREA A
1/8" = 1'-0"

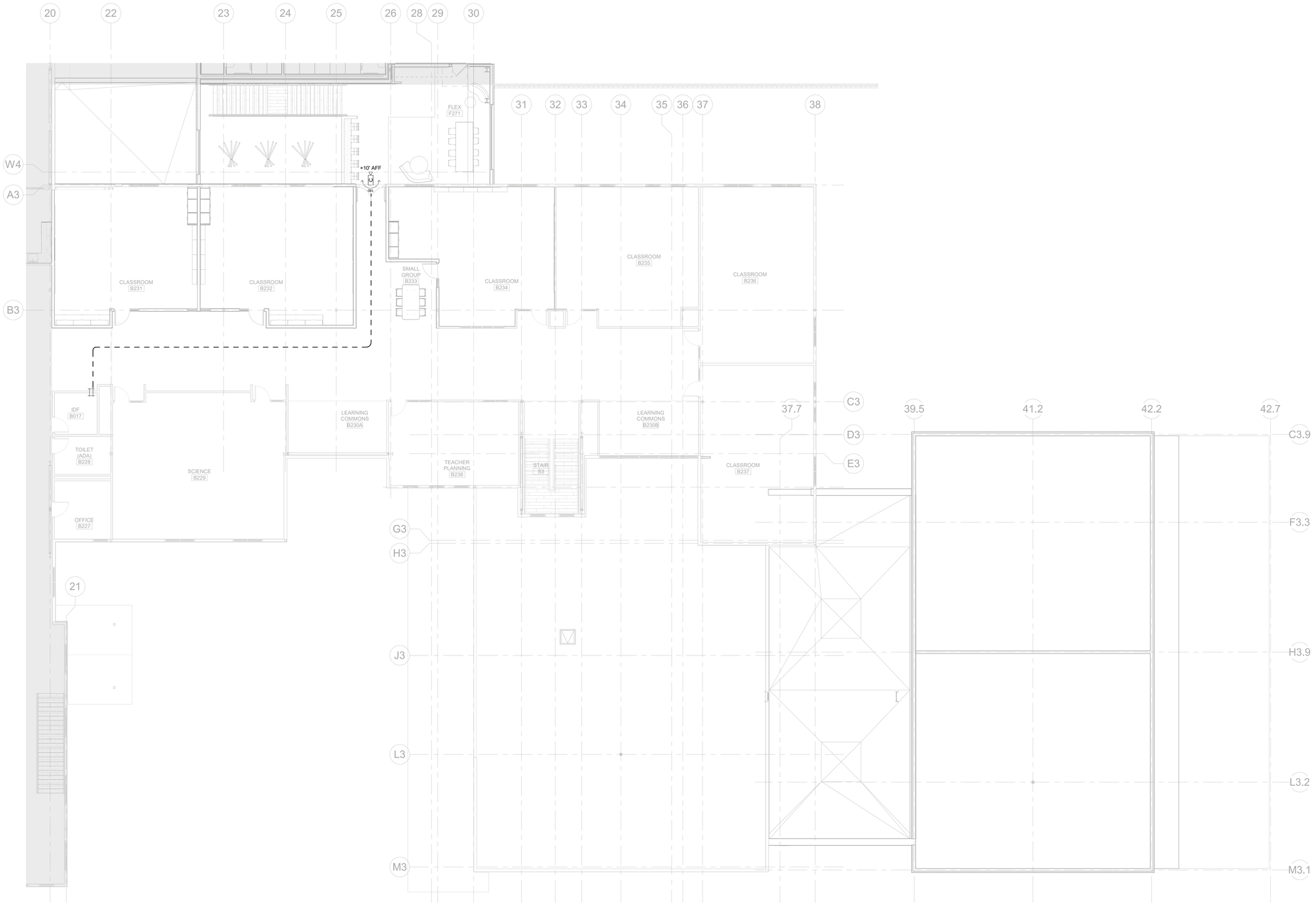
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN

GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.



MONTANA
KYLE J. GRAMSTAD
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet: SECURITY PLAN - LEVEL 2 - AREA B
project: WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner: WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision | date

phase: BID DOCUMENTS

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issue date: Feb 06, 2026

T2.2.2B

2/25/2026 3:47:37 PM

16 SECURITY PLAN - LEVEL 2 - AREA B
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.

MONTANA
KYLER J. KRAMMES
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN - LEVEL 2 - AREA C
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase BID DOCUMENTS

NOT FOR CONSTRUCTION

issue date Feb 06, 2026

T2.2.2C

2/25/2026 3:47:44 PM

16 SECURITY PLAN - LEVEL 2 - AREA C
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

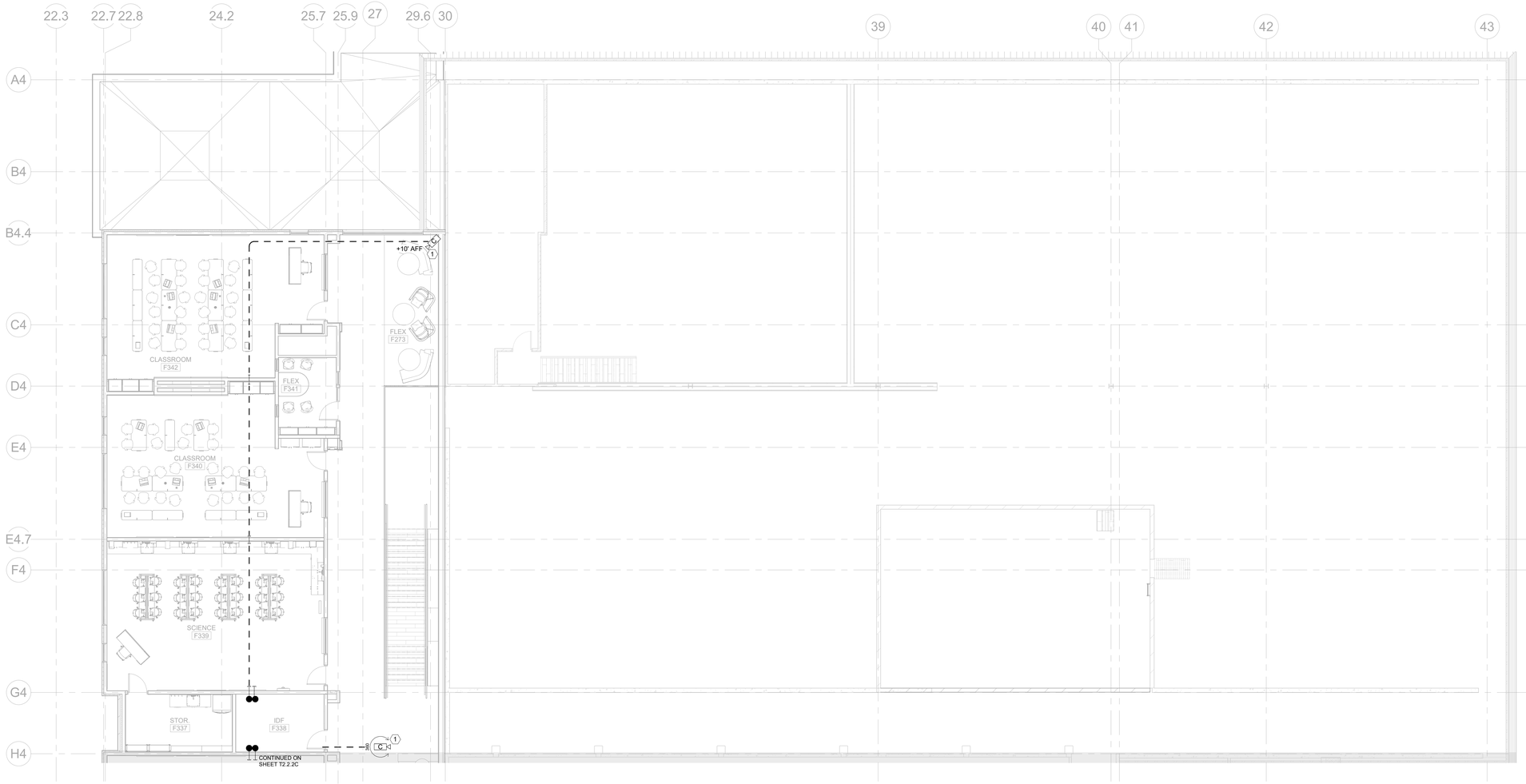
KEY PLAN
D
C
A
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GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.



16 SECURITY PLAN - LEVEL 2 - AREA D
1/8" = 1'-0"

2/25/2026 3:48:02 PM

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN

MONTANA
KYLE J. GUNNARSON
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
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project WHITEFISH HIGH SCHOOL
ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

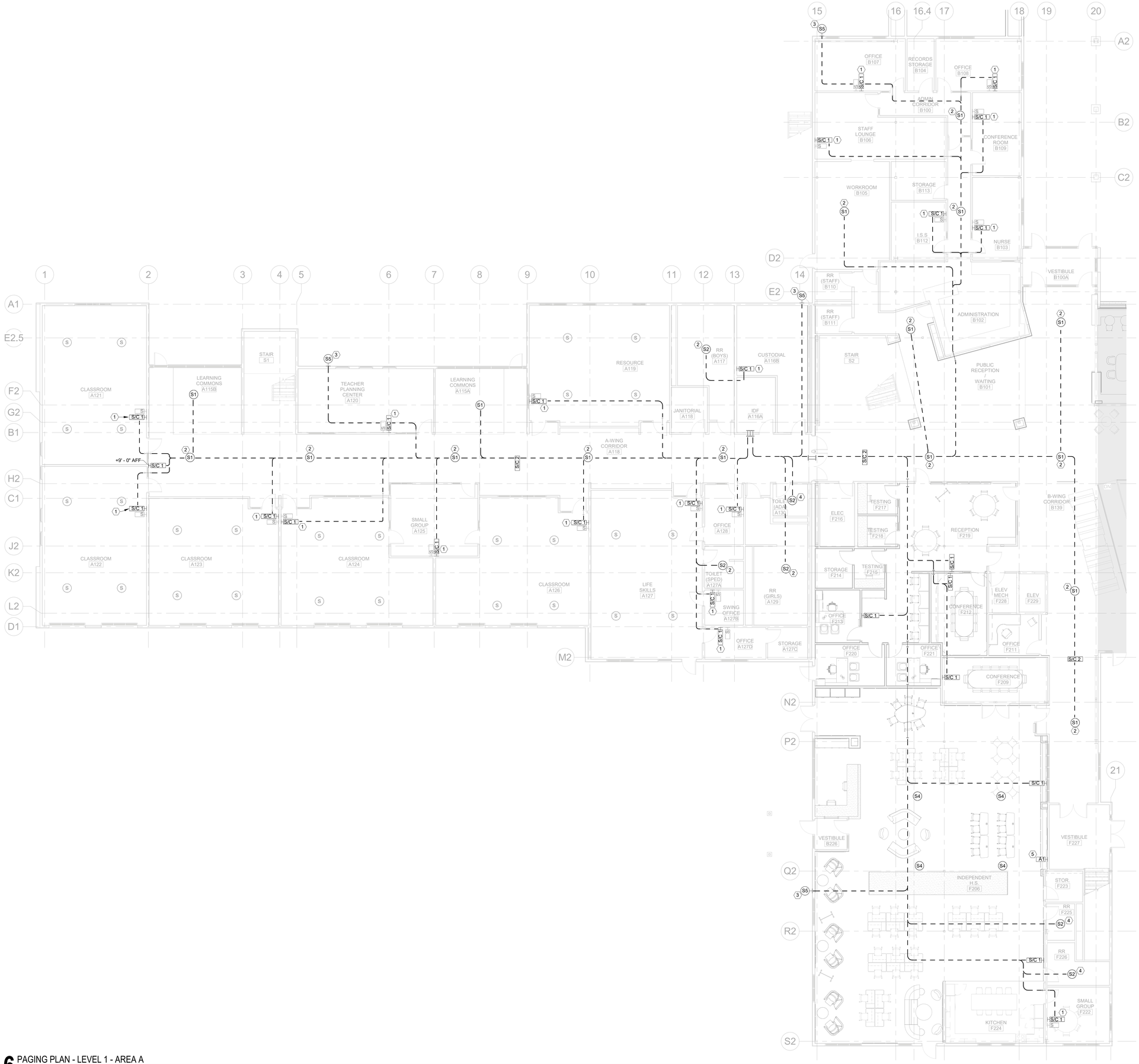
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phase
BID DOCUMENTS

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issue date
Feb 06, 2026

T2.2.2D



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 PLACE NEW SPEAKER/CLOCK COMBO UNIT IN SAME LOCATION AS DEMO'D CLOCK. PROVIDE DOUBLE GANG RETRO MOUNTING RING. REUSE EXISTING PATHWAYS TO NEAREST ACCESSIBLE CEILING SPACE. USE DEMO'D CLOCK CABLING AS PULL STRING. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION. PATHWAY SHOWN IS APPROXIMATE. FIELD VERIFY EXACT PATHWAY.
2 PLACE NEW SPEAKER IN SAME CEILING CUTOUT AS DEMO'D SPEAKER. REUSE EXISTING PATHWAY TO NEAREST ACCESSIBLE CEILING SPACE. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION.
3 PLACE NEW SPEAKER IN SAME WALL CUTOUT AS DEMO'D SPEAKER. REUSE EXISTING PATHWAY TO NEAREST ACCESSIBLE CEILING SPACE. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION.
4 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
5 AMP TO BE PLACED DIRECTLY ON COUNTER, NOT MOUNTED TO WALL ON BRACKET. COORDINATE EXACT HEIGHT AND LOCATION OF BACKBOX WITH FURNITURE LAYOUT PRIOR TO ROUGH-IN.

MONTANA
KYLER J. WEBER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 1 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A2	2-19-26

phase
BID DOCUMENTS

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Feb 06, 2026

T2.3.1A

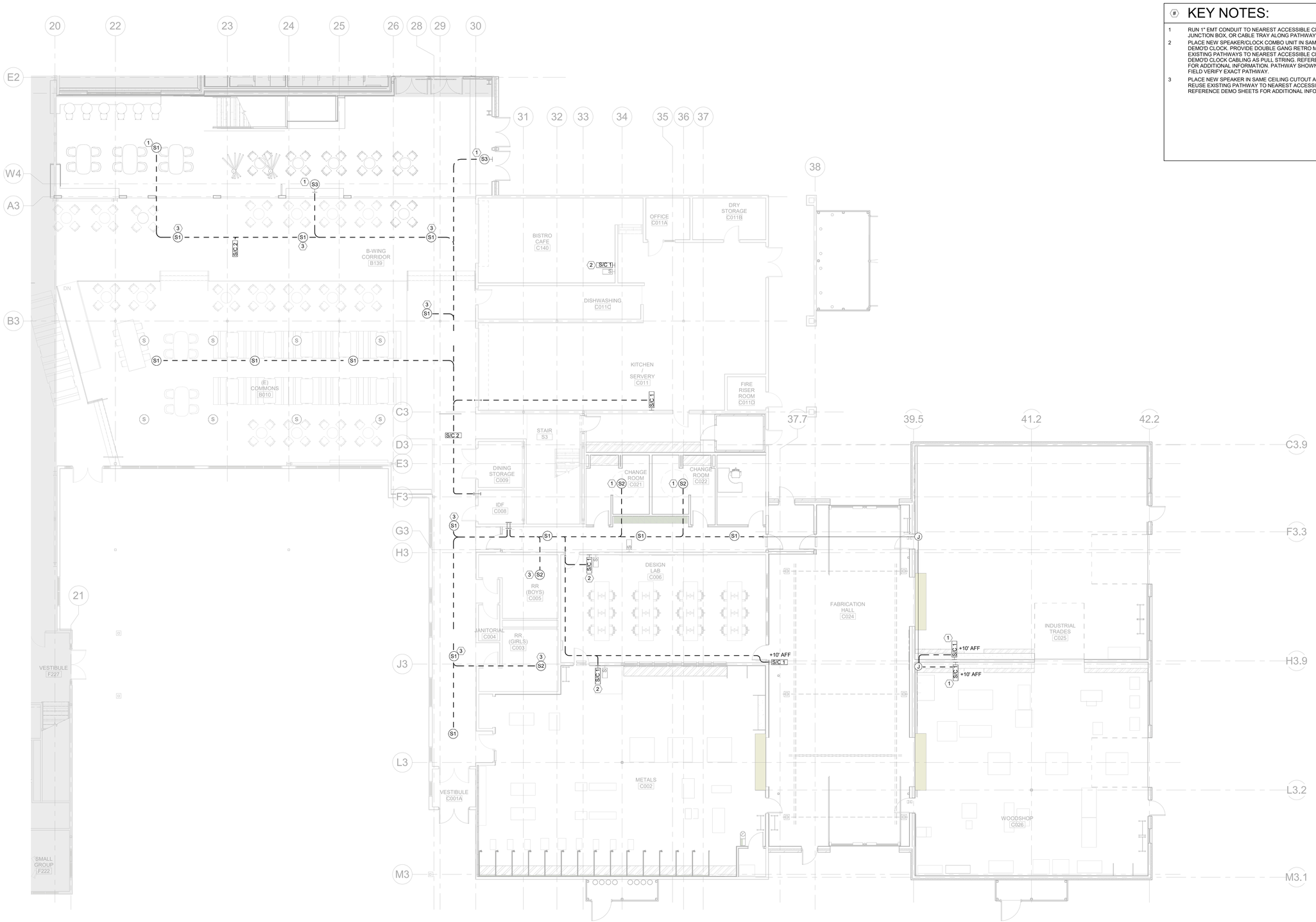
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16 PAGING PLAN - LEVEL 1 - AREA A
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN



GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
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C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
2 PLACE NEW SPEAKER/CLOCK COMBO UNIT IN SAME LOCATION AS DEMO'D CLOCK. PROVIDE DOUBLE GANG RETRO MOUNTING RING. REUSE EXISTING PATHWAYS TO NEAREST ACCESSIBLE CEILING SPACE. USE DEMO'D CLOCK CABLING AS PULL STRING. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION. PATHWAY SHOWN IS APPROXIMATE. FIELD VERIFY EXACT PATHWAY.
3 PLACE NEW SPEAKER IN SAME CEILING CUTOUT AS DEMO'D SPEAKER. REUSE EXISTING PATHWAY TO NEAREST ACCESSIBLE CEILING SPACE. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION.

MONTANA
KYLER J. WILKINSON
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 1 - AREA B
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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16 PAGING PLAN - LEVEL 1 - AREA B
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

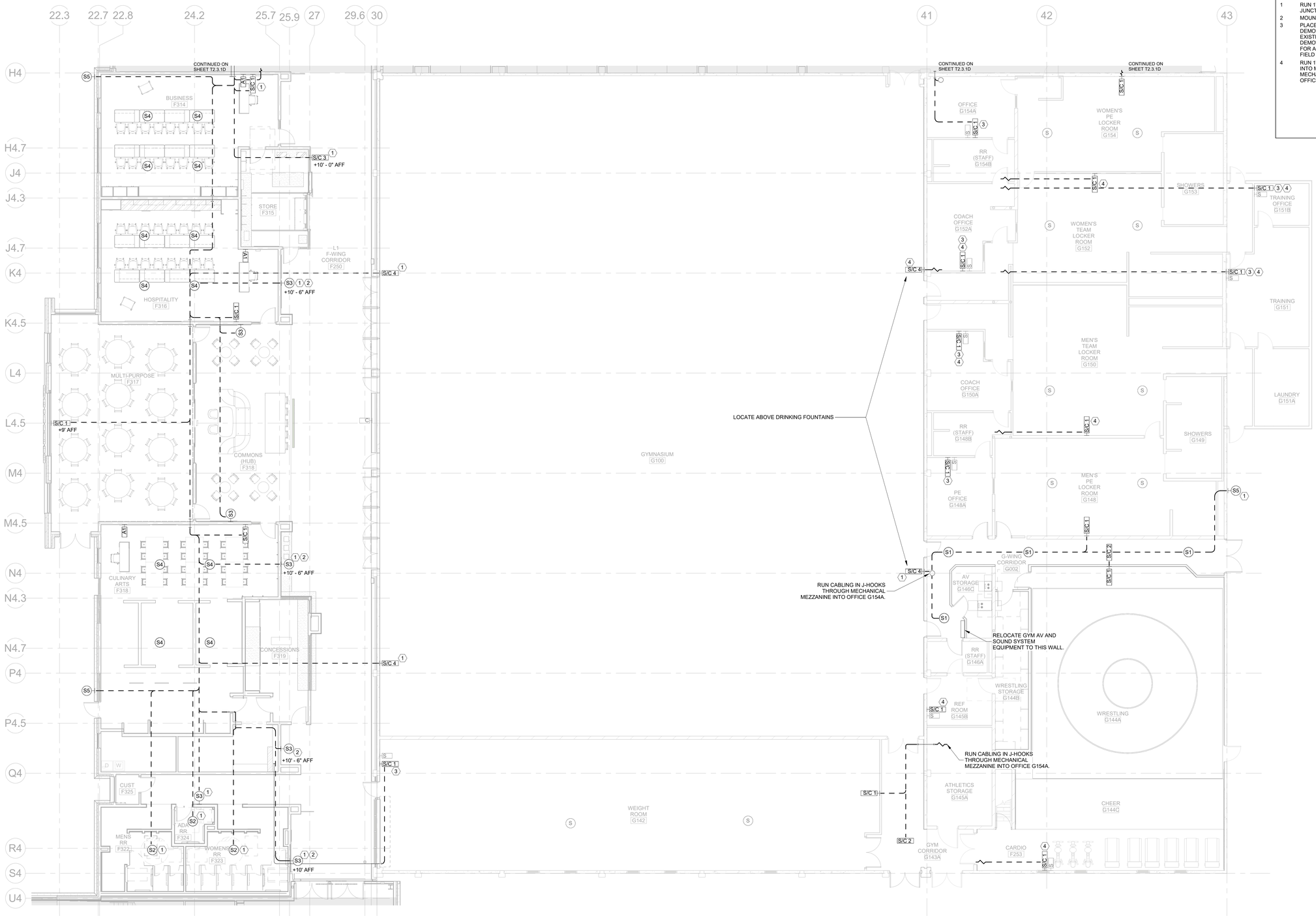
KEY PLAN
D
C
A
B

GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
2 MOUNT SPEAKER TO VERTICAL SIDE OF SOFFIT.
3 PLACE NEW SPEAKER/CLOCK COMBO UNIT IN SAME LOCATION AS DEMO'D CLOCK. PROVIDE DOUBLE GANG RETRO MOUNTING RING. REUSE EXISTING PATHWAYS TO NEAREST ACCESSIBLE CEILING SPACE. USE DEMO'D CLOCK CABLING AS PULL STRING. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION. PATHWAY SHOWN IS APPROXIMATE. FIELD VERIFY EXACT PATHWAY.
4 RUN 1" EMT CONDUIT TO MECHANICAL MEZZANINE. STUB CONDUIT +3" INTO MECHANICAL MEZZANINE. RUN CABLING IN J-HOOKS THROUGH MECHANICAL MEZZANINE AND INTO ACCESSIBLE CEILING SPACE IN OFFICE G154A.



16 PAGING PLAN - LEVEL 1 - AREA C
1/8" = 1'-0"

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

NORTH

KEY PLAN

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MONTANA
KYLER J. WEBER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 1 - AREA C
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase BID DOCUMENTS

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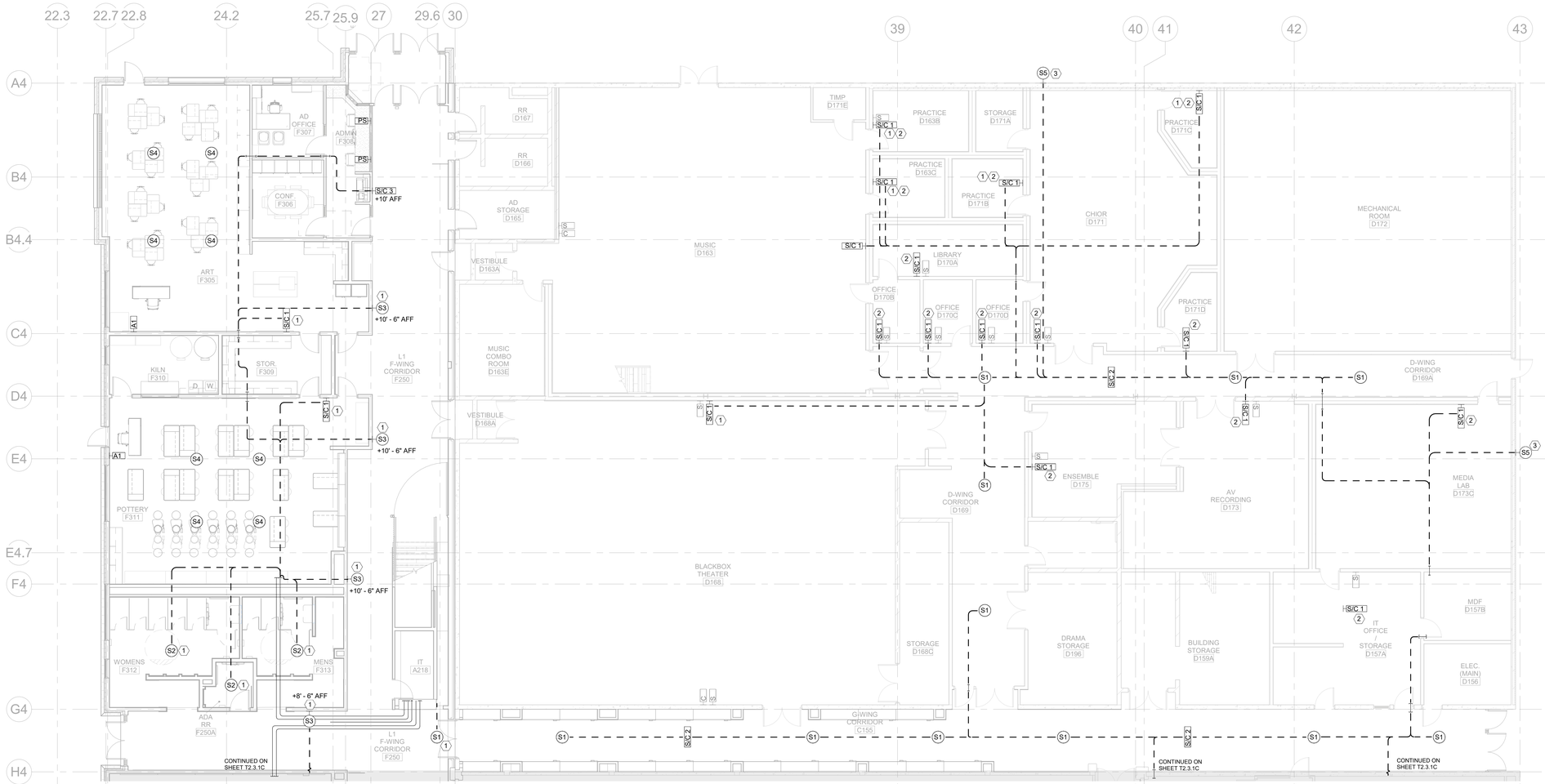
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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
2 PLACE NEW SPEAKER/CLOCK COMBO UNIT IN SAME LOCATION AS DEMO'D CLOCK. PROVIDE DOUBLE GANG RETRO MOUNTING RING. REUSE EXISTING PATHWAYS TO NEAREST ACCESSIBLE CEILING SPACE. USE DEMO'D CLOCK CABLING AS PULL STRING. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION. PATHWAY SHOWN IS APPROXIMATE. FIELD VERIFY EXACT PATHWAY.
3 PLACE NEW SPEAKER IN SAME WALL CUTOUT AS DEMO'D SPEAKER. REUSE EXISTING PATHWAY TO NEAREST ACCESSIBLE CEILING SPACE. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION.



16 PAGING PLAN - LEVEL 1 - AREA D
1/8" = 1'-0"

2/25/2026 3:48:29 PM

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

NORTH

KEY PLAN

MONTANA
KYLER J. WILLIAMSON
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 1 - AREA D
project WHITEFISH HIGH SCHOOL
ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

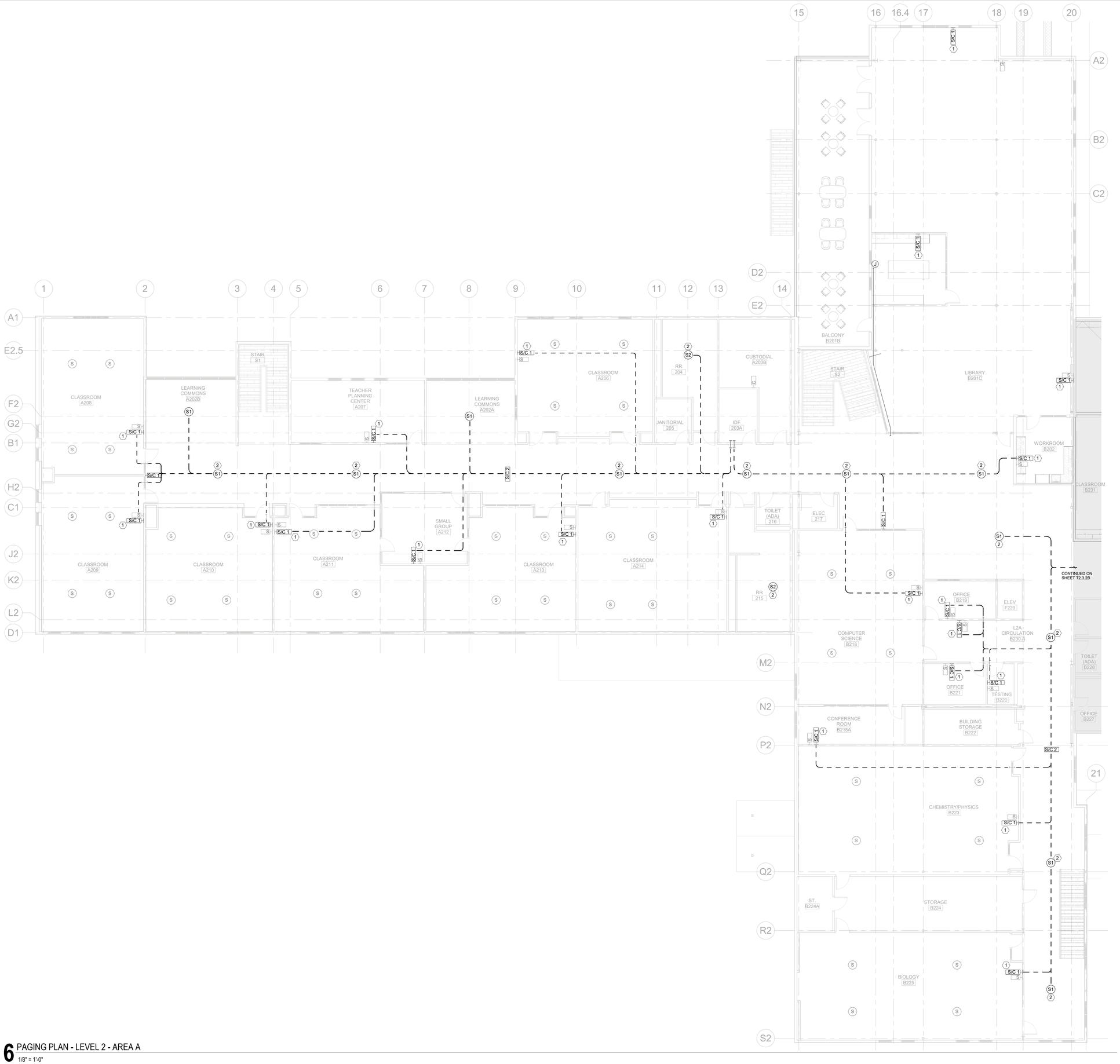
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phase
BID DOCUMENTS

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issue date
Feb 06, 2026

T2.3.1D



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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 PLACE NEW SPEAKER/CLOCK COMBO UNIT IN SAME LOCATION AS DEMO'D CLOCK. PROVIDE DOUBLE GANG RETRO MOUNTING RING. REUSE EXISTING PATHWAYS TO NEAREST ACCESSIBLE CEILING SPACE. USE DEMO'D CLOCK CABLING AS PULL STRING. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION. PATHWAY SHOWN IS APPROXIMATE. FIELD VERIFY EXACT PATHWAY.

2 PLACE NEW SPEAKER IN SAME CEILING CUTOUT AS DEMO'D SPEAKER. REUSE EXISTING PATHWAY TO NEAREST ACCESSIBLE CEILING SPACE. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION.

MONTANA — KYLER J. WEBER — No. 85920 PE — LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER — BICSI — Pete Weber — BICSI ID # 338372 — EXPIRES 12-31-28 — RCDD

sheet PAGING AND AV PLAN - LEVEL 2 - AREA A
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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phase BID DOCUMENTS

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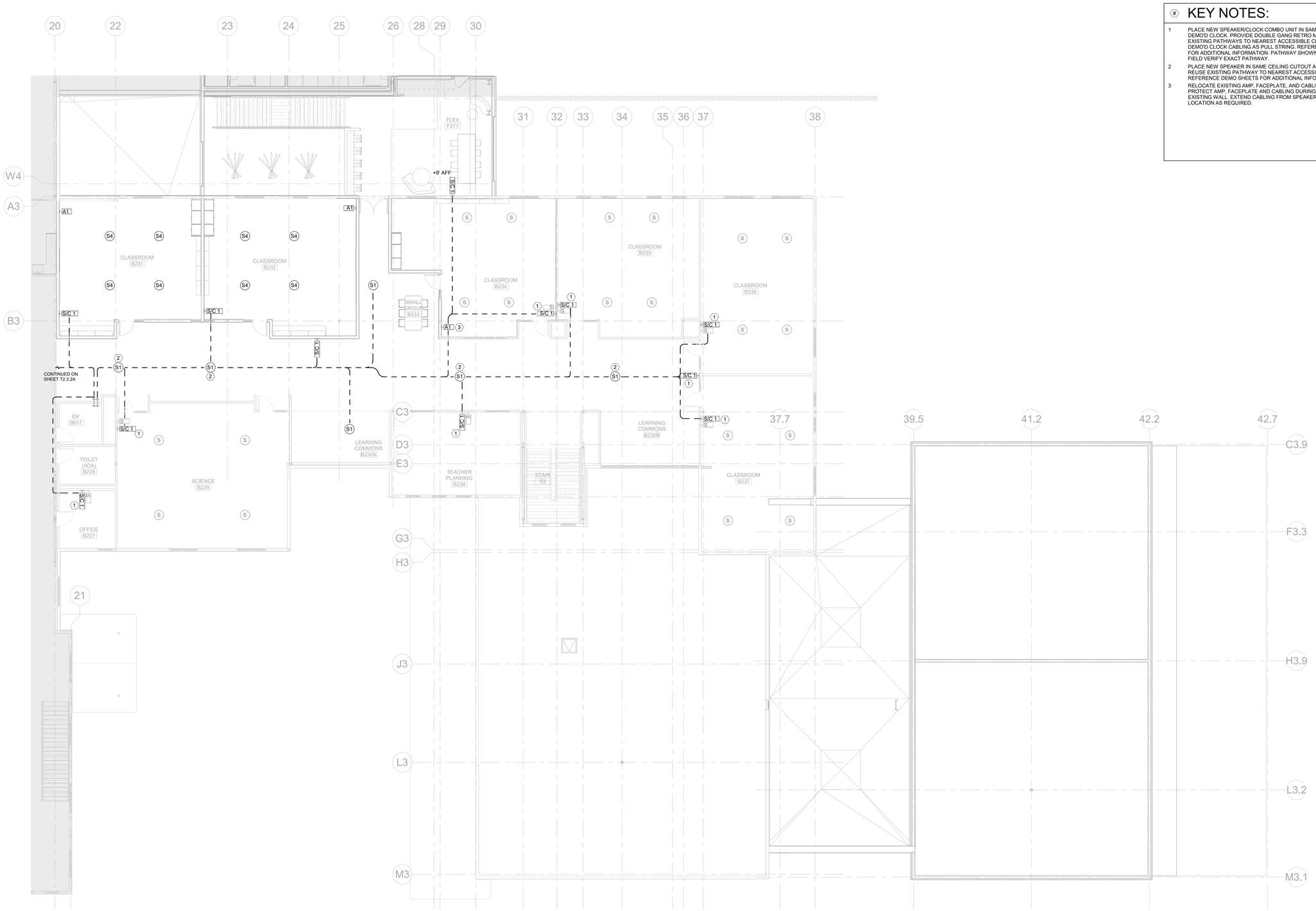
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16 PAGING PLAN - LEVEL 2 - AREA A
1/8" = 1'-0"

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

NORTH

KEY PLAN



GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

(#) KEY NOTES:

1 PLACE NEW SPEAKER/CLOCK COMBO UNIT IN SAME LOCATION AS DEMO'D CLOCK. PROVIDE DOUBLE GANG RETRO MOUNTING RING. REUSE EXISTING PATHWAYS TO NEAREST ACCESSIBLE CEILING SPACE. USE DEMO'D CLOCK CABLING AS PULL STRING. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION. PATHWAY SHOWN IS APPROXIMATE. FIELD VERIFY EXACT PATHWAY.

2 PLACE NEW SPEAKER IN SAME CEILING CUTOUT AS DEMO'D SPEAKER. REUSE EXISTING PATHWAY TO NEAREST ACCESSIBLE CEILING SPACE. REFERENCE DEMO SHEETS FOR ADDITIONAL INFORMATION.

3 RELOCATE EXISTING AMP, FACEPLATE, AND CABLING TO NEW WALL. PROTECT AMP, FACEPLATE AND CABLING DURING DEOMOLITION OF EXISTING WALL. EXTEND CABLING FROM SPEAKER TO NEW AMP LOCATION AS REQUIRED.

MONTANA
KYLE J. GALLAGHER
NO. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 2 - AREA B
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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issue date
Feb 06, 2026

T2.3.2B

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16 PAGING PLAN - LEVEL 2 - AREA B
1/8" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"

NORTH

KEY PLAN



GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.

MONTANA
KYLER J. GUNNARSON
NO. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 2 - AREA C
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase BID DOCUMENTS

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T2.3.2C

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16 PAGING PLAN - LEVEL 2 - AREA C
1/8" = 1'-0"

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

NORTH

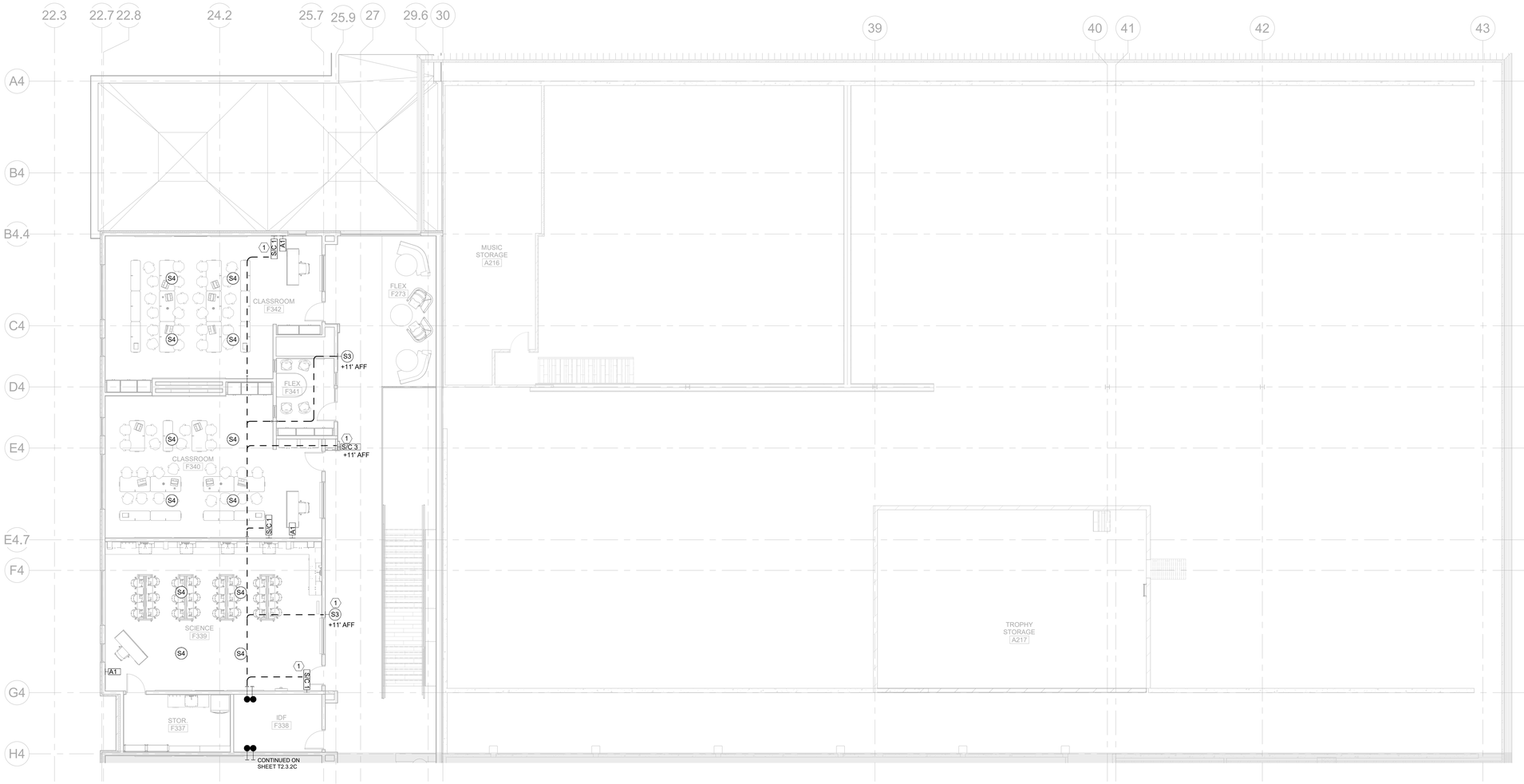
KEY PLAN

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

(#) KEY NOTES:

1 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.



16 PAGING PLAN - LEVEL 2 - AREA D
1/8" = 1'-0"

2/25/2026 3:49:02 PM

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

NORTH

KEY PLAN

MONTANA
KYLE J. GUNNARSON
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet PAGING AND AV PLAN - LEVEL 2 - AREA D
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

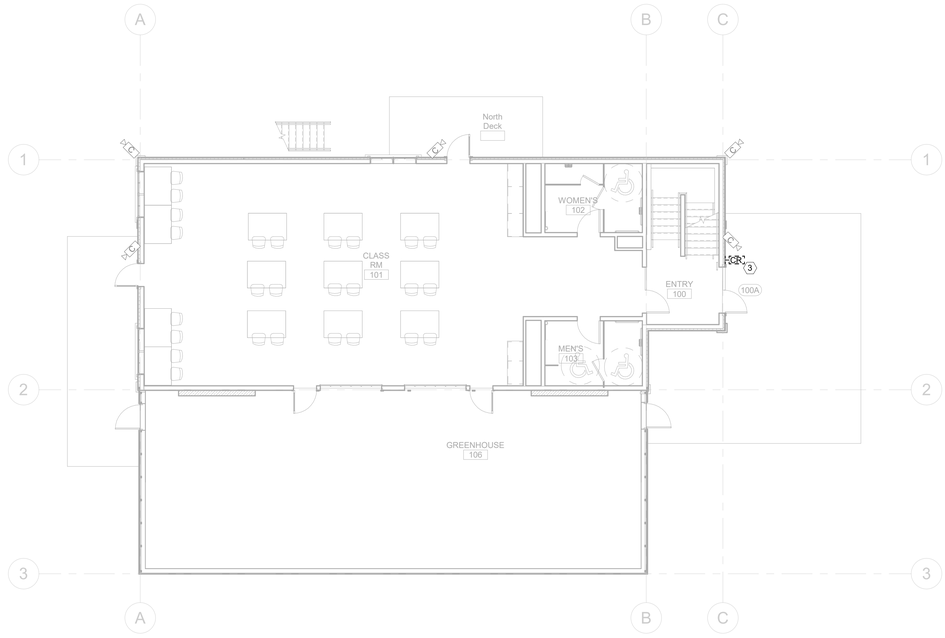
revision	date
A2	2-19-26

phase
BID DOCUMENTS

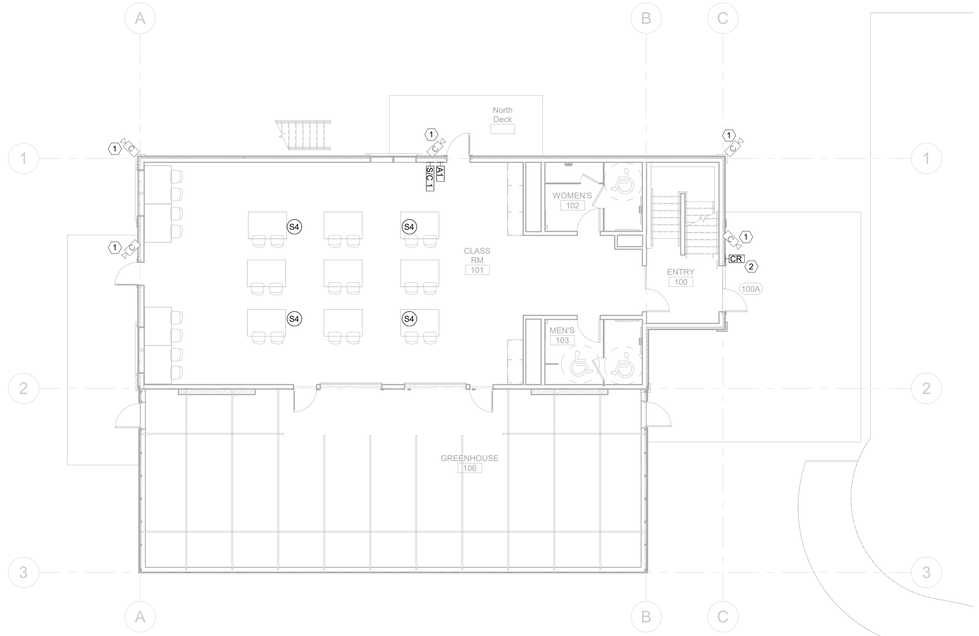
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issue date
Feb 06, 2026

T2.3.2D



6 CSE BUILDING PLAN - DEMO
1/8" = 1'-0"



16 CSE BUILDING PLAN - NEW CONSTRUCTION
1/8" = 1'-0"

GENERAL ICT NOTES

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D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 EXISTING CAMERA AND CAMERA CABLING TO REMAIN.
2 EXISTING ACCESS CONTROL DOOR TO BE PROVIDED WITH (N) CARD READER AND OSDP COMPLIANT CABLE. ALL EXISTING ACCESS CONTROL DOORS TO TERMINATE IN IDF C008. REUSE EXISTING PATHWAY. SEE DETAILS 11/T9.1.2 AND 13/T9.1.2 FOR ADDITIONAL INFORMATION.
3 DEMO CARD READER AND CARD READER CABLING. ALL OTHER CABLING AND DEVICES FOR DOOR FUNCTIONALITY TO REMAIN INCLUDING DOOR POSITION SWITCHES, REQUEST TO EXITS, AND LOCK CONTROL DEVICES.

MONTANA
KYLER J. KLINGER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet CSE BUILDING PLAN
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

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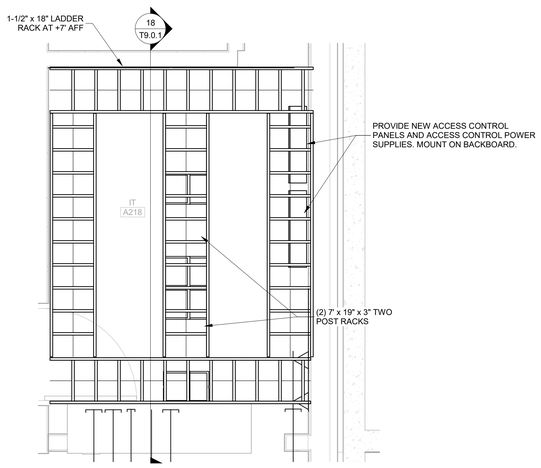
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issue date Feb 06, 2026

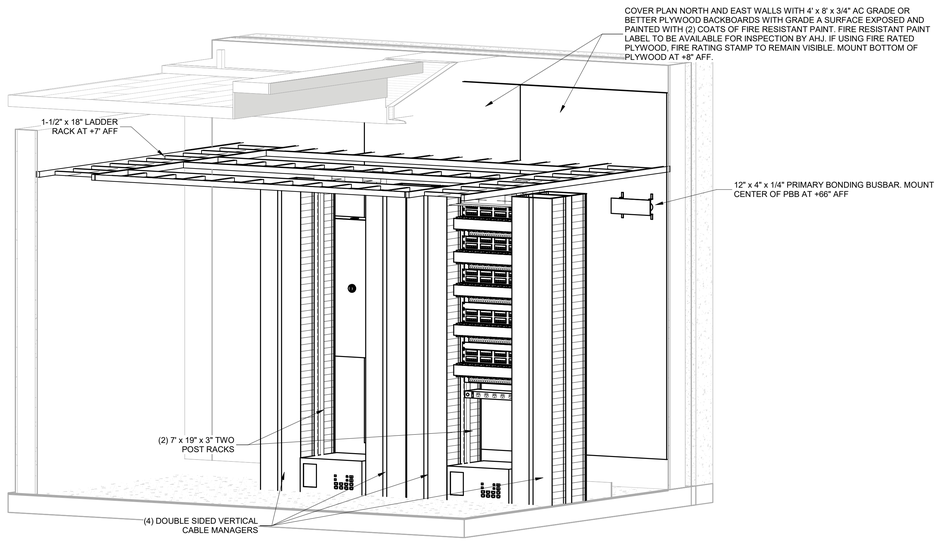
T9.0.0

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"
NORTH

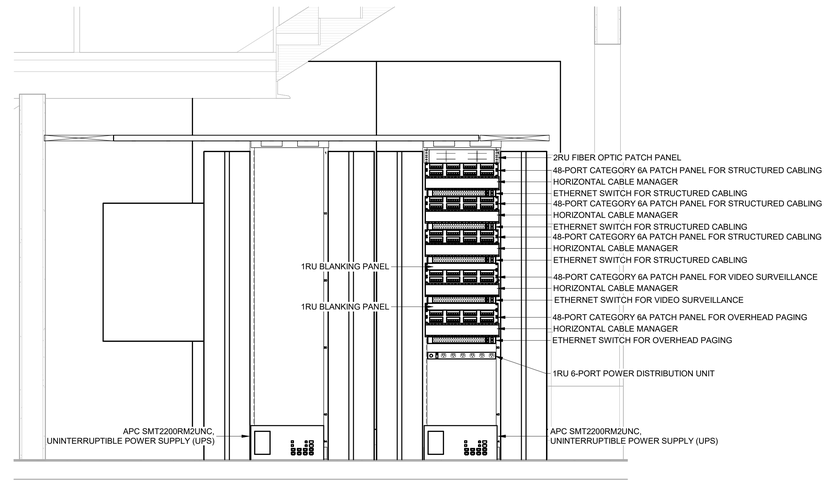
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6 IT A218 - ENLARGED VIEW
1/2" = 1'-0"



16 IT A218 - ISOMETRIC VIEW
N.T.S.



18 IT A218 - RACK SECTIONS
3/4" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"
NORTH

GENERAL TR NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CABLES SHALL HAVE A SERVICE LOOP LONG ENOUGH SO THAT EACH CABLE SHALL REACH FURTHEST CORNER OF TELECOM ROOM (10' MINIMUM).
E. BOND ALL LADDER RACK SECTIONS AND RACKS/CABINETS TO BONDING BUSBAR WITH #6 GROUND WIRE. SEE SPECIFICATIONS FOR ADDITIONAL BONDING AND GROUNDING REQUIREMENTS.
F. ALL PLYWOOD SHALL BE AC GRADE PLYWOOD AND HAVE GRADE A SURFACE EXPOSED AND PAINTED WITH (2) COATS OF FIRE RESISTANT PAINT. FIRE RESISTANT PAINT LABEL TO BE AVAILABLE FOR INSPECTION BY AHJ. IF USING FIRE RATED PLYWOOD, FIRE RATING STAMP TO REMAIN VISIBLE. MOUNT PLYWOOD BACKBOARDS +8" AFF.
G. ALL CABLES SHALL BE NEATLY BUNDLED AND COMBED INTO GROUPS OF 24 FROM THE ENTRANCE POINT OF THE TR TO THE TERMINATION POINT AT THE PATCH PANEL.

MONTANA
KYLER J. KRAMMES
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet ICT ENLARGED VIEWS - IT A218
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

phase
BID DOCUMENTS

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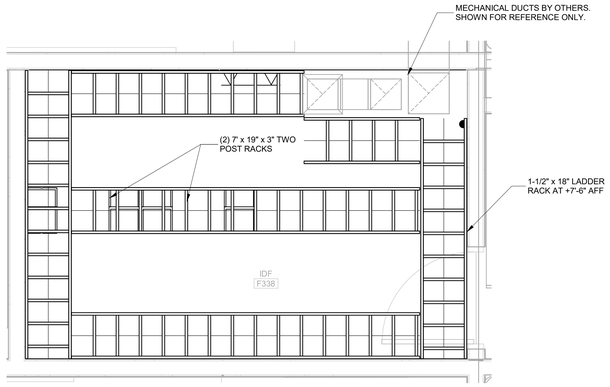
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Feb 06, 2026

T9.0.1

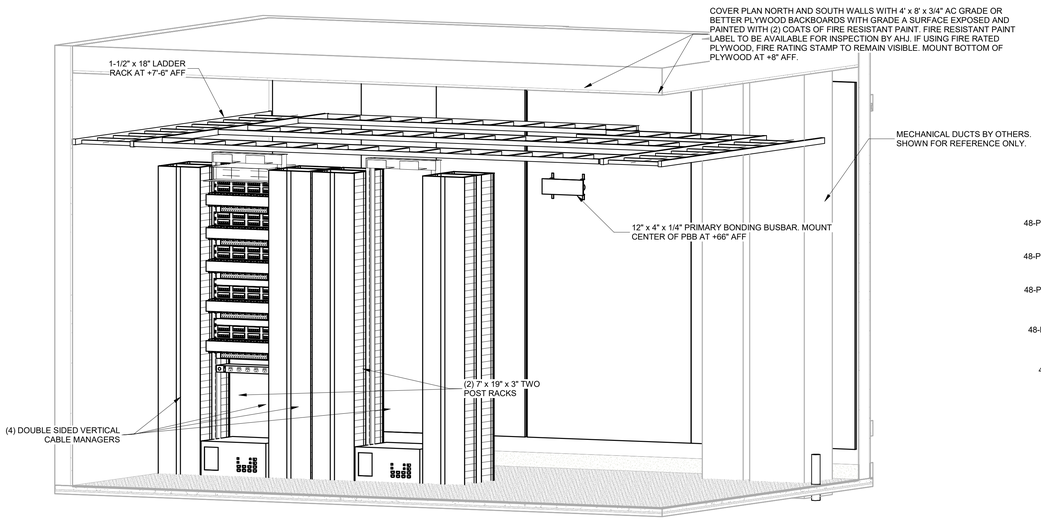
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GENERAL TR NOTES

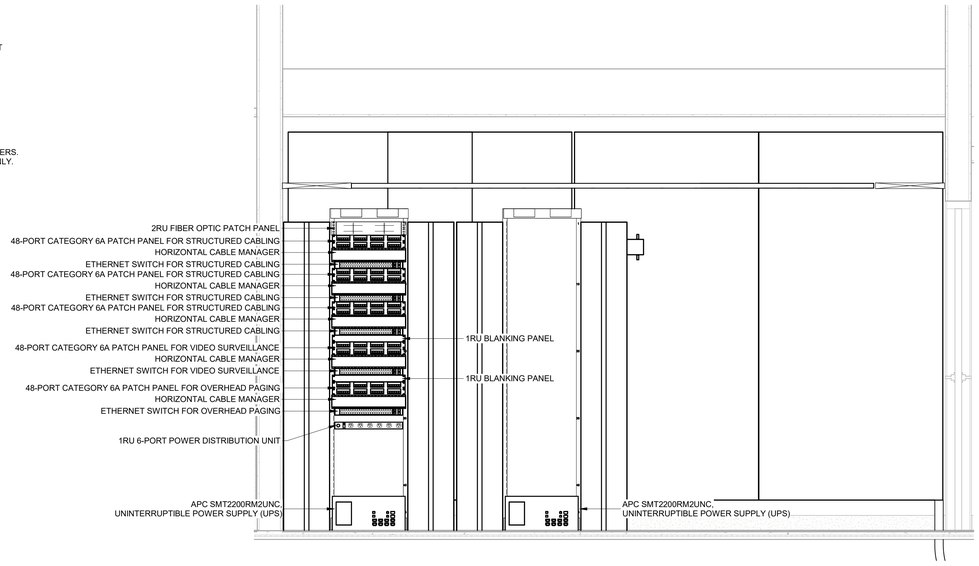
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6 IDF F338 - ENLARGED VIEW
1/2" = 1'-0"



16 IDF F338 - ISOMETRIC VIEW
N.T.S.



18 IDF F338 - RACK ELEVATIONS
3/4" = 1'-0"

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"
NORTH

2/25/2026 3:49:09 PM

MONTANA
KYLER J. KUHNERT
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet ICT ENLARGED VIEWS - IDF F338
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

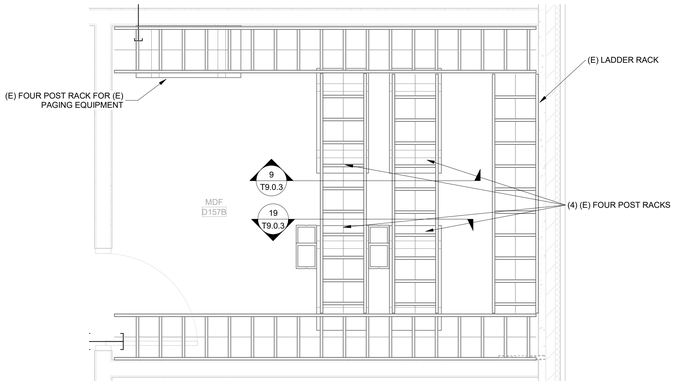
revision date

phase BID DOCUMENTS

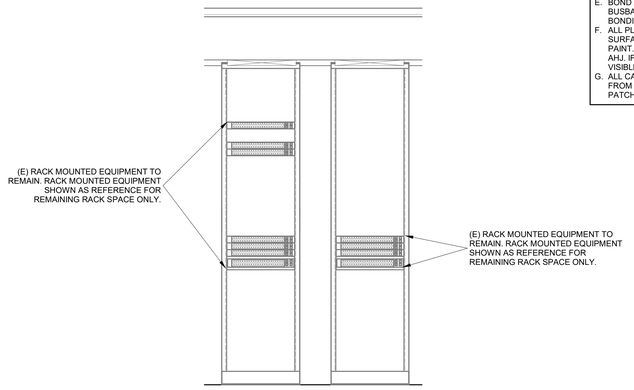
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issue date Feb 06, 2026

T9.0.2



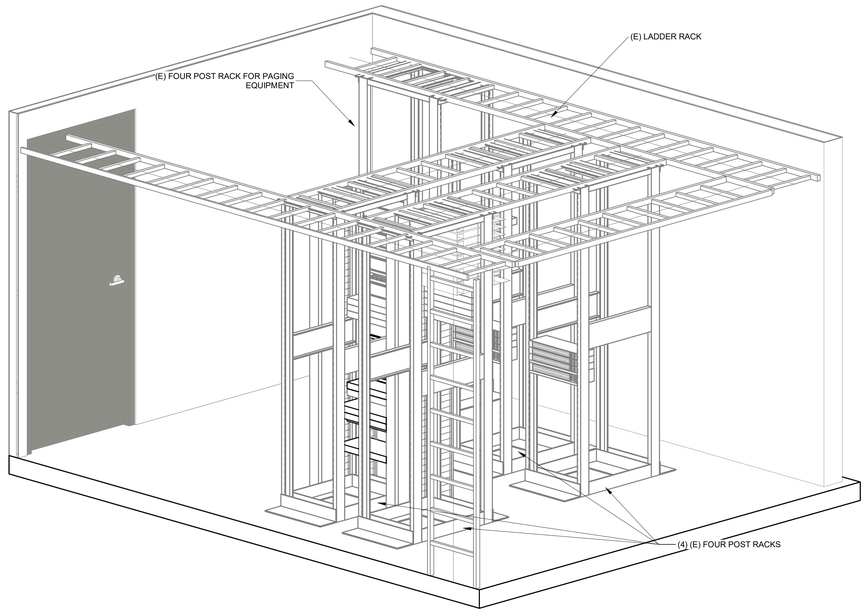
6 MDF D157B - ENLARGED VIEW
1/2" = 1'-0"



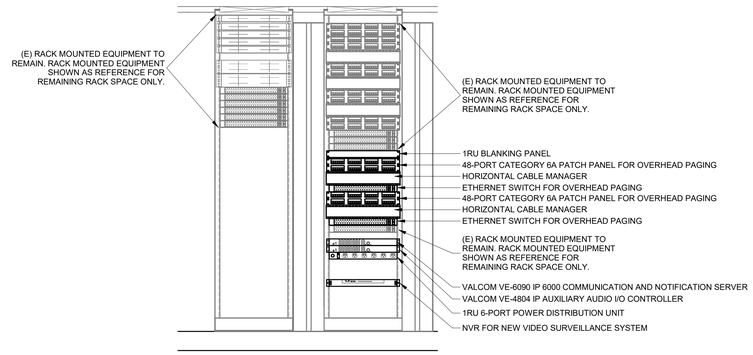
9 MDF D157B - RACK ELEVATION - NORTH
N.T.S.

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16 MDF D157B - ISOMETRIC VIEW



19 MDF D157B - RACK ELEVATION - SOUTH
N.T.S.

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"
NORTH

2/25/2026 3:49:11 PM

MONTANA
KYLE J. GUNNARSON
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet ICT ENLARGED VIEWS - MDF D157B
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A3	2-26-26

phase
BID DOCUMENTS

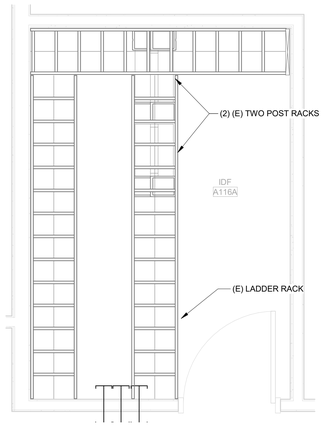
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issue date
Feb 06, 2026

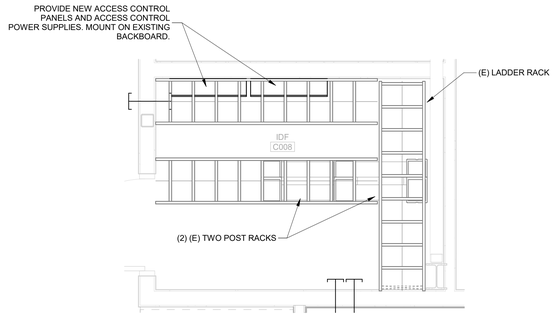
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GENERAL TR NOTES

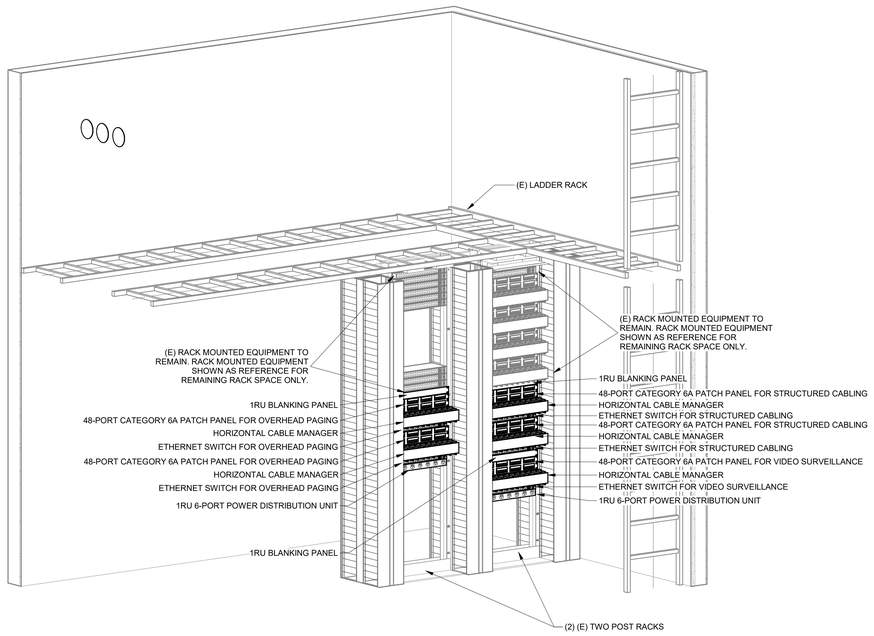
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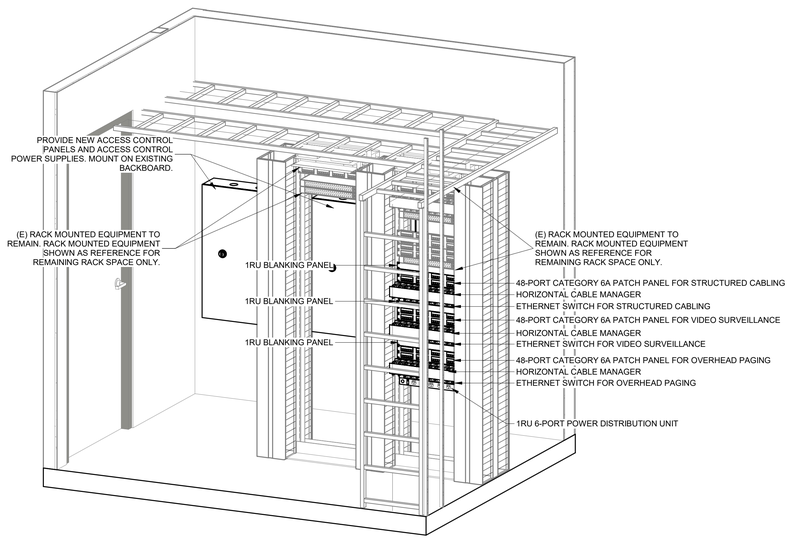
6 IDF A116A - ENLARGED VIEW
1/2" = 1'-0"



8 IDF C008 - ENLARGED VIEW
1/2" = 1'-0"



16 IDF A116A - ISOMETRIC VIEW



18 IDF C008 - ISOMETRIC VIEW

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"
NORTH

2/25/2026 3:49:14 PM

MONTANA
KYLE J. GUNNARSON
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet ICT ENLARGED VIEWS - IDF A116A AND IDF C008
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision	date
A3	2-26-26

phase
BID DOCUMENTS

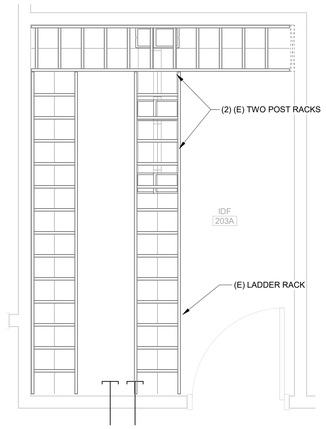
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issue date
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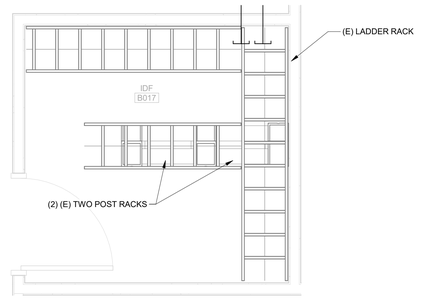
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GENERAL TR NOTES

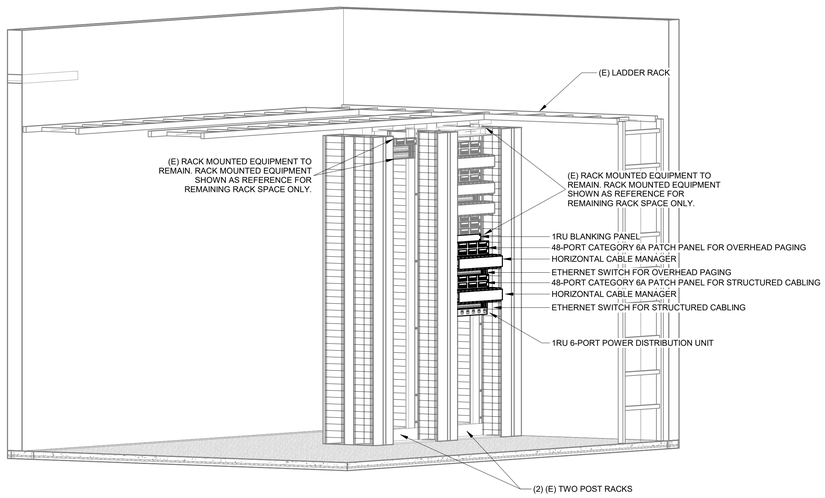
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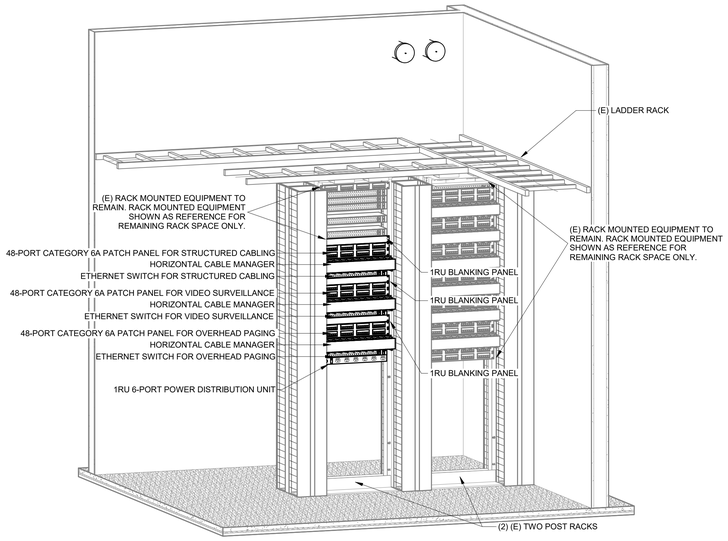
6 IDF 203A - ENLARGED PLAN
1/2" = 1'-0"



8 IDF B017 - ENLARGED VIEW
1/2" = 1'-0"



16 IDF 203A - ISOMETRIC VIEW



18 IDF B017 - ISOMETRIC VIEW

8' 4' 0' 8' 16'
SCALE : 1/8" = 1'-0"
NORTH

2/25/2026 3:49:18 PM

MONTANA
KYLE J. GRAHAM
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

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Bicsi
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet ICT ENLARGED VIEWS - IDF 203A AND IDF B017
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

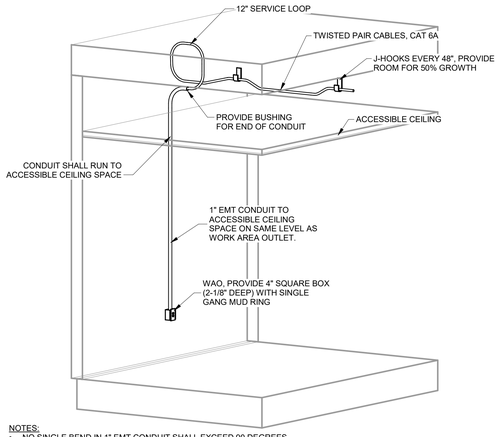
revision	date
A3	2-26-26

phase
BID DOCUMENTS

NOT FOR CONSTRUCTION

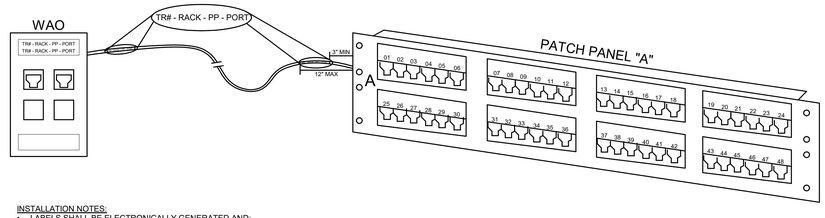
issue date
Feb 06, 2026

T9.0.5



NOTES:
- NO SINGLE BEND IN 1" EMT CONDUIT SHALL EXCEED 90 DEGREES.
- THE AGGREGATE OF CONDUIT BENDS SHALL NOT EXCEED 180 DEGREES
- CONDUIT SHALL STUB TO CEILING SPACE ON SAME LEVEL AS WORK AREA OUTLET.

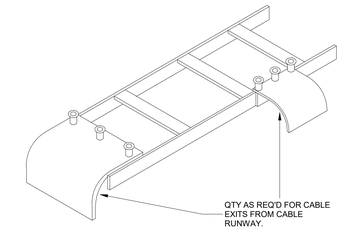
6 WORK AREA OUTLET DETAIL
N.T.S.



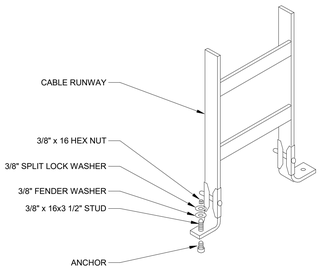
INSTALLATION NOTES:
- LABELS SHALL BE ELECTRONICALLY GENERATED AND:
  - PROVIDE VINYL SUBSTRATE WITH WHITE PRINTING AREA AND A CLEAR 'TAIL' THAT SELF LAMINATES THE PRINTED AREA WHEN WRAPPED AROUND THE PRINTED AREA. IF CABLE IS WHITE IN COLOR, A DIFFERENT COLOR SHALL BE USED.
- CONTRACTOR TO PROVIDE AND INSTALL TYPED LABEL ON EACH TELECOM ROOM, JACK, FACEPLATE, PATCH PANEL, AND AT EACH END OF EVERY CABLE INSTALLED BY THIS CONTRACTOR.
- LABEL EACH CABLE/WIRE WITHIN 12" OF EACH TERMINATION POINT, BUT ENSURE THAT AT LEAST 3" SHALL REMAIN BETWEEN LABEL AND TERMINATION POINT.
- CONTRACTOR SHALL SUBMIT AND REVIEW THE FINAL LABELING SCHEME WITH THE DESIGNER PRIOR TO INSTALLATION.
- LABELING SHALL FOLLOW ANSI/TIA-606-D, UNLESS THE OWNER SPECIFIES THEIR OWN LABELING REQUIREMENTS.

LABELING EXAMPLE:
- FOR A DUPLEX WAO THAT TERMINATES IN TR 01, RACK 2, PATCH PANEL C, PORTS 36 & 37: THE CORRESPONDING LABELS SHOULD LOOK LIKE 01-2-C-36 AND 01-2-C-37, RESPECTIVELY.
  - FOR TRs (TELECOMMUNICATIONS ROOMS) WITH A COMBINED TOTAL OF ONE TELECOMMUNICATIONS RACK AND/OR CABINET, THE RACK/CABINET IDENTIFIER MAY BE DROPPED FROM THE LABEL (I.E. "TR# - PP - PORT).

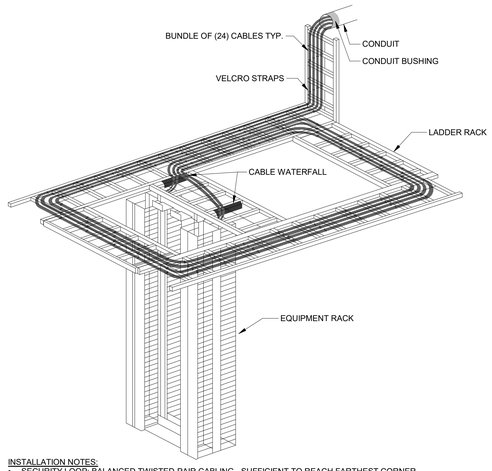
7 DATA CABLE LABELING DETAIL
N.T.S.



4 CABLE TRAY RADIUS DROP
N.T.S.

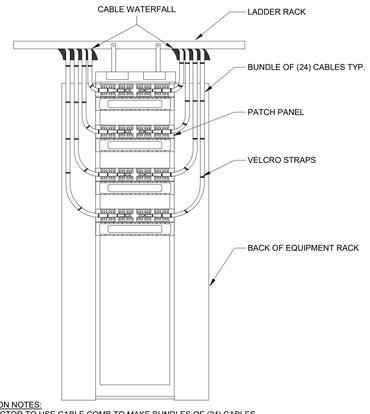


9 VERTICAL CABLE TRAY
N.T.S.



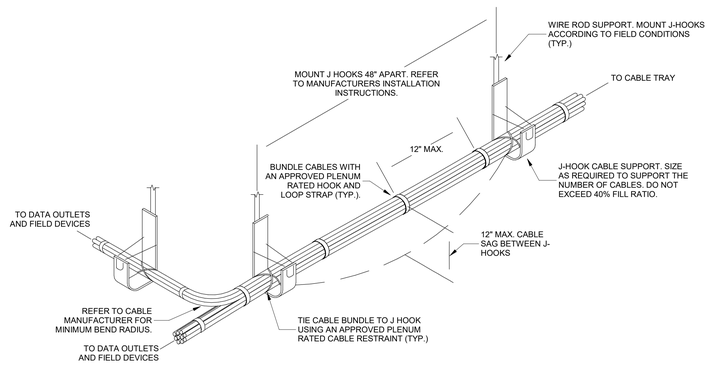
INSTALLATION NOTES:
- SECURITY LOOP: BALANCED TWISTED-PAIR CABLING - SUFFICIENT TO REACH FARTHEST CORNER OF THE TR VIA THE PATHWAYS PLUS THE DISTANCE FROM FLOOR TO CEILING WITHOUT EXCEEDING THE ~90m (295ft) LIMITATION.
- SECURITY LOOP: OPTICAL FIBER CABLING - SUFFICIENT TO REACH FARTHEST CORNER OF THE TR VIA THE PATHWAYS PLUS THE DISTANCE FROM FLOOR TO CEILING AND AN ADDITIONAL ~3m (10ft) OF SLACK FOR STORAGE INSIDE HARDWARE.
- CONTRACTOR TO MAKE BUNDLES OF (24) CABLES USING VELCRO STRAPS AND UTILIZING CABLE COMBS TO MAINTAIN ORGANIZED BUNDLES.
- CONTRACTOR TO PROVIDE AND INSTALL VELCRO STRAPS AROUND CABLE BUNDLES EVERY 12". CABLE TIES NOT ACCEPTED.
- BUNDLES TO HAVE ONLY CATEGORY 6 OR 6A CABLES. NO MIXING CATEGORY 6 WITH 6A IN SAME BUNDLE.

16 LADDER RACK WITH SECURITY LOOP DETAIL
N.T.S.



INSTALLATION NOTES:
- CONTRACTOR TO USE CABLE COMB TO MAKE BUNDLES OF (24) CABLES.
- CONTRACTOR TO PROVIDE AND INSTALL VELCRO STRAPS AROUND CABLE BUNDLES EVERY 12". CABLE TIES NOT ACCEPTED.

17 CABLE MANAGEMENT DETAIL
N.T.S.



18 J-HOOK DETAIL
N.T.S.

MONTANA
KYLE J. WILLIAMS
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
Pete Weber
BICSI ID # 358372
EXPIRES 12-31-28
RCDD

sheet ICT DETAILS
project WHITEFISH HIGH SCHOOL ACADEMIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.00

revision date

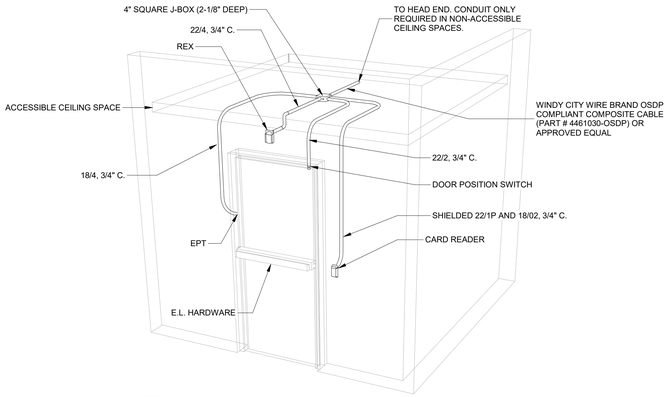
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issue date Feb 06, 2026

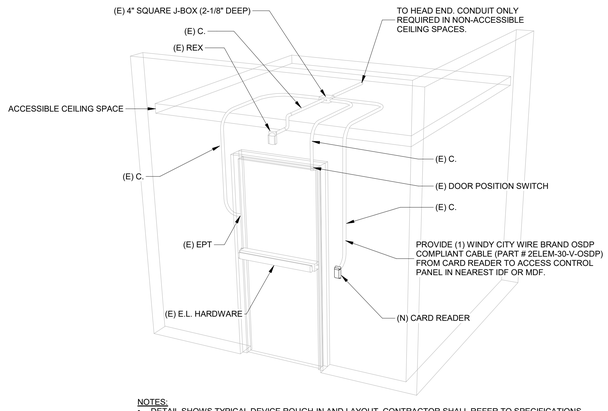
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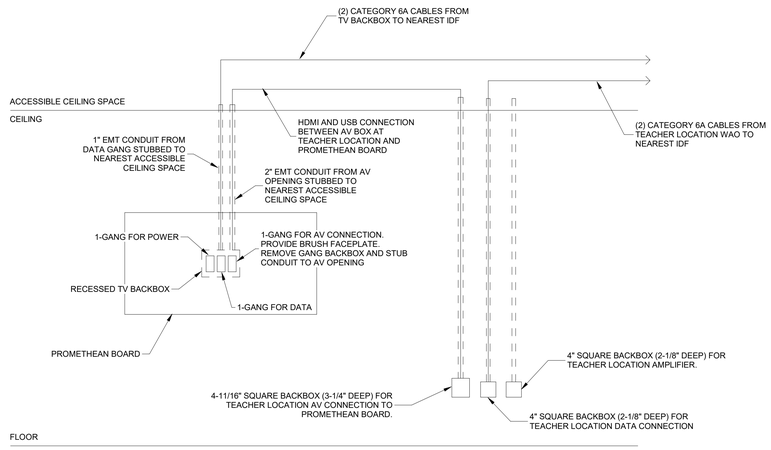
NOTES:
- DETAIL SHOWS TYPICAL DEVICE ROUGH-IN AND LAYOUT. CONTRACTOR SHALL REFER TO SPECIFICATIONS SECTION 08 7100 FOR PROJECT SPECIFIC DOOR HARDWARE.
- VERIFY AND COORDINATE REQUIREMENTS WITH OWNER, ARCHITECT, AND SECURITY CONTRACTOR PRIOR TO ROUGH-IN.

6 TYPICAL NEW ACCESS CONTROL DOOR DETAIL - ELECTRIFIED LATCH
N.T.S.



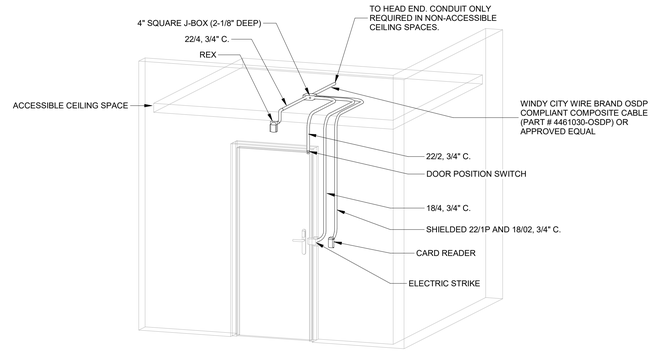
NOTES:
- DETAIL SHOWS TYPICAL DEVICE ROUGH-IN AND LAYOUT. CONTRACTOR SHALL REFER TO SPECIFICATIONS SECTION 08 7100 FOR PROJECT SPECIFIC DOOR HARDWARE.

11 TYPICAL EXISTNG ACCESS CONTROL DOOR DETAIL - ELECTRIFIED LATCH
N.T.S.



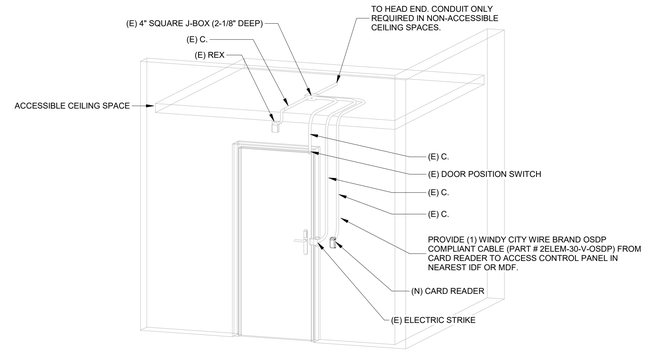
NOTES:
- TYPICAL TEACHING WALL LAYOUT SHOWN FOR REFERENCE ONLY. NOT ALL CLASSROOMS FOLLOW EXACT DEVICE LOCATIONS. SEE DRAWINGS FOR ADDITIONAL INFORMATION.

16 TYPICAL EXISTING ACCESS CONTROL DOOR DETAIL - ELECTRIC STRIKE
N.T.S.



NOTES:
- DETAIL SHOWS TYPICAL DEVICE ROUGH-IN AND LAYOUT. CONTRACTOR SHALL REFER TO SPECIFICATIONS SECTION 08 7100 FOR PROJECT SPECIFIC DOOR HARDWARE.
- VERIFY AND COORDINATE REQUIREMENTS WITH OWNER, ARCHITECT, AND SECURITY CONTRACTOR PRIOR TO ROUGH-IN.

8 TYPICAL NEW ACCESS CONTROL DOOR DETAIL - ELECTRIC STRIKE
N.T.S.



NOTES:
- DETAIL SHOWS TYPICAL DEVICE ROUGH-IN AND LAYOUT. CONTRACTOR SHALL REFER TO SPECIFICATIONS SECTION 08 7100 FOR PROJECT SPECIFIC DOOR HARDWARE.

13 TYPICAL EXISTING ACCESS CONTROL DOOR DETAIL - ELECTRIC STRIKE
N.T.S.

MONTANA
KYLE J. GRAMMER
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

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ICT ABBREVIATIONS LEGEND

AFC	ABOVE FINISHED CEILING	MMF	MULTI-MODE FIBER
ACT	ACOUSTICAL CEILING TILE	MUTOA	MULTI-USER TELECOMMUNICATIONS OUTLET ASSEMBLY
AFF	ABOVE FINISHED FLOOR	(N)	NEW
AFG	ABOVE FINISHED GRADE	NEC	NATIONAL ELECTRIC CODE
AHJ	AUTHORITY HAVING JURISDICTION	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
AP	ACCESS POINT (WIRELESS, TYP.)	NIC	NOT IN CONTRACT
AV	AUDIO-VISUAL	NTS	NOT TO SCALE
AWG	AMERICAN WIRE GAUGE	O.C.	ON CENTER
BAS	BUILDING AUTOMATION SYSTEM	OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
C.	CONDUIT	OFOI	OWNER FURNISHED, OWNER INSTALLED
CAT	CATEGORY	OH	OVERHEAD
CFCI	CONTRACTOR FURNISHED, CONTRACTOR INSTALLED	OSP	OUTSIDE PLANT CABLE
CFOI	CONTRACTOR FURNISHED, OWNER INSTALLED	PB	PULLBOX
CMP	COMMUNICATIONS PLENUM (RATED)	PBB	PRIMARY BONDING BUSBAR
CMR	COMMUNICATIONS RISER (RATED)	PEX	PRESS TO EXIT
CU	COPPER	PoE	POWER OVER ETHERNET
(D)	DEMOLISHED	PP	PATCH PANEL
DIM	DIMENSION	QEL	QUIET ELECTRIFIED LATCH
DMARC	DEMARCATION	QTY	QUANTITY
DPS	DOOR POSITION SWITCH	REQ	REQUIREMENT
(E), EX.	EXISTING	RM	ROOM
EA	EACH	REX	REQUEST TO EXIT
EC	ELECTRICAL CONTRACTOR (DIV 26)	SBB	SECONDARY BONDING BUSBAR
EF	ENTRANCE FACILITY	SMF	SINGLE-MODE FIBER
E.L.	ELECTRIFIED LATCH	SP	SERVICE PROVIDER
EMT	ELECTRICAL METALLIC TUBING	SPEC	SPECIFICATION
EPT	ELECTRIC POWER TRANSFER	STP	SHIELDED TWISTED PAIR
ER	EQUIPMENT ROOM	TR	TELECOM ROOM
FACP	FIRE ALARM CONTROL PANEL	TTB	TELEPHONE TERMINAL BOARD
FLR	FLOOR	TYP	TYPICAL
GND	GROUND	UG	UNDERGROUND
HT	HEIGHT/HIGH	UPS	UNINTERRUPTIBLE POWER SUPPLY
I/O	INDOOR/OUTDOOR	UNO	UNLESS NOTED OTHERWISE
ICT	INFORMATION AND COMMUNICATIONS TECHNOLOGY	UTP	UNSHIELDED TWISTED PAIR
IDS	INTRUSION DETECTION SYSTEM	VIF	VERIFY IN FIELD
IMC	INTERMEDIATE METAL CONDUIT	W/	WITH
ISP	INTERNET SERVICE PROVIDER	W/O	WITHOUT
J-BOX	JUNCTION BOX	WAO	WORK AREA OUTLET
MFR	MANUFACTURER	WAP	WIRELESS ACCESS POINT
MH	MAINTENANCE HOLE	WP	WEATHERPROOF
MIN	MINIMUM		

ABBREVIATIONS AND SYMBOLS GENERAL NOTES

A. THE ABBREVIATIONS ON THIS SHEET COMPRISE A STANDARD LIST; NOT ALL ABBREVIATIONS APPEAR ON THIS PROJECT.
B. THE SYMBOLS ON THIS SHEET COMPRISE A STANDARD LIST; NOT ALL SYMBOLS APPEAR ON THIS PROJECT.
C. ALL MOUNTING HEIGHTS ARE TO CENTER OF DEVICE ABOVE FINISHED FLOOR, UNLESS NOTED OTHERWISE. MOUNTING HEIGHTS INDICATED ON ARCHITECTURAL WALL ELEVATIONS OR AS NOTED SPECIFICALLY ON THE DRAWINGS OR IN THE SPECIFICATIONS SHALL TAKE PRECEDENCE OVER MOUNTING HEIGHTS LISTED.

ICT PROJECT GENERAL NOTES

1. THIS PROJECT IS TO CONFORM TO THE LATEST LOCALLY ADOPTED VERSION OF THE NATIONAL ELECTRICAL CODE AND THE LATEST REVISION OF:
   ANSI/TIA-526-7-A, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant, and its published addenda.
   ANSI/TIA-526-14-C, Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant, and its published addenda.
   ANSI/TIA-568.0-E, Generic Telecommunications Cabling for Customer Premises, and its published addenda.
   ANSI/TIA-568.1-E, Commercial Building Telecommunications Infrastructure Standard, and its published addenda.
   ANSI/TIA-568.2-E, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, and its published addenda.
   ANSI/TIA-568.3-E, Optical Fiber Cabling and Components Standard, and its published addenda.
   ANSI/TIA-569-E, Telecommunications Pathways and Spaces, and its published addenda
   ANSI/TIA-598-D Optical Fiber Cable Color Coding
   ANSI/TIA-606-D, Administration Standard for Telecommunications Infrastructure, and its published addenda
   ANSI/TIA-607-D, Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises, and its published addenda.
   ANSI/TIA-758-C, Customer Owned Outside-Plant Telecommunications Infrastructure Standard, and its published addenda.
2. SEE SPECIFICATIONS FOR ADDITIONAL CONTRACTOR QUALIFICATIONS, PRODUCT INSTALLATION, AND QUALITY REQUIREMENTS.
3. ALL DIMENSIONS MUST BE VERIFIED IN THE FIELD AND ANY DEVIATIONS CAUSING CHANGES EXCEEDING 6 INCHES TO THE INTENDED LOCATION OF MAJOR TELECOMMUNICATIONS INFRASTRUCTURE COMPONENTS MUST BE COORDINATED WITH THE ARCHITECT AND DESIGNER PRIOR TO INSTALLATION.
4. ALL ICT DEVICES SHALL BE SECURELY MOUNTED PLUMB AND STRAIGHT TO WALLS, FLOORS, OR RACKS, PER THE MANUFACTURER'S RECOMMENDED MOUNTING PRACTICE, UNLESS OTHERWISE INDICATED IN THE ICT DRAWINGS.
5. ALL CABLES SHALL BE RATED FOR THE ENVIRONMENT IN WHICH THEY ARE INSTALLED.
6. INSTALL FIRESTOP ASSEMBLIES IN ALL THROUGH-SLAB AND THROUGH-WALL PENETRATIONS FOR THE INSTALLATION OF ICT CABLING AS REQUIRED TO MAINTAIN FIRE RATING OF PENETRATED SLAB OR WALL. REVIEW DRAWINGS FOR PARTITION TYPE RATINGS. FIRESTOPPING SYSTEMS USED FOR ALL PENETRATIONS SHALL BE A UL LISTED ASSEMBLY AND APPROVED BY APPLICABLE AUTHORITIES HAVING JURISDICTION PRIOR TO INSTALLATION.
7. THE METHOD OF INSTALLATION FOR ALL ICT RELATED BACK BOXES IN WALLS AND THE METHOD FOR PASSAGE OF CONDUIT AND WIREWAYS THROUGH ACOUSTICALLY SENSITIVE WALLS SHALL BE COORDINATED WITH THE ACOUSTICAL CONSULTANT OR OWNER PRIOR TO INSTALLATION.
8. BOND ALL CONDUITS, CABLE TRAYS, AND JUNCTION BOXES PER ANSI/TIA-607-D IN ADDITION TO ANY APPLICABLE CODE REQUIREMENTS.
9. ALL ICT RELATED FLOOR BOXES, POKE THRU DEVICES, JUNCTION BOXES AND BACK BOXES SHOULD BE PROVIDED WITH AN EMPTY CONDUIT TO THE APPLICABLE TELECOMMUNICATIONS ROOM, CABLE TRAY PATHWAY OR PULL BOX. SEE ELECTRICAL DRAWINGS FOR ADDITIONAL DETAILS.
10. CONDUIT ROUTES ON THE ICT DRAWINGS SHOW ONLY INTERCONNECTION BETWEEN THE TERMINATION POINTS AND APPROXIMATE ROUTES. THE EXACT ROUTE OF CONDUIT AND CABLE PATHWAYS ARE DETERMINED BY FIELD CONDITIONS AND VERIFIED BY INSTALLING CONTRACTOR.
11. NOTIFY THE DESIGNER OF ANY DISCREPANCIES BETWEEN THE EXISTING CONDITIONS AND THE "T" (ICT) DRAWINGS. OBTAIN CLARIFICATION BEFORE PROCEEDING WITH WORK.
12. ALL PATHWAY AND RACEWAY INCLUDING CONDUIT SLEEVES, FLOOR BOXES, OUTLET BOXES AND CONDUIT BY ELECTRICAL, UNO.
13. ALL CABLES SHALL BE SUPPORTED EVERY 48" O.C. MAX. BY J-HOOKS, CABLE TRAY, OR IN CONDUIT.
14. ALL CABLES RUN IN CONDUIT UNDER SLAB SHALL BE INDOOR/OUTDOOR RATED CATEGORY 6A.
15. CABLE GAUGE AND NUMBER OF CONDUCTORS ARE SHOWN IN THE FORMAT: AWG/#
    (EX. 16/2 = 16 AWG / 2 CONDUCTOR)
16. CALL 811 PRIOR TO PERFORMING ANY EXCAVATION.

CABLE ROUTING LEGEND

- HORIZONTAL CABLE PATHWAY
- BACKBONE CABLE PATHWAY
- BELOW GRADE
- CONDUIT OR CONDUIT SLEEVE. EMT, UNO.
- LADDER RACK OR CABLE TRAY, SEE PLANS FOR ADDITIONAL INFORMATION.
- VERTICAL TRANSITION BETWEEN FLOORS OR GRADE
- HORIZONTAL TRANSITION BETWEEN SHEETS AND/OR DETAILS
- JUNCTION BOX. 4" x 4" x 2-1/8", UNO.

STRUCTURED CABLING LEGEND

- WORK AREA OUTLET - WALL MOUNT AT +18", UNO. "X" INDICATES NUMBER OF CATEGORY 6 JACKS, UNO. SEE NOTE 1.
- "AP" - WORK AREA OUTLET - WALL MOUNT WIRELESS ACCESS POINT. MOUNT AT +8' AFF, UNO. "X" INDICATES NUMBER OF CATEGORY 6A JACKS, UNO. SEE NOTE 1.
- "TV" - WORK AREA OUTLET FOR TV BOX. WALL MOUNTED BOX PROVIDED BY ELECTRICAL CONTRACTOR. "X" INDICATES NUMBER OF CATEGORY 6A JACKS, UNO.
- WORK AREA OUTLET - CEILING MOUNT. PROVIDE 15' SERVICE LOOP. "X" INDICATES NUMBER OF CATEGORY 6 JACKS. SEE NOTE 2.
- "AP" - WORK AREA OUTLET - CEILING MOUNT WIRELESS ACCESS POINT. "X" INDICATES NUMBER OF CATEGORY 6A JACKS. SEE NOTE 2.

NOTE 1: PROVIDE 4" SQUARE BOX (2-1/8" DEEP) WITH SINGLE-GANG MUD RING & 1" EMT CONDUIT STUBBED UP TO ACCESSIBLE CEILING SPACE.

NOTE 2: IN LOCATIONS ABOVE T-BAR CEILING, TERMINATE IN BISCUIT STYLE HOUSING ABOVE CEILING TILE. LABEL HOUSING AND T-BAR RAIL IN HARD LID CEILINGS, STUB 1" EMT CONDUIT FROM OUTLET TO NEAREST ACCESSIBLE CEILING SPACE

SECURITY LEGEND

- CR — CARD READER. MOUNT AT +46". SEE DETAIL 1 & 2/T0.3. SEE NOTE 1.
- DC — DOOR CONTACTS. SEE DETAIL 1 & 2/T0.3.
- REX — REQUEST TO EXIT MOTION DETECTOR.
- C — INDICATES SIMPLEX CATEGORY 6 OUTLET FOR IP CAMERA. PROVIDE DOME CAMERA, MINIMUM 5 MEGA PIXELS. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.
- C — INDICATES SIMPLEX CATEGORY 6 OUTLET FOR IP CAMERA. PROVIDE 2-SENSOR, 180° CAMERA, MINIMUM 5 MEGA PIXELS PER SENSOR. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.
- C — INDICATES SIMPLEX CATEGORY 6 OUTLET FOR IP CAMERA. PROVIDE 4-SENSOR 360° CAMERA, MINIMUM 5 MEGA PIXELS PER SENSOR. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.
- C — INDICATES SIMPLEX CATEGORY 6 OUTLET FOR IP CAMERA. PROVIDE 4-SENSOR 360° CAMERA, MINIMUM 5 MEGA PIXELS PER SENSOR. SEE SPECIFICATIONS FOR ADDITIONAL DETAILS. SEE NOTE 2.

NOTE 1: PROVIDE 4" SQUARE BOX (2-1/8" DEEP) WITH SINGLE GANG MUD RING & 3/4" EMT CONDUIT STUBBED TO NEAREST ACCESSIBLE CEILING SPACE.

NOTE 2: FOR EXTERIOR CAMERAS, TERMINATE INSIDE BUILDING ON BISCUIT BLOCK IN NEAREST ACCESSIBLE CEILING SPACE. PROVIDE 1" SLEEVE FLUSH w/ BUILDING TO BUILDING EXTERIOR AND WEATHERPROOF SLEEVE PENETRATION. FOR INTERIOR CAMERAS IN HARD LID CEILINGS, STUB 1" EMT CONDUIT FROM OUTLET TO NEAREST ACCESSIBLE CEILING SPACE. FOR INTERIOR CAMERAS IN T-BAR CEILINGS, TERMINATE ON BISCUIT BLOCK ABOVE T-BAR CEILING TILES. PROVIDE 15' SECURITY LOOP. MOUNT @ +8' AFF, UNO.

SOUND SYSTEM LEGEND

- S1 — INDICATES OWNER FURNISHED, CONTRACTOR INSTALLED COMMUNITY R2-77Z SPEAKER FOR STADIUM SOUND SYSTEM - MOUNT AS HIGH AS POSSIBLE TO POLE ON TOP OF PRESS BOX. PROVIDE ADAPTIVE PM-24-6DOWN-G OUTDOOR POLE MOUNT. POLE BY OTHERS. RUN I/O 12/2 SPEAKER CABLING FROM SPEAKER TO VOLTERA AMPLIFIER.
- S2 — INDICATES OWNER FURNISHED, CONTRACTOR INSTALLED COMMUNITY R2-77Z SPEAKER FOR STADIUM SOUND SYSTEM - MOUNT TO BEAM ON TOP OF PRESS BOX. MOUNTING STRUCTURE BY OTHERS. RUN I/O 12/2 SPEAKER CABLING FROM SPEAKER TO VOLTERA AMPLIFIER.

ICT SHEET INDEX

NUMBER	SHEET NAME
T0.1	ICT SYMBOLS AND ABBREVIATIONS
T0.2	ICT DETAILS
T0.3	ICT DETAILS
T1.0	ICT SITE PLAN
T1.1	STRUCTURED CABLING PLAN
T1.2	SECURITY PLAN
T1.3	I.T. A102 ENLARGED PLANS
T1.4	PRESS BOX ENLARGED PLANS

PROJECT IMPLEMENTATION NOTES

1. ALL CABLING, J-HOOKS, FACE PLATES, JACKS, PATCH PANELS, WIRE MANAGEMENT PANELS, RACKS, LADDER RACK, BONDING AND SYSTEM INSTALLATION IS NOT PART OF GENERAL CONTRACTOR SCOPE, AND IS PART OF OWNER E-RATE SOLICITATION.
2. ALL PATHWAY AND RACEWAY INCLUDING FISHING OF WALLS AND INSTALLATION OF PULL STRINGS, CONDUIT SLEEVES, FLOOR BOXES, OUTLET BOXES, CABLE TRAY AND CONDUIT BY GENERAL CONTRACTOR, AND IS NOT PART OF OWNER E-RATE SOLICITATION.

ICT RESPONSIBILITY MATRIX

RESPONSIBILITIES DEFINED	EFEI E	EFEI I	OFOI	OFCI	CFCI	CFOI
BACKBONE CABLING						
ROUGH-IN, CONDUITS, PATHWAYS, AND SLEEVES					■	
OPTICAL FIBER BACKBONE CABLING	■					
HORIZONTAL CABLING						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
COPPER HORIZONTAL CABLING	■					
TELEPHONE DEVICES			■			
WIRELESS ACCESS POINTS						
ACTIVE DEVICES	■					
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
CABLING	■					
TELECOMMUNICATIONS ROOMS						
HORIZONTAL CABLING:SWITCHING AND ROUTING EQUIPMENT	■					
BACKBONE CABLING: SWITCHING AND ROUTING EQUIPMENT	■					
RACKS, FRAMES, ENCLOSURES AND ACCESSORIES	■					
CABLE MANAGEMENT EQUIPMENT	■					
UNINTERRUPTIBLE POWER SUPPLIES (RACK MOUNTED)	■					
PLYWOOD BACKBOARDS					■	
PATCH CORDS	■					
BONDING BUSBARS					■	
ACCESS CONTROL						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
HEAD END EQUIPMENT AND COMPONENTS					■	
FIELD DEVICES (CARD READERS, DOOR CONTACTS, REQUEST TO EXITS,...					■	
CABLING					■	
VIDEO SURVEILLANCE						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
HEAD-END EQUIPMENT AND COMPONENTS (NVR)					■	
CAMERAS					■	
CABLING		■				
VIDEO SURVEILLANCE SWITCHING AND ROUTING EQUIPMENT					■	
SOUND SYSTEMS						
ROUGH-IN, CONDUITS, BOXES, PATHWAYS, AND SLEEVES					■	
AMPLIFIERS AND SPEAKERS					■	
AUDIO-VISUAL CABLING (AS INDICATED ON DRAWINGS)					■	

NOTES:

1. THE MATRIX IS TO BE USED IN CONJUNCTION WITH THE DRAWINGS AND SPECIFICATIONS. ANY CONFLICTING INFORMATION SHALL BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM IMMEDIATELY.

ICT RESPONSIBILITY MATRIX LEGEND:

EFEI - E-RATE CONTRACTOR FURNISHED, E-RATE CONTRACTOR INSTALLED
- E SUB-COLUMN REPRESENTS ELIGIBLE E-RATE ITEMS
- I SUB-COLUMN REPRESENTS IN-ELIGIBLE E-RATE ITEMS

OFOI - OWNER FURNISHED, OWNER INSTALLED
OFCI - OWNER FURNISHED, GENERAL CONTRACTOR INSTALLED
CFCI - GENERAL CONTRACTOR FURNISHED,GENERAL CONTRACTOR INSTALLED
CFOI - GENERAL CONTRACTOR FURNISHED, OWNER INSTALLED

MONTANA
KYLE J. [illegible]
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
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sheet ICT SYMBOLS AND ABBREVIATIONS
project WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

No.	Description	Date
A2	Addendum 2	2-18-26

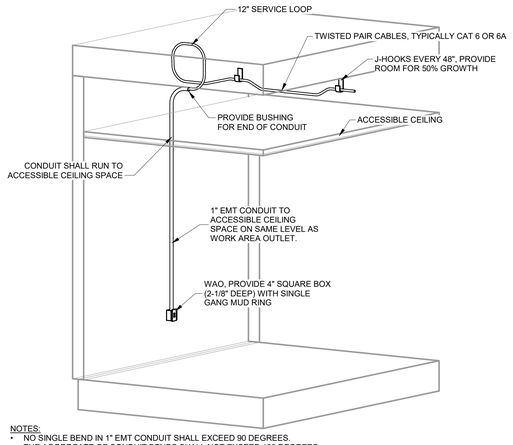
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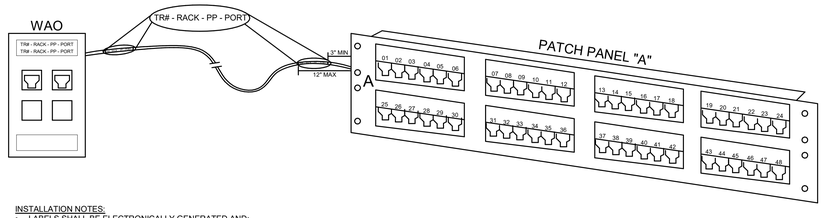
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NOTES:
- NO SINGLE BEND IN 1" EMT CONDUIT SHALL EXCEED 90 DEGREES.
- THE AGGREGATE OF CONDUIT BENDS SHALL NOT EXCEED 180 DEGREES
- CONDUIT SHALL STUB TO CEILING SPACE ON SAME LEVEL AS WORK AREA OUTLET.

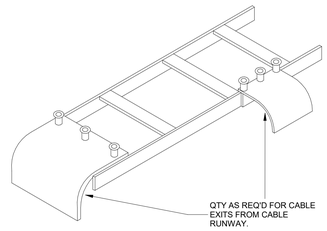
1 WORK AREA OUTLET DETAIL
N.T.S.



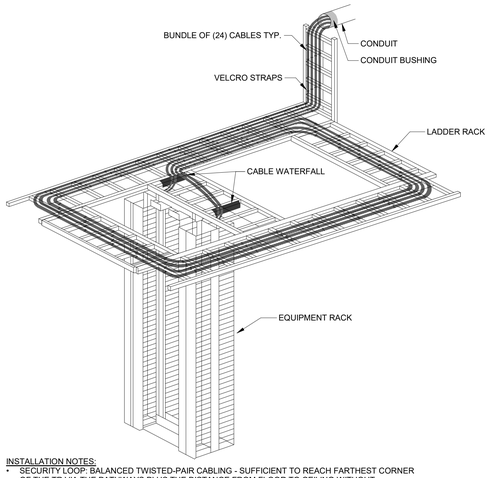
INSTALLATION NOTES:
- LABELS SHALL BE ELECTRONICALLY GENERATED AND:
  - PROVIDE VINYL SUBSTRATE WITH WHITE PRINTING AREA AND A CLEAR 'TAIL' THAT SELF LAMINATES THE PRINTED AREA WHEN WRAPPED AROUND THE PRINTED AREA. IF CABLE IS WHITE IN COLOR, A DIFFERENT COLOR SHALL BE USED.
- CONTRACTOR TO PROVIDE AND INSTALL TYPED LABEL ON EACH TELECOM ROOM, JACK, FACEPLATE, PATCH PANEL, AND AT EACH END OF EVERY CABLE INSTALLED BY THIS CONTRACTOR.
- LABEL EACH CABLE/WIRE WITHIN 12" OF EACH TERMINATION POINT, BUT ENSURE THAT AT LEAST 3" SHALL REMAIN BETWEEN LABEL AND TERMINATION POINT.
- CONTRACTOR SHALL SUBMIT AND REVIEW THE FINAL LABELING SCHEME WITH THE DESIGNER PRIOR TO INSTALLATION.
- LABELING SHALL FOLLOW ANSI/TIA-606-D, UNLESS THE OWNER SPECIFIES THEIR OWN LABELING REQUIREMENTS.

LABELING EXAMPLE:
- FOR A DUPLEX WAO THAT TERMINATES IN TR 01, RACK 2, PATCH PANEL C, PORTS 36 & 37: THE CORRESPONDING LABELS SHOULD LOOK LIKE 01-2-C-36 AND 01-2-C-37, RESPECTIVELY.
  - FOR TRs (TELECOMMUNICATIONS ROOMS) WITH A COMBINED TOTAL OF ONE TELECOMMUNICATIONS RACK AND/OR CABINET, THE RACK/CABINET IDENTIFIER MAY BE DROPPED FROM THE LABEL (I.E. "TR# - PP - PORT).

2 DATA CABLE LABELING DETAIL
N.T.S.

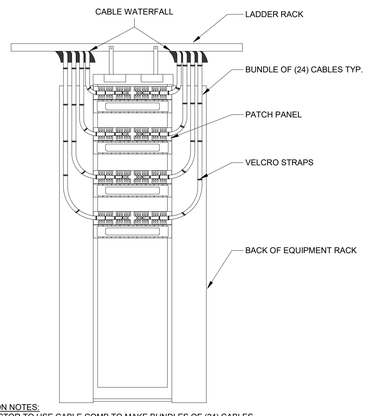


3 CABLE TRAY RADIUS DROP
N.T.S.



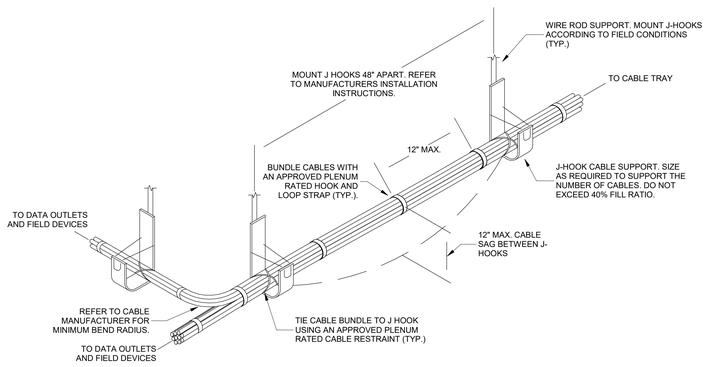
INSTALLATION NOTES:
- SECURITY LOOP: BALANCED TWISTED-PAIR CABLING - SUFFICIENT TO REACH FARTHEST CORNER OF THE TR VIA THE PATHWAYS PLUS THE DISTANCE FROM FLOOR TO CEILING WITHOUT EXCEEDING THE ~90m (295ft) LIMITATION.
- SECURITY LOOP: OPTICAL FIBER CABLING - SUFFICIENT TO REACH FARTHEST CORNER OF THE TR VIA THE PATHWAYS PLUS THE DISTANCE FROM FLOOR TO CEILING AND AN ADDITIONAL ~3m (10ft) OF SLACK FOR STORAGE INSIDE HARDWARE.
- CONTRACTOR TO MAKE BUNDLES OF (24) CABLES USING VELCRO STRAPS AND UTILIZING CABLE COMBS TO MAINTAIN ORGANIZED BUNDLES.
- CONTRACTOR TO PROVIDE AND INSTALL VELCRO STRAPS AROUND CABLE BUNDLES EVERY 12". CABLE TIES NOT ACCEPTED.
- BUNDLES TO HAVE ONLY CATEGORY 6 OR 6A CABLES. NO MIXING CATEGORY 6 WITH 6A IN SAME BUNDLE.

4 LADDER RACK WITH SECURITY LOOP DETAIL
N.T.S.



INSTALLATION NOTES:
- CONTRACTOR TO USE CABLE COMB TO MAKE BUNDLES OF (24) CABLES.
- CONTRACTOR TO PROVIDE AND INSTALL VELCRO STRAPS AROUND CABLE BUNDLES EVERY 12". CABLE TIES NOT ACCEPTED.

5 CABLE MANAGEMENT DETAIL
N.T.S.



6 J-HOOK DETAIL
N.T.S.

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KYLER J. [illegible] LICENSED PROFESSIONAL ENGINEER MONTANA No. 85920 PE

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS

sheet ICT DETAILS
project WHITEFISH HIGH SCHOOL
owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

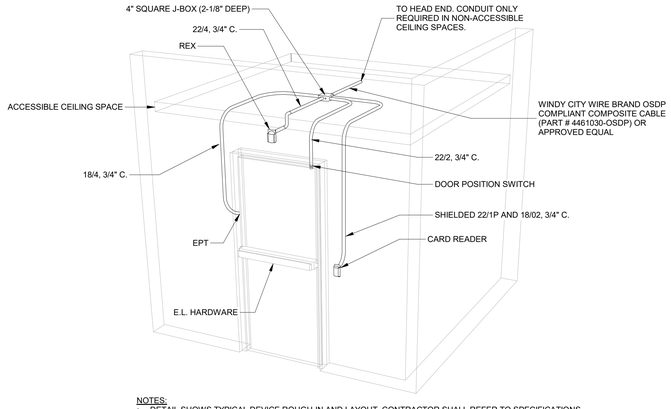
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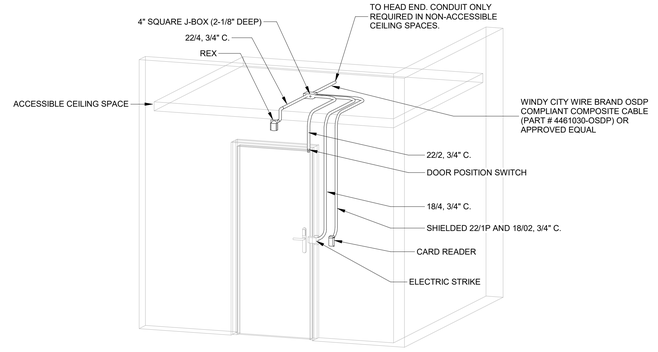
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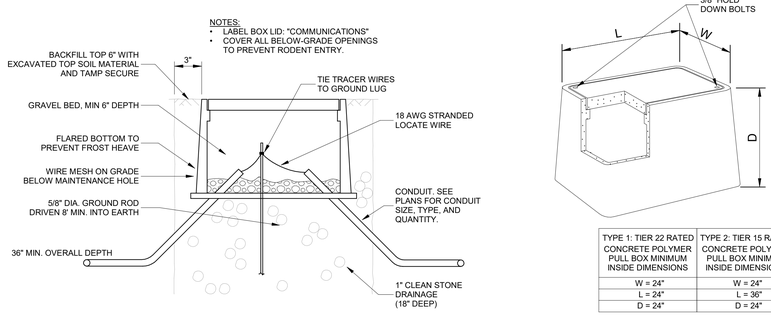
NOTES:
- DETAIL SHOWS TYPICAL DEVICE ROUGH-IN AND LAYOUT. CONTRACTOR SHALL REFER TO SPECIFICATIONS SECTION 08 7100 FOR PROJECT SPECIFIC DOOR HARDWARE.
- VERIFY AND COORDINATE REQUIREMENTS WITH OWNER, ARCHITECT, AND SECURITY CONTRACTOR PRIOR TO ROUGH-IN.

1 TYPICAL ACCESS CONTROL DOOR DETAIL - ELECTRIFIED LATCH
N.T.S.



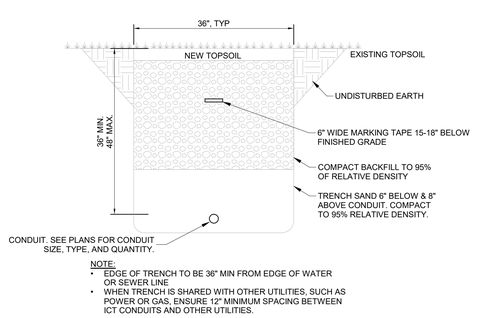
NOTES:
- DETAIL SHOWS TYPICAL DEVICE ROUGH-IN AND LAYOUT. CONTRACTOR SHALL REFER TO SPECIFICATIONS SECTION 08 7100 FOR PROJECT SPECIFIC DOOR HARDWARE.
- VERIFY AND COORDINATE REQUIREMENTS WITH OWNER, ARCHITECT, AND SECURITY CONTRACTOR PRIOR TO ROUGH-IN.

2 TYPICAL ACCESS CONTROL DOOR DETAIL - ELECTRIC STRIKE
N.T.S.



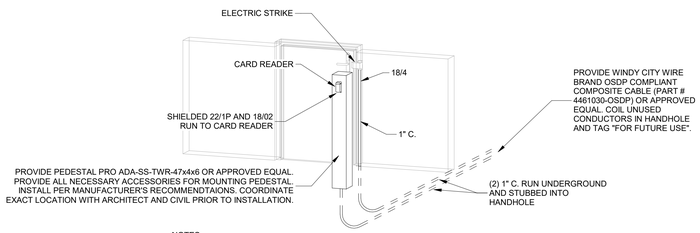
TYPE 1: TIER 22 RATED CONCRETE POLYMER PULL BOX MINIMUM INSIDE DIMENSIONS	TYPE 2: TIER 15 RATED CONCRETE POLYMER PULL BOX MINIMUM INSIDE DIMENSIONS	TYPE 3: TIER 15 RATED CONCRETE POLYMER PULL BOX MINIMUM INSIDE DIMENSIONS
W = 24"	W = 24"	W = 24"
L = 24"	L = 36"	L = 24"
D = 24"	D = 24"	D = 24"

3 COMMUNICATIONS - HANDHOLE DETAIL
N.T.S.



NOTE:
- EDGE OF TRENCH TO BE 36" MIN FROM EDGE OF WATER OR SEWER LINE
- WHEN TRENCH IS SHARED WITH OTHER UTILITIES, SUCH AS POWER OR GAS, ENSURE 12" MINIMUM SPACING BETWEEN ICT CONDUITS AND OTHER UTILITIES.

4 COMMUNICATIONS - TRENCH DETAIL
N.T.S.



NOTES:
- COORDINATE DOOR HARDWARE WITH ARCHITECT.
- VERIFY AND COORDINATE REQUIREMENTS WITH OWNER AND SECURITY CONTRACTOR PRIOR TO ROUGH-IN.
- EC TO PROVIDE ALL 120V POWER CIRCUITING, AND PROVIDE ROUGH-IN ONLY FOR SIGNAL WIRING. DEVICES AND LOW VOLTAGE SIGNAL WIRING BY SECURITY CONTRACTOR.
- TYPICAL ACCESS CONTROL DRAWING. REFER TO DOOR HARDWARE SCHEDULE FOR EXACT PROJECT DETAILS.

5 TYPICAL ACCESS CONTROL DOOR DETAIL - ELECTRIC STRIKE
N.T.S.

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MONTANA — KYLER J. [illegible] — No. 85920 PE — LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER — Bicsi — Pete Weber — BICSI ID # 338372 — EXPIRES 12-31-28 — RCDD

sheet ICT DETAILS
project WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

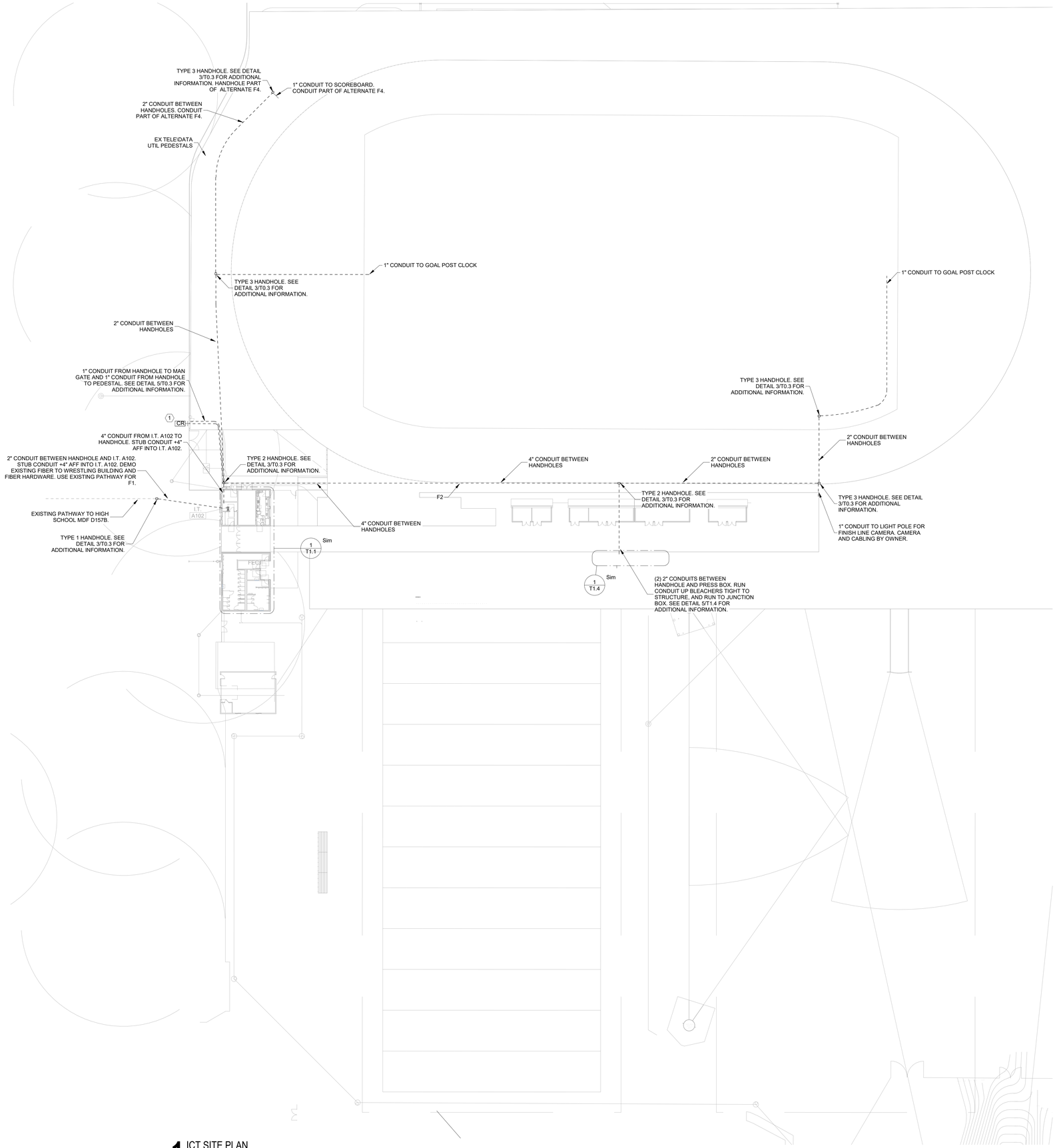
No.	Description	Date
A2	Addendum 2	2-18-26

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T0.3



1 ICT SITE PLAN
1" = 30'-0"

5.33' 2.66' 0' 5.33' 10.66'
SCALE : 3/16" = 1'-0"

NORTH

GENERAL ICT SITE NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.
F. LINES SHOWN ON THE PLAN FROM ICT BASED DEVICES TO THE BUILDING REPRESENT THE PROPOSED ROUTING PATH FOR PATHWAYS. CONTRACTOR SHALL SELECT BEST PATH WHEN ROUTING FOR THE LEAST IMPACT ON SITE OR BUILDING.
G. PRIOR TO ANY TRENCHING, CONTACT 811 "CALL BEFORE YOU DIG" AND COORDINATE WITH OWNER AND UTILITIES TO LOCATE ALL BURIED POWER, COMMUNICATIONS, GAS, WATER, SEWER, IRRIGATION PIPING, ETC. FROM THIS INFORMATION, ESTABLISH THE BEST ROUTING AND PLAN FOR AREAS THAT WILL REQUIRE HAND DIGGING.
H. ALL PATHWAYS ON SITE SHALL HAVE A MINIMUM OF 36" OF CLEAN, PROPERLY COMPACTED COVER.
I. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF SIDEWALKS, PAVEMENT, FLOORS, WALLS, CEILINGS, ROOFS, ETC. TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
J. CAREFULLY CUT AND RETAIN SOD ALIVE FOR REINSTALLATION. SAW CUT, REMOVE, AND LEGALLY DISPOSE OF CONCRETE AND ASPHALT.
K. INSTALL MOLDED PLASTIC INTERMEDIATE (HORIZONTAL) SPACERS EVERY SIX FEET WHENEVER TWO OR MORE CONDUITS ARE INSTALLED IN A TRENCH. MAINTAIN A MINIMUM 12-INCH SEPARATION BETWEEN POWER AND COMMUNICATIONS CONDUITS. WHERE TRENCH IS SHARED WITH OTHER UTILITIES, A MINIMUM 24-INCH SEPARATION SHALL BE MAINTAINED FROM WATER, GAS, OR SEWER LINES. ALL CONDUIT SEPARATIONS ARE MEASURED SURFACE-TO-SURFACE AND NOT CENTER-TO-CENTER.
L. FILL TRENCH AND COMPACT TO MATCH ADJACENT UNDISTRUBED SOIL. REPLACE SOD TO MATCH EXISTING. POUR CONCRETE AND REPLACE ASPHALT TO MATCH ADJACENT SURFACES.
M. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF ANY DAMAGE TO EXISTING BURIED POWER, COMMUNICATIONS, GAS, WATER, SEWER, IRRIGATION PIPING, ETC. AND SHALL HIRE TRAINED AND CERTIFIED CRAFTSMEN TO PERFORM THE REPAIRS AND BRING THEM BACK TO 'LIKE EXISTING CONDITIONS'. REPAIR WORK WILL NOT BE CONSIDERED COMPLETE UNTIL ALL SYSTEMS ARE ONCE AGAIN FUNCTIONING PROPERLY AND OWNER IS SATISFIED WITH THE REPAIRS.
N. **COORDINATE CONDUIT SIZES AND CONDUIT TYPES WITH CIVIL PLANS.**

KEY NOTES:

1 CARD READER FOR MAN GATE. MOUNT CARD READER TO PEDESTAL. PROVIDE PEDESTAL PRO ADA-SS-TWR-47x4x6 OR APPROVED EQUAL. PROVIDE ALL NECESSARY ACCESSORIES FOR MOUNTING PEDESTAL. INSTALL PER MANUFACTURER'S RECOMMENDTAIONS. COORDINATE EXACT LOCATION WITH ARCHITECT AND CIVIL PRIOR TO INSTALLATION. SEE DETAIL 5/T0.3 FOR ADDITIONAL INFORMATION.

T - FIBER OPTIC BACKBONE SCHEDULE

MARK	CABLE TYPE	SOURCE	DESTINATION	APPROXIMATE DISTANCE
(F1)	12-STRAND OS2 SINGLEMODE FIBER	MDF D157B	I.T. A102	250'
(F2)	12-STRAND OS2 SINGLEMODE FIBER	I.T. A102	WALL MOUNTED CABINET IN PRESS BOX	400'

NOTE: PROVIDE 30' SERVICE LOOP ON EACH END OF FIBER.

MONTANA
KYLER J. GUMMOW
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet ICT SITE PLAN
project WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

No.	Description	Date
A2	Addendum 2	2-18-26
A3	Addendum 3	2-26-26

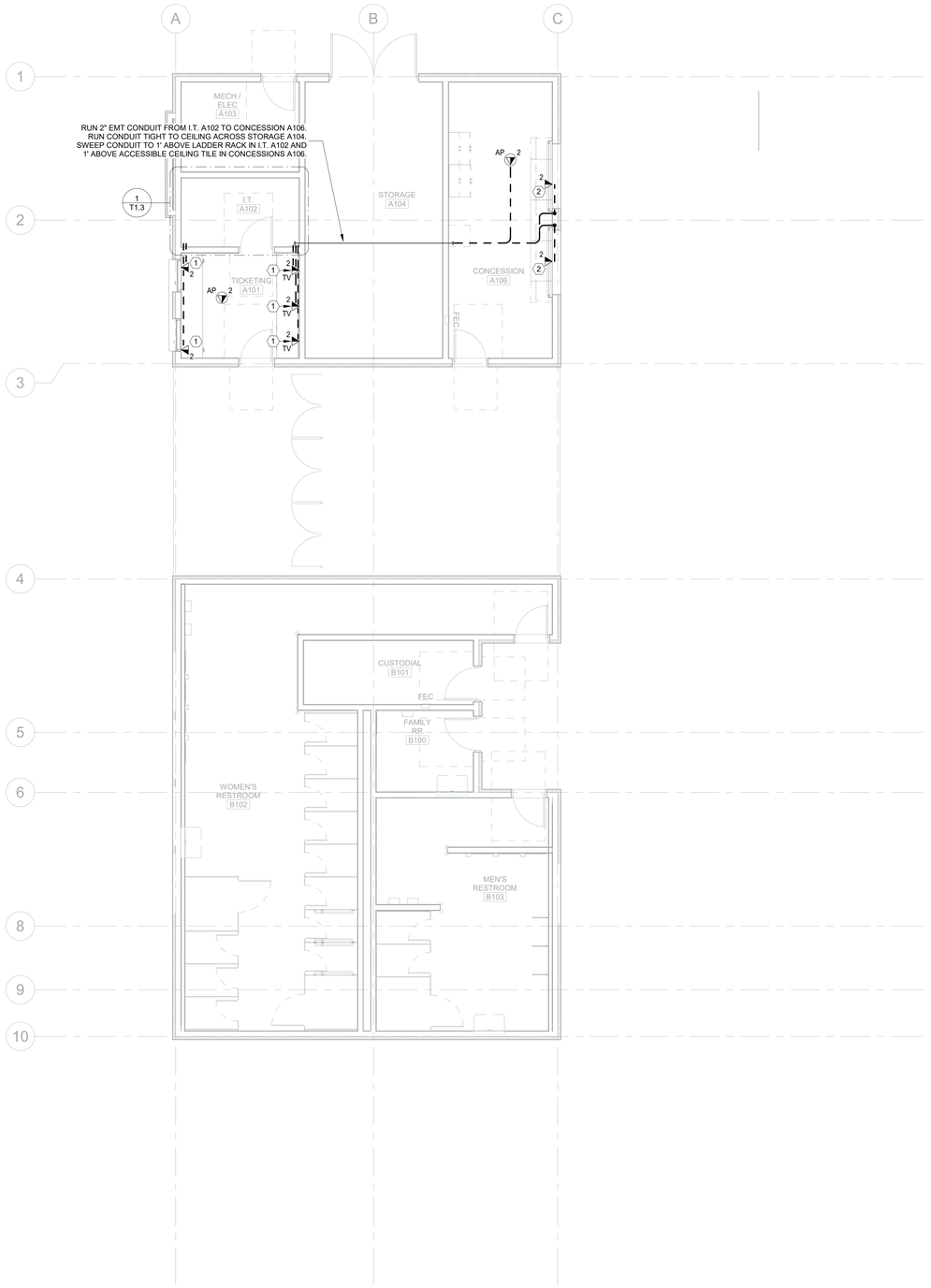
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GENERAL ICT NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO I.T. A102 ALONG PATHWAY AS SHOWN.
2 COORDINATE WAO WITH CASEWORK PRIOR TO ROUGH-IN.

MONTANA
KYLER J. GUNNARSON
REG. NO. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet STRUCTURED CABLING PLAN
project WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

No.	Description	Date

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issue date
FEB 06, 2026

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1 STRUCTURED CABLING PLAN
3/16" = 1'-0"

5.33' 2.66' 0' 5.33' 10.66'
SCALE : 3/16" = 1'-0"

NORTH

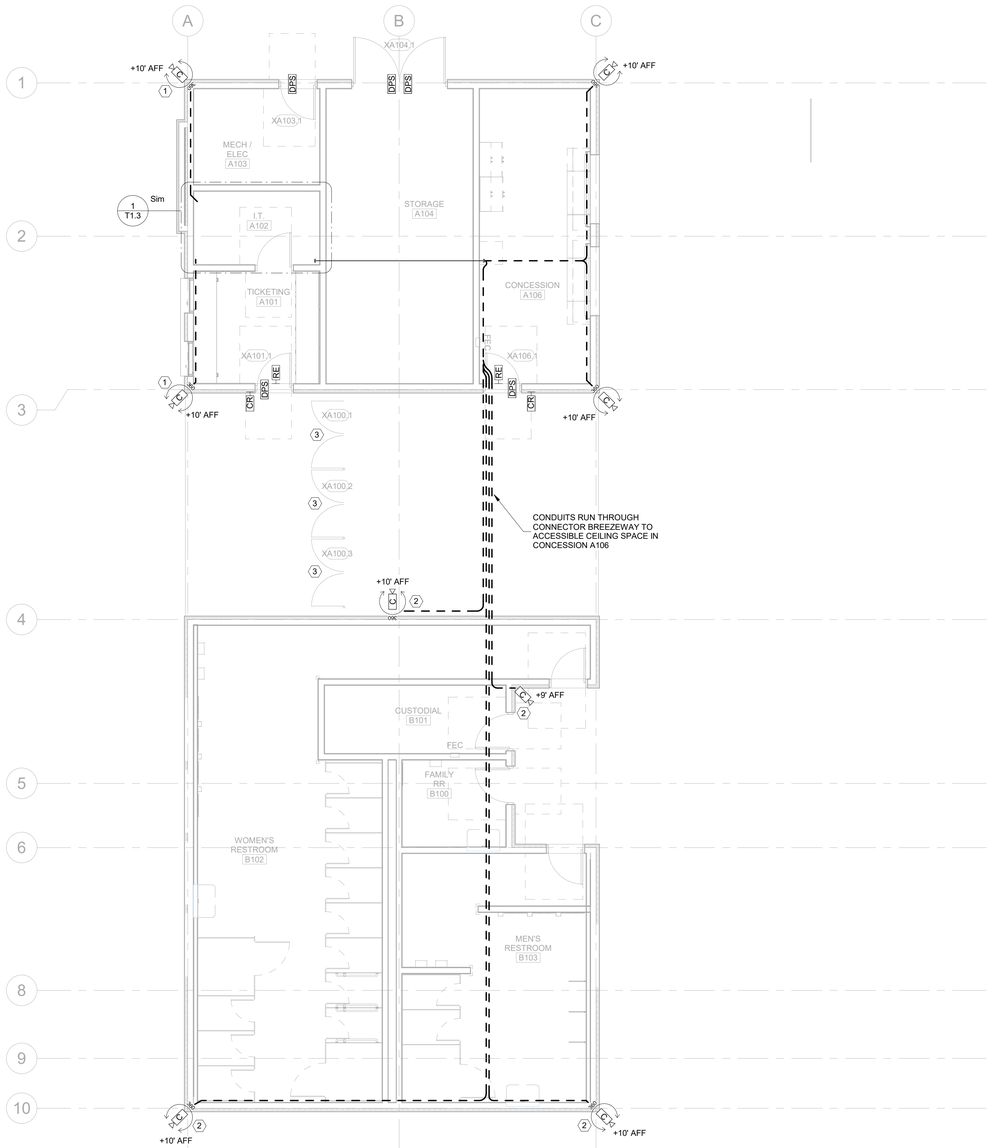
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GENERAL ICT NOTES

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C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CONDUIT ENDS SHALL BE FURNISHED WITH PLASTIC BUSHINGS FOR CABLE PROTECTION.
E. PROVIDE PULL STRINGS FOR ALL CONDUITS INSTALLED GREATER THAN 10'.

KEY NOTES:

1 RUN 1" EMT CONDUIT TO I.T. A102 ALONG PATHWAY AS SHOWN.
2 RUN 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING SPACE, JUNCTION BOX, OR CABLE TRAY ALONG PATHWAY AS SHOWN.
3 PROVIDE WINDY CITY WIRE BRAND OSDP COMPLIANT COMPOSITE CABLE (PART # 4461030-OSDP) OR APPROVED EQUAL FOR GATE TO BE ON SCHEDULE. COIL CARD READER CABLE ABOVE NEAREST ACCESSIBLE CEILING SPACE AND TAG "FOR FUTURE USE".



1 SECURITY PLAN
3/16" = 1'-0"

5.33' 2.66' 0' 5.33' 10.66'
SCALE : 3/16" = 1'-0"

NORTH

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MONTANA
KYLE J. YAMAMOTO
No. 25920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet SECURITY PLAN
project WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS
owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

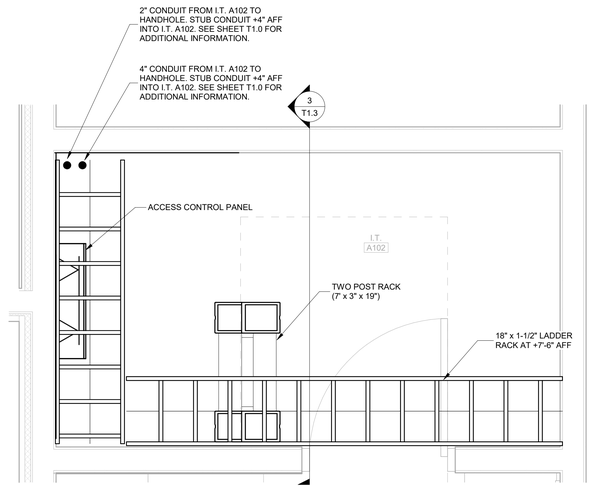
No.	Description	Date
A2	Addendum 2	2-18-26
A3	Addendum 3	2-26-26

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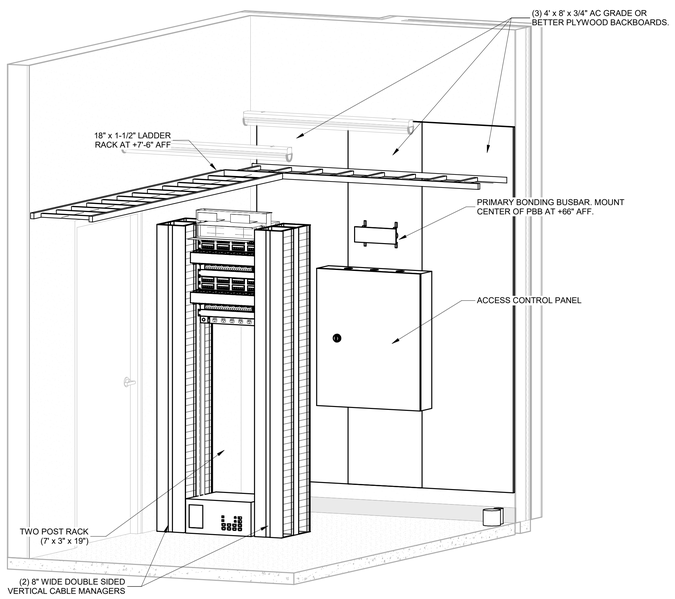
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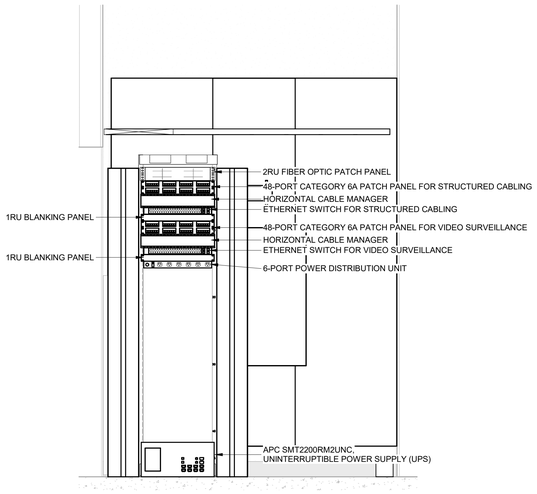


1 ENLARGED PLAN - I.T. A102

3/4" = 1'-0"



2 ISOMETRIC VIEW - I.T. A102



3 RACK ELEVATION - I.T. A102

3/4" = 1'-0"

GENERAL TR NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CABLES SHALL HAVE A SERVICE LOOP LONG ENOUGH SO THAT EACH CABLE SHALL REACH FURTHEST CORNER OF TELECOM ROOM (10' MINIMUM).
E. BOND ALL LADDER RACK SECTIONS AND RACKS/CABINETS TO BONDING BUSBAR WITH #6 GROUND WIRE. SEE SPECIFICATIONS FOR ADDITIONAL BONDING AND GROUNDING REQUIREMENTS.
F. ALL PLYWOOD SHALL BE AC GRADE PLYWOOD AND HAVE GRADE A SURFACE EXPOSED AND PAINTED WITH (2) COATS OF FIRE RESISTANT PAINT. FIRE RESISTANT PAINT LABEL TO BE AVAILABLE FOR INSPECTION BY AHJ. IF USING FIRE RATED PLYWOOD, FIRE RATING STAMP TO REMAIN VISIBLE. MOUNT PLYWOOD BACKBOARDS +8" AFF.
G. ALL CABLES SHALL BE NEATLY BUNDLED AND COMBED INTO GROUPS OF 24 FROM THE ENTRANCE POINT OF THE TR TO THE TERMINATION POINT AT THE PATCH PANEL.

MONTANA
KYLER J. GUMMOW
No. 35920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
BICSI
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet I.T. A102 ENLARGED PLANS

project WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS

owner WHITEFISH SCHOOL DISTRICT

project # 24196.10

No.	Description	Date
A3	Addendum 3	2-26-26

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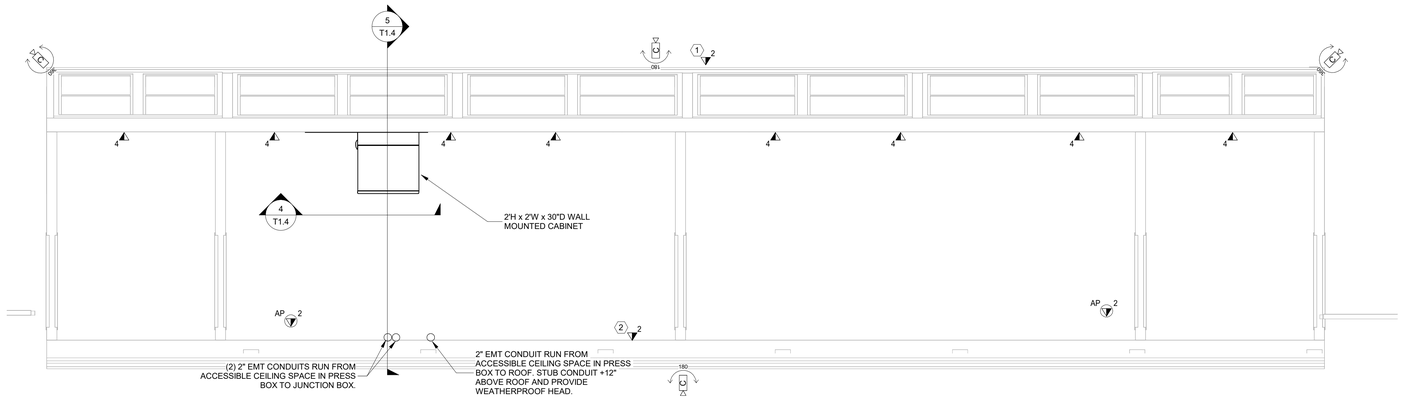
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5.33' 2.66' 0' 5.33' 10.66'

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

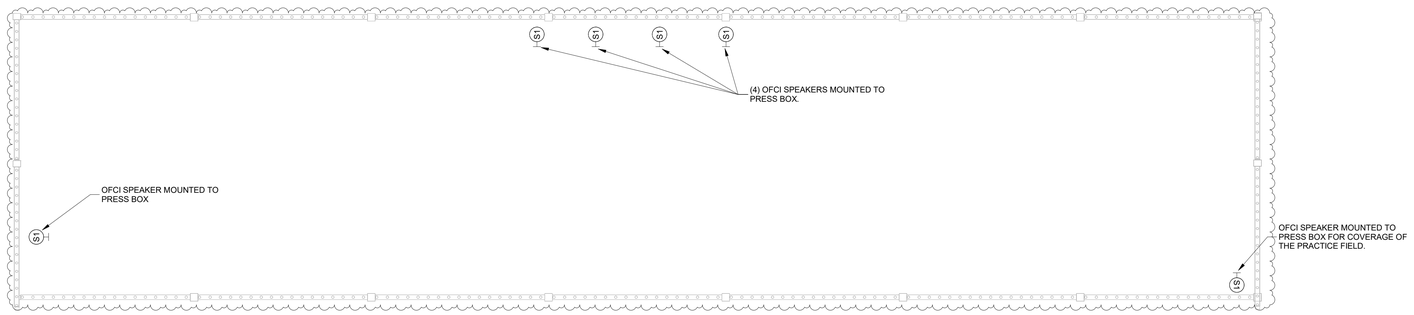
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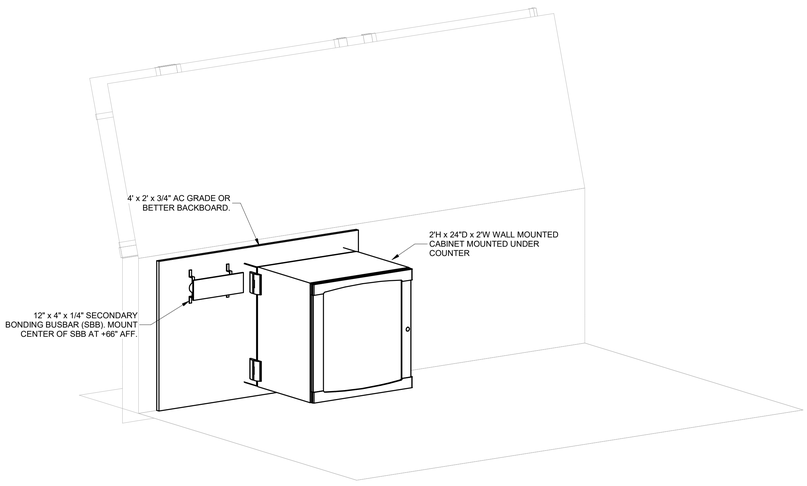
1 PRESS BOX - ICT ENLARGED PLAN

1/2" = 1'-0"



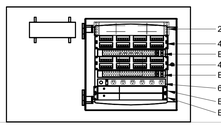
2 PRESS BOX - ICT ROOF PLAN

1/2" = 1'-0"



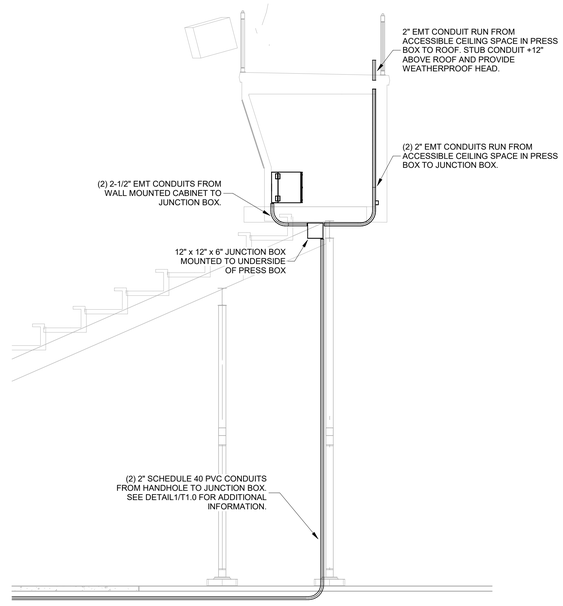
3 PRESS BOX - 3D VIEW

N.T.S.



4 PRESS BOX - CABINET SECTION

N.T.S.



5 PRESS BOX CONDUIT PATHWAYS SECTION

1/4" = 1'-0"

5.33' 2.66' 0' 5.33' 10.66'

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

NORTH

GENERAL TR NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
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C. ALL SIZING, PLACEMENT, AND QUANTITIES FOR CONDUITS, CONDUIT SLEEVES, CABLE TRAY, AND LADDER RACK CALLED OUT ON STRUCTURED CABLING PLANS AND/OR ENLARGED VIEWS.
D. ALL CABLES SHALL HAVE A SERVICE LOOP LONG ENOUGH SO THAT EACH CABLE SHALL REACH FURTHEST CORNER OF TELECOM ROOM (10' MINIMUM).
E. BOND ALL LADDER RACK SECTIONS AND RACKS/CABINETS TO BONDING BUSBAR WITH #6 GROUND WIRE. SEE SPECIFICATIONS FOR ADDITIONAL BONDING AND GROUNDING REQUIREMENTS.
F. ALL PLYWOOD SHALL BE AC GRADE PLYWOOD AND HAVE GRADE A SURFACE EXPOSED AND PAINTED WITH (2) COATS OF FIRE RESISTANT PAINT. FIRE RESISTANT PAINT LABEL TO BE AVAILABLE FOR INSPECTION BY AHJ. IF USING FIRE RATED PLYWOOD, FIRE RATING STAMP TO REMAIN VISIBLE. MOUNT PLYWOOD BACKBOARDS +8" AFF.
G. ALL CABLES SHALL BE NEATLY BUNDLED AND COMBED INTO GROUPS OF 24 FROM THE ENTRANCE POINT OF THE TR TO THE TERMINATION POINT AT THE PATCH PANEL.

KEY NOTES:

1 WAO FOR OWNER PROVIDED PIXELOT CAMERA AND OWNER PROVIDED HUDL CAMERA. TERMINATE INSIDE BUILDING ON BISCUIT BLOCK IN NEAREST ACCESSIBLE CEILING SPACE. PROVIDE 1" SLEEVE FLUSH w/ BUILDING TO BUILDING EXTERIOR AND WEATHERPROOF SLEEVE PENETRATION. MOUNT SLEEVE PENETRATION AT +8' AFF.

2 FOR FACP, COORDINATE LOCATION WITH CONTRACTOR PRIOR TO ROUGH-IN.

MONTANA
KYLER J. GUMMERUD
No. 85920 PE
LICENSED PROFESSIONAL ENGINEER

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Pete Weber
BICSI ID # 338372
EXPIRES 12-31-28
RCDD

sheet: PRESS BOX ENLARGED PLANS
project: WHITEFISH HIGH SCHOOL - ATHLETIC IMPROVEMENTS
owner: WHITEFISH SCHOOL DISTRICT

project # 24196.10

No.	Description	Date
A2	Addendum 2	2-18-26

phase: BID DOCUMENTS

NOT FOR CONSTRUCTION

issue date: FEB 06, 2026

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SECTION 270000

COMMUNICATIONS PROJECT OVERVIEW

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This project includes the installation, testing and certification of structured cabling. Network media included in this project are horizontal Category 6A cabling, and backbone singlemode fiber optic cable.

1.2 RELATED PROJECTS

A. The Contractor for this project will be required to coordinate with other contractors providing data, telephone, audio and video equipment and installation directly to the Owner.

1.3 CONTRACTOR QUALIFICATIONS

A. Installer Qualifications: Division 27 sub-contractor shall be a manufacturer certified contractor and will be required to provide a minimum 25-year performance warranty on parts and labor for all Category 6A cabling and systems. Proof of the sub-contractor's ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice to Proceed. This warranty shall cover the patch panels, horizontal cabling, work area outlets, and patch cords.

B. Contractor shall employ, in conjunction with construction of the project, a capable, experienced, and reliable foreperson and such skilled workers as may be required for the various classes of work to be performed. Contractor shall be required to submit evidence of foreperson's skilled experience on ANSI/TIA certified structured cabling systems. Evidence of experience shall be submitted to Owner with submittal of bid. Minimum experience for any individual involved in cabling work shall be cable pulling and termination work on projects for a minimum of 5 years and completion of training (40 hrs. minimum) which certifies the person's work in copper cabling installations. Training can be a combination of BICSI and manufacturer training.

END OF SECTION 270000

SECTION 270100

BASIC TELECOMMUNICATIONS REQUIREMENTS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Include in bid all labor, materials, tools, transportation, storage costs, training, equipment, insurance, temporary protection, permits, inspections, taxes and all necessary and related items required to provide complete and deliver operational systems shown and described.

B. References to Codes and Standards called for in the Contract Documents mean the latest edition, amendment and revisions to the Codes and Standards in effect on the date of these Contract Documents:

1. Minimum composition requirements and/or installation methods for the following materials and work are included in this Section.

a. Miscellaneous supports
b. Access doors and panels
c. Fire stopping
d. Flashing and sealing
e. Cutting and patching
f. Waterproofing

C. Contract shall include, but not be limited to:

1. Copper and fiber optic cabling
2. Routing cabling through telecommunication pathways
3. Telecommunications spaces

1.2 RELATED SECTION AND DOCUMENTS

A. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.

1.3 REGULATIONS AND CODE COMPLIANCE

A. All work and materials shall conform to and be installed, inspected and tested in accordance with the governing rules and regulations of federal, state and local governmental agencies.

B. The following is a list of codes and standards that will apply to this project.

1. Federal Occupational Safety and Health Administration - OSHA
2. National Life Safety Code, NFPA 101
3. National Electrical Safety Code, 2020
4. Underwriters Laboratory (UL)
5. Owner’s Insurance Carrier
6. ANSI/TIA - Building Telecommunications Standards
7. BICSI Telecommunications Distribution Methods Manual
8. IEEE Standards
9. Federal Communications Commission
10. NEMA – National Electrical Manufacturers’ Association
11. ADA, Americans with Disabilities Act
12. International Building Code

1.4 GLOSSARY

A. Acronyms:

ACRONYM	DEFINITION
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing Materials
BICSI	Building Industry Consulting Services International
EIA	Electronic Industries Association
ER	Equipment Room
FCC	Federal Communications Commission
FM	Factory Mutual Insurance Company
IEEE	Institute Of Electrical and Electronics Engineers
IRI	Industrial Rick Insurers
ISD	Information Systems Division
ISO	International Standards Organization
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
TIA	Telecommunications Industry Association
TR	Telecommunications Room
UFPO	Underground Facilities Protective Organization
UL	Underwriter's Laboratories, Inc.

1.5 DEFINITIONS:

A. Definitions:

1. Approved / Approval: Written permission to use a material or system.
2. As Called For: Materials, equipment including the execution Specified/shown in the contract documents.
3. Code Requirements: Minimum requirements.
4. Concealed: Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
5. Equal or Equivalent: Equally acceptable

6. Exposed: Work not identified as concealed.
7. Final Acceptance: Owner acceptance of the project from Contractor upon certified by Engineer.
8. Furnish: Supply and deliver to installation location.
9. Furnished by Others: Receive delivery at job site or where called for and install.
10. Inspection: Visual observations by Owner's site Representative.
11. Install: Mount and connect equipment and associated materials ready for use.
12. Labeled: Refers to classification by a standards agency.
13. Or Approved Equal: Approved equal or equivalent as determined by Engineer.
14. Engineer: The Prime Professional.
15. Prime Professional: Architect or Engineer having a contract directly with the Owner for professional services.
16. Provide: Furnish, install and connect ready for use.
17. Relocate: Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.
18. Replace: Remove and provide new item.
19. Review: A general contractual conformance check of specified products.
20. Roughing: Pipe, duct, conduit, equipment layout and installation.
21. Satisfactory: As specified in contract documents.
22. Site Representative: Construction Manager or Owner's Inspector at the work site.
23. Refer to General Conditions of the Contract for additional definitions.

1.6 INTENT OF DRAWINGS

A. The drawings are diagrammatic, unless detailed dimensioned drawings are included. Drawings show approximate locations of equipment, and fixtures. Exact locations are subject to the approval of the Engineer.

B. Anything mentioned in the Specifications and not shown in the Drawings or shown in the Drawings and not mentioned in the Specifications, shall be of like effect as if shown and mentioned in both. In case of differences between the Drawings and the Specifications, the stricter provision as determined by the Engineer shall govern. Omissions from the Drawings or Specifications, or the incorrect description of details of Work which are evidently necessary to carry out the intent of the Drawings and Specifications, or which are customarily performed, shall not relieve the Contractor from performing such omitted or incorrectly described details of the Work, but they shall be performed as if correctly described in the Contract Documents. Acceptance of this project by the Contractor acknowledges that they have verified all field measurements, field construction criteria, materials, catalog numbers and similar data, or will do so, and that they will check and coordinate each shop drawing and sample with the requirements of the Work and of the Contract Documents.

1.7 REVIEW OF THE CONTRACT DOCUMENTS

A. The contractor shall carefully study and compare the Contract Documents and shall at once report to the Engineer any error, inconsistency or omission he or she may discover. If contractor performs any construction activity knowing it involves a recognized error, inconsistency or omission in the contract documents without such notice to the Engineer or Owner, the contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable cost for correction.

B. The contractor must verify all dimensions locating the work and its relation to existing work, all existing conditions and their relation to the work and all man-made obstructions and conditions, etc. affecting the completion and proper execution of the work as indicated in the Contract Documents.

1.8 EXAMINATION OF THE PREMISES

A. Contractor shall visit Site to familiarize themselves with the local conditions under which the work is to be performed and correlate their observations with the requirements of the Contract Documents. No allowance will be made for claims for concealed conditions, which Contractor,

in exercise of reasonable diligence in its observations of the Site and review of the local conditions under which the work is to be performed, learned or should have learned of, unless otherwise specifically agreed by Owner and Engineer in writing.

B. Before ordering any materials or doing any work, the contractor shall verify all measurements and be responsible for correctness of same. No extra charge or compensation will be allowed for duplicate work or material required because of an unverified difference between an actual dimension and the measurement indicated in the drawings. Any discrepancies found shall be submitted in writing to the Project Manager and Engineer for consideration before proceeding with the work.

PART 2 - PRODUCTS

2.1 EQUIPMENT AND MATERIALS MINIMUM REQUIREMENTS

A. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.

B. Provide materials that meet the following minimum requirements:

1. All equipment and material for which there is a listing service shall bear a National Recognized Testing Laboratory (NRTL) label.
2. Electrical equipment and systems shall meet UL Standards and requirements of the NESC. This listing requirement applies to the entire assembly. Any modifications to equipment to suit the intent of the specifications shall be performed in accordance with these requirements.
3. Equipment shall meet all applicable FCC Regulations.
4. All materials, unless otherwise specified, shall be new and be the standard products of the manufacturer. Used equipment or damaged material will be rejected.
5. The listing of a manufacturer as “acceptable” does not indicate acceptance of a standard or cataloged item of equipment. All equipment and systems must conform to the Specifications and meet the quality of the design make.
6. The Contractor shall furnish and file with the proper Authorities all drawings required by them in connection with this work. The Contractor, if required, shall obtain all official permits, licenses and inspections and shall pay all legal and proper fees and charges.
7. The Contractor shall at inception of the work provide the Project Coordinator with copies of all required building and trade permits, if said are required.
8. The Contractor shall be responsible for arranging all inspections and for securing all required signatures. Upon completion of the work, properly completed permits shall be returned to the Project Coordinator, if any are required.

2.2 WORKMANSHIP, SUBSTITUTIONS AND WARRANTY

A. Materials and workmanship shall meet or exceed industry standards. Horizontal and backbone cabling and all related passive equipment shall be fully guaranteed by the manufacturer for a minimum of twenty-five years from final acceptance. Cable integrity and associated terminations shall be thoroughly inspected, fully tested and guaranteed as free from defects, transpositions, opens-shorts, tight kinks, damaged jacket insulation, etc.

1. All labor must be thoroughly competent and skilled, and all work shall be executed in strict accordance with the best practice of the trades.
2. Contractor shall be responsible for and make good, without expense to the Owner, any and all defects arising during this warranty period that are due to imperfect materials, appliances, improper installation or poor workmanship.
3. No substitution will be considered unless written request has been submitted by the Bidder to the Engineer and has been approved by the Engineer at least seven (7) days prior to the date for receipt of bids. Each request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitution.

Provide original product data (no copies will be accepted) with performance and test data and any other information necessary for an evaluation. See Division 1 for further information.

4. After a Contract is awarded, requests to substitute for previously approved materials shall be submitted by the Contractor to the Engineer within seven (7) days, complete with reasons for substitution and savings, which accrue to Owner if substitutes are approved. Substitutes, after Contract award, will be considered only if equal or superior to that specified.
5. Approval of alternate or substitute equipment or material in no way voids Contract document requirements.
6. Under no circumstances shall the Owner be required to prove that an item proposed for substitution is not equal to the specified item. It shall be mandatory that the Contractor submit to the Owner all evidence to support his contention that the item proposed for substitution is equal to the contract specified item. The Owner's decision as to the equality of substitution shall be final and without further recourse.

2.3 CABLES

A. Any cable associated with this Contract shall be suitable, listed and marked for use in a riser or plenum application unless noted otherwise. For example, riser cable shall minimally be CMR rated for riser spaces and CMP for plenum spaces per the 2020 National Electrical Code and shall meet all local and state codes.

2.4 FACTORY ASSEMBLED PRODUCTS

A. Provide maximum standardization of components to reduce spare part requirements.

B. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.

1. All components of an assembled unit need not be products of same manufacturer, but the completed system shall supply the Owner with a minimum manufacturer's 25-year performance warranty.
2. Constituent parts, which are alike, shall be product of a single manufacturer.
3. Components shall be compatible with each other and with the total assembly for intended service.
4. Contractor shall guarantee for the minimum of twenty-five years, the assemblies of components, and shall repair or replace elements of the assemblies as required to deliver complete assembly.

C. Components of equipment shall bear manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

D. Major items of equipment that serve the same function must be the same make and model. Exception will be permitted if performance requirements cannot be met.

2.5 COMPATIBILITY OF RELATED EQUIPMENT

A. Equipment and materials installed shall be compatible in all respects with other items being furnished and with existing items so that a complete and fully operational system will result.

B. Provide maximum standardization of components to reduce spare part requirements.

C. Manufacturers of equipment assemblies that include components made by others shall assume complete responsibility for final assembled unit.

1. Constituent parts that are alike shall be product of a single manufacturer.
2. Contractor shall guarantee assemblies of components and shall repair or replace elements of the assemblies as required to deliver the complete assembly.

3. Components of equipment shall bear manufacturer's name or trademark, model number and serial number on a nameplate securely affixed in a conspicuous place, or cast integral with, stamped or otherwise permanently marked upon the components of the equipment.

2.6 SPECIAL TOOLS

A. If any part of equipment requires a special tool for assembly, adjustment or maintenance thereof and such tool is not readily available on commercial tool market, it shall be furnished by the Contractor.

2.7 LIFTING ATTACHMENTS

A. Provide equipment with suitable lifting attachments to enable equipment to be lifted in its normal position. Lifting attachments shall withstand any handling conditions that might be encountered without bending or distortion of shape, such as rapid lowering and braking of load.

2.8 MISCELLANEOUS SUPPORTS

A. Metal bars, plates, tubing, etc. shall conform to ASTM standards:

1. Steel plates, shapes, bars, and grating - ASTM A 36
2. Cold-Formed Steel Tubing - ASTM A 500
3. Hot - Rolled Steel Tubing - ASTM A 501
4. Steel Pipe - ASTM A 53, Schedule 40, welded

2.9 FIRESTOPPING

A. Fire stopping for Openings through Fire and Smoke Rated Walls and Floor Assemblies shall be listed or classified by an approved independent testing laboratory for "Through-Penetration Fire-Stop Systems." The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814.

B. Inside of all conduits, the fire-stop system shall consist of a dielectric, water resistant, non-hardening, permanently pliable/re-enterable putty along with the appropriate damming or backer materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.

C. The Contractor shall patch all openings remaining around and inside all conduit, sleeves and cable penetrations to maintain the integrity of any fire rated wall, ceiling, floor, etc. The fire-stop system shall consist of a dielectric, water resistant, non-hardening, permanently pliable/re-enterable putty along with the appropriate damming materials (where required). The sealant must be capable of being removed and reinstalled and must adhere to all penetrants and common construction materials and shall be capable of allowing normal wire/cable movement without being displaced.

D. All building conduits and sleeves installed and/or used under this contract shall be fire-stopped, or re-fire-stopped, upon cable placement through such passageways.

E. Manufacturer's recommended installation standards must be closely followed (i.e. minimum depth of material, use of ceramic fiber and installation procedures).

PART 3 - EXECUTION

3.1 ROUGH-IN

A. Before construction work commences, the Contractor shall visit the site and identify the exact routing for all horizontal pathways.

B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, etc. Verify final locations for installation with field measurements and with the equipment being connected. Verify exact location and elevations at work site prior to any rough

in work. If field conditions, details, changes in equipment or shop drawing information require a significant change to the original documents, contact the owners' representative for approval before proceeding.

C. All equipment locations shall be coordinated with other trades, other renovation projects, and existing conditions to eliminate interference with required clearances for equipment maintenance and inspections.

1. Coordinate work with other trades, other renovation projects, and existing conditions to determine exact routing of all cable tray, hangers, conduit, etc., before fabrication and installation. Verify with Engineer exact location and mounting height of all equipment in finished areas, such as equipment racks, communication and electrical devices. Coordinate all work with existing Architecture.
2. Where more than one trade is involved in an area, space or chase, all shall cooperate and install their own work to utilize the space equally between them in proportion to their individual requirements. There will be no priority schedule for trades. If, after installation of any equipment, piping, ducts, conduit, and boxes, it is determined that ample maintenance and passage space has not been provided, rearrange work and/or furnish other equipment as required for ample maintenance space. Any changes in the size or location of the material or equipment supplied or proposed, which may be necessary in order to meet field conditions or in order to avoid conflicts between trades, shall be brought to the immediate attention of the Engineer and approval received before such alterations are made.

D. Provide easy, safe, and code mandated clearances at equipment racks and enclosures, and other equipment requiring maintenance and operation.

E. The Contractor shall be responsible for all required locations, cutting, patching, coring and associated work for the complete cabling system at no additional cost to the Owner.

3.2 CUTTING AND PATCHING

A. Contractor shall include the required cutting and patching work to perform work. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch and/or paint openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

3.3 CHASES

A. General:

1. Assume responsibility for correct and final location and size of such pathways.
2. Rectify improperly sized, improperly located or omitted conduit due to faulty or late information or failure to check final location.
3. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Cap or fire stop all unused conduits and sleeves.
4. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge-galvanized sleeves at fire rated assemblies. Extend sleeves a minimum 3" above floors.
5. In wall openings, drill or cut holes to suit. Provide 18 gauge-galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire stopping similar to that for floor openings.

3.4 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, straps, struts, and other items to properly support contract work. Supports shall meet the approval of the Engineer. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and

partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast Panels/Planks and Metal Decks, support communication work as determined by manufacturer and Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

3.5 GENERAL INSTALLATION REQUIREMENTS

A. Coordinate ordering and installation of all equipment with long lead times or having a major impact on work by other trades so as not to delay the job or impact the schedule.

B. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible.

C. Set all equipment to accurate line and grade, level all equipment and align all equipment components.

D. Provide all scaffolding, rigging, hoisting and services necessary for erection and delivery of equipment and apparatus furnished into the premises. These items shall be removed from premises when no longer required.

E. No equipment shall be hidden or covered up prior to inspection by the Engineer. All work that is determined to be unsatisfactory shall be corrected immediately.

F. All work shall be installed level and plumb, parallel and perpendicular to other building systems and components.

G. Contractor shall replace/repair all ceiling tiles or plaster damaged by work performed as part of Division 27 contract.

3.6 PAINTING

A. Contract includes the following:

1. Painting for all cut and patch work performed as part of Division 27 contract.
2. Painting for junction boxes and conduits per Owner’s standards or Division 27 standards.
3. Painting for damage to existing wall and ceiling surfaces.
4. Under no circumstances shall any of the cabling be painted.

3.7 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Engineer is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor, or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Engineer's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any moneys owed to the Contractor.

B. In the event that the Engineer is required to provide additional engineering services as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents, or if the Engineer is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, then the Engineer's expense in connection with such additional services shall be paid by the Contractor and may be deducted from any monies owed to the Contractor.

3.8 FIRE-STOPPING

A. Fire-stopping for Openings through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed. The system shall meet the requirements of "Fire Tests of Through-Penetration Fire-Stops" designated ASTM E814. To be used inside all conduits and sleeves. Caulk on exterior of conduit penetration.

2. Provide fire-stop system seals at all locations where conduit, fiber, cable trays, cables/wires, and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities that permit the easy removal or addition of conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating. Typical rating:

    a. Floors - 3 hours
    b. Corridor walls - 2 hours
    c. Offices - ¾ hour
    d. Smoke partitions - ¾ - 1 hour

END OF SECTION 270100

SECTION 271116

COMMUNICATIONS RACKS, FRAMES, AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Two-post 19-inch equipment racks.
2. 19-inch wall mounted cabinets.
3. Power strips.
4. Uninterruptible power supplies.
5. Grounding.
6. Labeling.

1.2 DEFINITIONS

A. Access Provider: An operator that provides a circuit path or facility between the service provider and user. An access provider can also be a service provider.

B. Service Provider: The operator of a telecommunications transmission service delivered through access provider facilities.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on this project, provide cut sheet with highlighted part number of product. A separate submittal is required for each specification section. Do not combine or merge specification sections.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

B. Seismic Qualification Data: Certificates, from manufacturer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Cabling shall be a manufacturer certified installer.

1. Layout Responsibility: Preparation of Shop Drawings shall be under direct supervision of Project Manager
2. Installation Supervision: Installation shall be under direct supervision of Project Manager who shall be present at all times when Work of this Section is performed at Project site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Equipment shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified.

B. UL listed.

C. RoHS compliant.

2.2 TWO-POST 19-INCH EQUIPMENT RACKS

A. Description: Two-post racks with threaded rails designed for mounting telecommunications equipment.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business, or equivalent.
2. Chatsworth, or equivalent.
3. Panduit Corp, or equivalent.

C. General Requirements:

1. Frames: Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
2. Material: Aluminum.
3. Finish: Manufacturer's standard, baked-polyester powder coat.
4. Color: Black.

D. Floor-Mounted Racks:

1. Overall Height: As indicated on Drawings.
2. Upright Depth: 3 inches
3. Two-Post Load Rating: 1000 lbs. minimum.
4. Number of Rack Units per Rack: 45.
5. Threads: 12-24.
6. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip. See drawings for additional details.
7. Base shall have a minimum of four mounting holes for permanent attachment to floor.
8. Top shall have provisions for attaching to cable tray or ceiling.
9. Self-leveling.
10. As indicated on Drawings.

E. Cable Management:

1. With integral wire retaining fingers.
2. Vertical cable management panels shall have a minimum 12” wide front and rear channels, with covers.
3. Double-sided horizontal cable management with covers shall be included between all components.
4. As indicated on Drawings.

2.3 19-INCH WALL MOUNTED CABINETS

A. Description: Wall mounted cabinet with threaded rails designed for mounting telecommunications equipment.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business, or equivalent.
2. Chatsworth, or equivalent.
3. Panduit Corp, or equivalent.

C. General Requirements:

1. Frames: Modular units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.

2. Material: Aluminum.
3. Finish: Manufacturer's standard, baked-polyester powder coat.
4. Color: Black.

D. Wall Mounted Cabinets:

1. Overall Height: As indicated on Drawings.
2. Upright Depth: 24 inches
3. Load Rating: 300 lbs. minimum.
4. Number of Rack Units per Rack: 12.
5. Threads: 12-24.
6. Horizontal cable management channels, grounding lug, and a power strip. See drawings for additional details.
7. Vertical cabling finger sections for vertical cable management.
8. Shall have a minimum of four mounting holes for permanent attachment to wall.
9. As indicated on Drawings.

E. Cable Management:

1. With integral wire retaining fingers.
2. Vertical finger cable manager attached to mounting rails.
3. Horizontal cable management with covers shall be included between all components.
4. As indicated on Drawings.

2.4 POWER STRIPS

A. Power Strips: Comply with UL 1363.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Rack mounting, with integral flanges.
3. Height: 1 RU.
4. Housing: Metal
5. Six 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles. For horizontal strips.
6. Twenty-four 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles. For vertical strips.
7. LED indicator lights for power and protection status.
8. LED indicator lights for reverse polarity and open outlet ground.
9. Circuit Breaker and Thermal Fusing: When protection is lost, circuit opens and cannot be reset.
10. Circuit Breaker and Thermal Fusing: Unit continues to supply power if protection is lost.
11. Cord connected with 10-footline cord.
12. Rocker-type on-off switch, illuminated when in on position.
13. Surge Protection: UL 1449, Type 3.

    a. Maximum Surge Current, Line to Neutral: 27 kA
    b. Protection modes shall be line to neutral, line to ground, and neutral to ground.
    c. UL 1449 Voltage Protection Rating for line to neutral and line to ground shall be 600 V and 500 V for neutral to ground.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. B-line, an Eaton business, or equivalent.
2. Chatsworth, or equivalent.
3. Panduit Corp, or equivalent.

2.5 UNINTERRUPTIBLE POWER SUPPLIES

A. Description: Rack mounted Smart UPS with network card.

1. Input Voltage: 120VAC, 1 phase.
2. Input Connection Type: NEMA 5-20P.
3. Output Voltage: 120VAC, 1 phase.
4. Maximum Configurable Power: 2200 VA.
5. Rack Units: 2RU.

B. Basis of Design:

1. APC (Part #: SMT2200RM2UNC), or equivalent.

2.6 GROUNDING

A. Comply with requirements in TIA-607-D for grounding conductors and connectors.

2.7 LABELING

A. Comply with TIA-606-D and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Comply with BICSI TDMM for layout of communications equipment spaces.

C. Comply with BICSI ITSIMM for installation of communications equipment spaces.

D. Bundle cables without exceeding manufacturer's limitations on bending radii. Use velcro for cable bundles.

E. Coordinate layout and installation of communications equipment in racks and room.

F. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

3.2 GROUNDING

A. Comply with TIA 607-D.

B. Locate Secondary Bus Bar (SBB) to minimize length of bonding conductors. Fasten to wall, allowing at least 2” of clearance behind SBB. Connect SBB with a minimum No. 4 AWG grounding electrode conductor from SBB to suitable electrical building ground. Connect rack SBB to near SBB or the Primary Bus Bar (PBB).

1. Bond the shield of shielded cable to patch panel, and bond patch panel to SBB or PBB.

END OF SECTION 271116

SECTION 271323

COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. 9/125 micrometer single-mode, indoor-outdoor optical fiber cable (OS2).
2. Optical fiber cable connecting hardware, patch panels, and cross-connects.
3. Cabling identification products.

1.2 OPTICAL FIBER BACKBONE CABLING DESCRIPTION

A. Optical fiber backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.

B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Separate submittal required for each specification section.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers and installation supervisor.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. As-built drawings

C. Test results

D. Warranty certificate

1.6 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.7 INSTALLER QUALIFICATIONS

A. Installer Qualifications: Division 27 sub-contractor must have personnel certified by BICSI on staff and shall be a manufacturer certified contractor and will be required to provide a minimum 25-year performance warranty on parts and labor for all fiber optic systems. Proof of the sub-contractor’s ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice To Proceed. This warranty shall cover the patch panels, adapter plates, connectors, fiber optic cabling, and patch cords.

B. Contractor shall employ, in conjunction with construction of the project, a capable, experienced, and reliable foreperson and such skilled workers as may be required for the various classes of work to be performed. Contractor shall be required to submit evidence of foreperson's skilled experience on ANSI/TIA certified fiber optic systems. Evidence of experience shall be submitted to Owner with submittal of bid. Minimum experience for any workman involved in cabling work shall be cable pulling and termination work on projects for a minimum of 5 years and

completion of training (40 hrs. minimum) which certifies the person's work in fiber optic installations. Training can be a combination of BICSI and manufacturer training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS

A. General Performance: Backbone cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.

C. Grounding: Comply with TIA-607-D.

D. All OSP cables shall grounded at both ends.

E. Indoor cables shall be interlocking armor cables or indoor or indoor/outdoor cables run in appropriately rated inner duct.

F. All non interlocking armor cables shall be run in appropriately rated inner duct if not in conduit.

2.2 9/125 MICROMETER, SINGLE-MODE, OPTICAL FIBER CABLE (OS2)

A. Description: Single mode, 9/125-micrometer, optical fiber cable. Refer to drawings for strand count and cable type. Refer to Section 271800 for testing requirements.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. CommScope, Inc, or equivalent.
2. Corning Cable Systems, or equivalent.
3. Leviton, or equivalent.

C. Standards:

1. Comply with TIA-492CAAB for detailed specifications.
2. Comply with TIA-568.3-E for performance specifications.
3. Comply with ICEA S-104-696 for mechanical properties.

D. Armored cable shall be steel armored type.

E. Maximum Attenuation: 0.5 dB/km at 1310 nm; 0.5 dB/km at 1550 nm.

F. Jacket:

1. Jacket Color: Yellow for indoor. Black for indoor/outdoor.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals.

G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

1. Plenum Rated, Nonconductive: Type OFNP
2. Plenum Rated, Armored (Conductive): Type OFCP

2.3 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CommScope, Inc, or equivalent.
2. Corning Cable Systems, or equivalent.
3. Leviton, or equivalent.

B. Standards:

1. Comply with Optical Fiber Connector Intermateability Standard (OFCIS) specifications of the TIA-604 series.
2. Comply with TIA-568.3-E.
3. Comply with TIA-607-D.

C. Fiber Optic Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors in 1U,2U, 3U, and 4U options. Each panel shall have a clear door, removable front and rear enclosures, strain relief brackets, routing clips and guides, mounting brackets, and labels. See drawings for additional details

D. Connector Type: Type LC complying with TIA-604-10-B.

E. Adapter Plates: LC Adapters Duplex, UPC, 12 Fiber. Blank all unused panels.

F. Patch Cords: Factory-made, LC-LC dual-fiber cables in 1-meter and 2-meterlengths. Check requirements in field prior to ordering.

2.4 IDENTIFICATION PRODUCTS

A. Comply with TIA-606-D and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays.

1. Install plenum cable in environmental air spaces, including plenum ceilings.

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

3.2 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

A. Comply with NECA 1, NECA 301, and NECA/BICSI 568.

B. General Requirements for Optical Fiber Cabling Installation:

1. Comply with TIA-568.1-E and TIA-568.3-E.
2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 48 inches and not more than 12 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
9. In the communications equipment room, provide a 10-footlong service loop on each end of cable.

10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Group connecting hardware for cables into separate logical fields.

3.3 FIRESTOPPING

A. Comply with TIA-569-E, Annex A, "Firestopping."
B. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.4 GROUNDING

A. Install grounding according to BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.
B. Comply with TIA-607-D.
C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inchclearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 6 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.5 IDENTIFICATION

A. Cable and Wire Identification:

1. Label each cable within 3 inches of each termination point with a mechanically generated label
2. Label each patch panel with mechanically generated labels
3. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-C.

3.6 FIELD QUALITY CONTROL

A. Perform testing per section 271800.

END OF SECTION 271323

SECTION 271513

COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Category 6A twisted pair cable.
2. Twisted pair cable hardware, including plugs and jacks.
3. Cable management system.
4. Grounding provisions for twisted pair cable.

1.2 COPPER HORIZONTAL CABLING DESCRIPTION

A. Horizontal cabling system shall provide interconnections between the patch panels in the telecommunications rooms, and the equipment outlet. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

B. The maximum allowable horizontal cable length is 90 meters. This maximum allowable length does not include an allowance for the length of 10 meters used for patching.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product used on this project, provide cut sheet with highlighted part number of product. A separate submittal is required for each specification section. Do not combine or merge specification sections.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installers and installation supervisor.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. As-built drawings.

C. Test results.

D. Warranty certificate.

1.6 COORDINATION

A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.7 INSTALLER QUALIFICATIONS

A. Installer Qualifications: Division 27 sub-contractor shall be a manufacturer certified contractor and will be required to provide a minimum 25-year performance warranty on parts and labor for all Category 6A cabling and systems. Proof of the sub-contractor’s ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice To Proceed. This warranty shall cover the patch panels, horizontal cabling, work area outlets, and patch cords.

B. Contractor shall employ, in conjunction with construction of the project, a capable, experienced, and reliable foreperson and such skilled workers as may be required for the various classes of work to be performed. Contractor shall be required to submit evidence of foreperson's skilled experience on ANSI/TIA certified structured cabling systems. Evidence of experience shall be submitted to Owner with submittal of bid. Minimum experience for any workman involved in

cabling work shall be cable pulling and termination work on projects for a minimum of 5 years and completion of training (40 hrs. minimum) which certifies the person's work in copper cabling installations. Training can be a combination of BICSI and manufacturer training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS

A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.

C. Grounding: Comply with TIA-607-D.

2.2 GENERAL CABLE CHARACTERISTICS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:

1. Communications, Plenum Rated: Type CMP

B. RoHS compliant.

2.3 CATEGORY 6A TWISTED PAIR CABLE

A. Description: Four-pair, balanced-twisted pair cable, certified to meet transmission characteristics of Category 6A cable at frequencies up to 500MHz. See drawings for additional details.

B. Manufacturers: Subject to compliance with requirements. Available manufacturers offering products that may be incorporated into the Work include the following:

1. CommScope, Inc, or equivalent.
2. Leviton, or equivalent.
3. The Siemon Company, or equivalent.

C. Standard: Comply with TIA-568.2-E for Category 6A cables.

D. Conductors: 100-ohm, 23 AWG solid copper.

E. Shielding/Screening: Unshielded twisted pairs (UTP)

F. Cable Rating: Plenum.

G. Jacket: Blue.

2.4 TWISTED PAIR CABLE HARDWARE

A. Description: Hardware designed to connect, splice, and terminate twisted pair copper communications cable. No minimum specification grade hardware will be accepted.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. CommScope, Inc, or equivalent.
2. Leviton, or equivalent.
3. The Siemon Company, or equivalent.

C. General Requirements for Twisted Pair Cable Hardware:

1. Comply with the performance requirements of Category 6A.
2. Comply with TIA-568.2-E, IDC type, with modules designed for punch-down caps or tools.
3. Cables shall be terminated with connecting hardware of same category or higher.
4. No minimum specification hardware will be accepted.

D. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.

1. Features:

a. Universal T568A and T568B wiring labels.
b. Labeling areas adjacent to conductors.
c. Replaceable connectors.
d. 48 ports.

2. Construction: 16-gauge steel and mountable on 19-inchequipment racks.
3. Number of Jacks per panel: 48.

E. Patch Cords: Provide one factory terminated Category 6A patch cord for each horizontal cable terminated within the patch panels. See drawings for additional details. The patch cable lengths shall be field measured before ordering (typical lengths are 3' and 5'). Provide two factory terminated Category 6A patch cord for each duplex outlet indicated on the plans and four for each quad outlet indicated on the plans. The patch cable lengths shall be field measured before ordering (typical lengths are 5' – 9'). Division 27 contractor to provide all patching within the telecommunications room. Field verify prior to ordering.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords to be 28 AWG, UNO.
   a. Permanent links that exceed 83 meters shall use 24 AWG patch cords.
3. Provide all patching required for a complete and operational system.

F. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Standard: Comply with TIA-568.2-E.2.
3. Marked to indicate transmission performance.

G. Jacks and Jack Assemblies:

1. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Designed to snap-in to a patch panel or faceplate.
3. Standard: Comply with TIA-568.2-E.
4. Marked to indicate transmission performance.
5. Color to be determined at time of submittal.

H. Faceplates:

1. Two, Four, and Six port, vertical single gang faceplates designed to mount to double gang wall boxes with single gang mud rings.
2. Eight, Ten, and Twelve port, vertical double gang faceplates designed to mount to double gang wall boxes.
3. Plastic Faceplate: High-impact plastic.
4. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.
5. Snap-in, clear-label covers and machine-printed inserts.
6. Color to be determined at time of submittal.

2.5 GROUNDING

A. Comply with TIA-607-D.

PART 3 - EXECUTION

3.1 INSTALLATION OF TWISTED-PAIR HORIZONTAL CABLES

A. Comply with NECA 1 and ANSI/TIA 568.

B. Wiring Method: Install cables in j-hooks, raceways and cable trays. Conceal raceway and cables, except in unfinished spaces.

1. Install plenum cable in environmental air spaces, including plenum ceilings.

C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

D. General Requirements for Cabling:

1. Comply with TIA-568.1-E.
2. Install 110-style IDC termination hardware unless otherwise indicated.
3. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 48”and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.
7. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Use hook and loop Velcro for all cable bundling.
8. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation, and replace it with new cable.
9. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
10. In the telecommunications room, install a 10’long service loop. At the work area outlet, install a 12” long service loop.

E. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-E for separating unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.

3.2 FIRESTOPPING

A. Comply with TIA-569-E.

3.3 GROUNDING

A. Comply with TIA-607-D.

B. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inchclearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 6 AWG grounding electrode conductor.

C. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

D. Bonding busbar shall be 12” x 4” x 1/4”.

3.4 IDENTIFICATION

A. Cable and Wire Identification:

1. Label each cable within 2” of each termination with a mechanically generated label.
2. Label each patch panel, patch panel port, and each faceplate port with a mechanically generated label.
3. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-D.

3.5 FIELD QUALITY CONTROL

A. Perform tests per section 271700.

END OF SECTION 271513

SECTION 271700

TESTING, IDENTIFICATION AND ADMINISTRATION OF BALANCED TWISTED PAIR INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.

B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.

C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.

1.2 SCOPE

A. This Section includes the minimum requirements for the test certification, identification and administration of horizontal balanced twisted pair cabling.

B. This Section includes minimum requirements for:

1. Copper cabling test instruments
2. Copper cabling testing
3. Identification
    a. Labels and labeling
4. Administration
5. Test results documentation
6. As-built drawings

C. Testing shall be carried out in accordance with this document.

D. Testing shall be performed on each cabling link. (100% testing)

E. All tests shall be documented.

1.3 QUALITY ASSURANCE

A. All testing procedures and field-test instruments shall comply with applicable requirements of:

1. ANSI/TIA-1152, Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
2. ANSI/TIA-568.0-E, Generic Telecommunications Cabling for Customer Premises.
3. ANSI/TIA-568.1-E, Commercial Building Telecommunications Cabling Standard
4. ANSI/TIA-568.2-E, Balanced Twisted-Pair Telecommunications Cabling and Components Standards.
5. ANSI/TIA-606-D, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements.

B. Trained technicians who have successfully attended an appropriate training program and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

1. Manufacturer of the connectors or cable.
2. Manufacturer of the test equipment used for the field certification.
3. Training organizations (e.g., BICSI, A Telecommunications Association headquarters in Tampa, Florida; ACP [Association of Cabling Professionals™] Cabling Business Institute located in Dallas, Texas)

C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.

1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
2. The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

1.4 SUBMITTALS

A. Manufacturers catalog sheets and specifications for the test equipment being used on this project.

B. A schedule (list) of all balanced twisted-pair copper links to be tested.

C. Sample test reports.

1.5 ACCEPTANCE OF TEST RESULTS

A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in tested for:

1. Wire Map
2. Length
3. Propagation Delay
4. Delay Skew
5. DC Loop Resistance – recorded for information only
6. DC Resistance Unbalance – recorded for information only
7. Insertion Loss
8. NEXT (Near-End Crosstalk)
9. PS NEXT (Power Sum Near-End Crosstalk)
10. ACR-N (Attenuation to Crosstalk Ratio Near-End) – recorded for information only
11. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End) – recorded for information only
12. ACR-F (Attenuation to Crosstalk Ratio Far-End)
13. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
14. Return Loss
15. TCL (Transverse Conversion Loss) – recorded for information only
16. ELTCTL (Equal Level Transverse Conversion Transfer Loss) – recorded for information only

B. All installed cabling Permanent Links shall be field-tested and pass the test requirements and analysis as described in Part 3. Any Permanent Link that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected Permanent Link meets performance requirements. The final and passing result of the tests for all Permanent Links shall be provided in the test results documentation in accordance with Part 3.

C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

PART 2 - PRODUCTS

2.1 BALANCED TWISTED-PAIR CABLE TESTERS

A. The field-test instrument shall be within the calibration period recommended by the manufacturer, typically 12 months.

B. Certification tester

1. Accuracy

a. Level IV accuracy in accordance with ANSI/TIA-1152
b. Independent verification of accuracy
c. Acceptable manufacturers

1) Fluke Networks, or equivalent.

2. Permanent Link Adapters

a. RJ45 plug must meet the requirements for NEXT, FEXT and Return Loss in accordance with ANSI/TIA-568.2-E Annex C.
b. Twisted pair Category 5e, 6, and 6A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

3. Results Storage

a. Must be capable of storing > 10,000 results for all measurements found in 2.1 B.4 below.

4. Measurement capabilities

a. Wire Map
b. Length
c. Propagation Delay
d. Delay Skew
e. DC Loop Resistance
f. DC Resistance Unbalance
g. Insertion Loss
h. NEXT (Near-End Crosstalk)
i. PS NEXT (Power Sum Near-End Crosstalk)
j. ACR-N (Attenuation to Crosstalk Ratio Near-End)
k. PS ACR-N (Power Sum Attenuation to Crosstalk Ratio Near-End)
l. ACR-F (Attenuation to Crosstalk Ratio Far-End)
m. PS ACR-F (Power Sum Attenuation to Crosstalk Ratio Far-End)
n. Return Loss
o. TCL (Transverse Conversion Loss)
p. ELTCTL (Equal Level Transverse Conversion Transfer Loss)
q. Time Domain Reflectometer
r. Time Domain Xtalk Analyzer

C. PC Software

1. Windows® based.
2. Must show when 3 dB and 4 dB rules are applied.
3. Re-certification capability, where results must have their Cable IDs suffixed with (RC).
4. Built in PDF export – no additional third party software permitted.
5. Built-in statistical analysis.

2.2 IDENTIFICATION

A. Labels

1. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
2. Shall be preprinted using a mechanical means of printing (e.g., laser printer).
3. Where used for cable marking, provide vinyl substrate with a white printing area and a clear "tail" that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.
4. Where insert type labels are used provide clear plastic cover over label.
5. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18" above all direct buried services, underground conduits and duct-banks.
6. Acceptable Manufacturers:

a. Brady Corporation, or equivalent.
b. Silver Fox, or equivalent.
c. Brother, or equivalent.
d. Epson, or equivalent.
e. Dymo, or equivalent.

2.3 ADMINISTRATION

A. Administration of the documentation shall include test results of each Permanent Link.

B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.

C. The test result records saved within the field-test instrument shall be transferred into a Windows® -based database utility that allows for the maintenance, inspection and archiving of these test records.

PART 3 - EXECUTION

3.1 GENERAL

A. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 BALANCED TWISTED PAIR CABLE TESTING

A. Field-test instruments shall have the latest software and firmware installed.

B. Permanent Link test results including the individual frequency measurements from the tester shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC in which the administrative documentation (reports) may be generated.

C. Testing shall be performed on each cabling segment (connector to connector). Sampling is not acceptable.

D. Permanent Link adapters made from twisted pair Category 5e, 6, 6A, 7 or 7A cords are not permitted as their performance degrades with use and can cause false Return Loss failures.

E. The installer shall build a reference link. All components shall be anchored so it is not possible to disturb them. The technician is to conduct a Category 6A Permanent Link test each day to ensure no degradation of the tester or its Permanent Link adapters.

F. Wire Map Measurement

1. The wire map test is intended to verify pin-to-pin termination at each end and check for installation connectivity errors. For each of the 8 conductors in the cabling, the wire map indicates:

    a. Continuity to the remote end
    b. Shorts between any two or more conductors
    c. Reversed pairs
    d. Split pairs
    e. Transposed pairs
    f. Distance to open on shield
    g. Any other miss-wiring

2. The correct connectivity of telecommunications outlets/connectors is defined in ANSI/TIA-568.2-E. Two color schemes are permitted. The user shall define which scheme is to be used. The field tester shall document which color scheme was used. Examples are given below:



G. Length Measurement

1. The length of each balanced twisted pair shall be recorded.
2. Since physical length is determined from electrical length, the physical length of the link calculated using the pair with the shortest electrical delay shall be reported and used for making the pass or fail determination.
3. The pass or fail criteria is based on the maximum length allowed for the Permanent Link as specified in ANSI/TIA-568.2-E plus the nominal velocity of propagation (NVP) uncertainty of 10%. For a Permanent Link, the length measurement can be 325 ft. (99 m) before a fail is reported.

H. Propagation Delay measurement

1. Is the time it takes for a signal to reach the end of the link.
2. The measurement shall be made at 10 MHz per ANSI/TIA-1152.
3. The propagation delay of each balanced twisted pair shall be recorded.
4. Is not to exceed 498 ns per ANSI/TIA-568.2-E Section 6.3.18.

I. Delay Skew measurement

1. Is the difference in propagation delay @ 10 MHz between the shortest delay and the delays of the other wire pairs.
2. The delay skew of each balanced twisted pair shall be recorded.
3. Is not to exceed 44 ns per ANSI/TIA-568.2-E Section 6.3.19.

J. DC Resistance

1. Often reported as Resistance, is the loop resistance of both conductors in the pair.
2. Is not specified in ANSI/TIA-1152, but shall be recorded for all four pairs.

K. DC Resistance Unbalance

1. Often reported as Resistance Unbalance, is the difference in resistance of the two wires within the pair.
2. Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all four pairs.

L. Insertion Loss

1. Is the loss of signal strength over the cabling (in dB).
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Worst case shall be reported for all four pairs in one direction only.
4. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.7.

M. NEXT (Near-End Crosstalk)

1. Is the difference in amplitude (in dB) between a transmitted signal and the crosstalk received on other wire pairs at the same end of the cabling.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions. (12 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.8.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing NEXT results.

N. PS NEXT (Power Sum Near-End Crosstalk)

1. Is the difference (in dB) between the test signal and the crosstalk from the other pairs received at the same end of the cabling.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.9.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
7. The Time Domain Xtalk data shall be stored for any marginal or failing PS NEXT results.

O. ACR-N (Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152, but shall be recorded for all 12 possible combinations.

P. PS ACR-N (Power Sum Attenuation Crosstalk Ratio Near-End)

1. Is a calculation of PS NEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be calculated in both directions.
4. Is not specified in ANSI/TIA-1152, but shall be recorded for all 8 possible combinations.

Q. ACR-F (Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions. (24 pair to pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6A Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.11.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

R. PS ACR-F (Power Sum Attenuation Crosstalk Ratio Far-End)

1. Is a calculation of PS FEXT minus Insertion Loss of the disturbed pair in dB.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.13.
6. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).

S. Return Loss

1. Is the difference (in dB) between the power of a transmitted signal and the power of the signals reflected back.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions. (8 pair possible combinations)
4. Both worst case and worst margins shall be reported.
5. Shall be ignored at all frequencies where the Insertion Loss is less than 3 dB for that pair.
6. Is not to exceed the Category 6 Permanent Link limits found in ANSI/TIA-568.2-E Section 6.3.6.
7. Reported margins found to be within the accuracy of the field tester shall be marked with an asterisk (*).
8. The Time Domain Reflectometer data shall be stored for any marginal or failing Return Loss results.

T. TCL (Transverse Conversion Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the near-end on the same wire pair.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all 8 possible combinations.

U. ELTCTL (Equal Level Transverse Conversion Transfer Loss)

1. Is the ratio (in dB) between a differential mode signal inject at the near-end and the common-mode signal measured at the far end on the same wire pair minus the Insertion Loss of that pair.
2. The frequency resolution shall be:

    a. 1 – 31.25 MHz
    b. 31.25 – 100 MHz
    c. 100 – 500 MHz

3. Shall be measured in both directions.
4. Is not specified in ANSI/TIA-1152 for a Permanent Link, but shall be recorded for all 8 possible combinations.

3.3 ADMINISTRATION

A. Test results documentation

1. Test results saved within the field-test instrument shall be transferred into a Windows™-based database utility that allows for the maintenance, inspection and archiving of the test records. These test records shall be uploaded to the PC unaltered, i.e., “as saved in the field-test instrument”. The file format, CSV (comma separated value), does not provide adequate protection of these records and shall not be used.

2. The test results documentation shall be available for inspection by the Owner or the Owner's representative during the installation period and shall be passed to the Owner's representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as built information.
3. The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered in PDF Format prior to Owner acceptance of the building.
4. Circuit IDs reported by the test instrument should match the specified label ID (see 3.3 of this Section).
5. The detailed test results documentation data is to be provided in an electronic database for each tested balance twisted-pair and shall contain the following information

    a. The overall Pass/Fail evaluation of the link-under-test
    b. The date and time the test results were saved in the memory of the tester
    c. The identification of the customer site as specified by the end-user
    d. The name of the test limit selected to execute the stored test results
    e. The name of the personnel performing the test
    f. The version of the test software and the version of the test limit database held within the test instrument
    g. The manufacturer, model and serial number of the field-test instrument
    h. The adapters used
    i. The factory calibration date
    j. Wire Map
    k. Propagation Delay values, for all four pairs
    l. Delay Skew values, for all four pairs
    m. DC Resistance values, for all four pairs
    n. DC Resistance Unbalance, values for all four pairs
    o. Insertion Loss, worst case values for all four pairs
    p. NEXT, worst case margin and worst case values, both directions
    q. PS NEXT, worst case margin and worst case values, both directions
    r. ACR-F, worst case margin and worst case values, both directions
    s. PS ACR-F, worst case margin and worst case values, both directions
    t. Return Loss, worst case margin and worst case values, both directions
    u. TCL, worst case values both directions
    v. ELTCTL, worst case values, both directions
    w. Time Domain Crosstalk data if the link is marginal or fails
    x. Time Domain Reflectometer data if the link is marginal or fails

B. Record copy and as-built drawings.

1. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or Owner, and at end of the project in PDF format. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. The as built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. The as-builts shall include all field changes made up to construction completion:

    a. Field directed changes to pull schedule.
    b. Horizontal cable routing changes.
    c. Associated detail drawings.

END OF SECTION 271700

SECTION 271800

TESTING, IDENTIFICATION AND ADMINISTRATION OF FIBER INFRASTRUCTURE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Provide all labor, materials, tools, field-test instruments and equipment required for the complete testing, identification and administration of the work called for in the Contract Documents.

B. In order to conform to the overall project event schedule, the cabling contractor shall survey the work areas and coordinate cabling testing with other applicable trades.

C. In addition to the tests detailed in this document, the contractor shall notify the Owner or the Owner's representative of any additional tests that are deemed necessary to guarantee a fully functional system. The contractor shall carry out and record any additional measurement results at no additional charge.

1.2 SCOPE

A. This Section includes the minimum requirements for the test certification, identification and administration of backbone and horizontal optical fiber cabling.

B. This Section includes minimum requirements for:

1. Fiber optic test instruments
2. Fiber optic testing
3. Identification
    a. Labels and labeling
4. Administration
    a. Test results documentation
    b. As-built drawings

C. Testing shall be carried out in accordance with this document. This includes testing the attenuation and polarity of the installed cable plant with an optical loss test set (OLTS) and the installed condition of the cabling system and its components with an optical time domain reflectometer (OTDR). The condition of the fiber end faces shall also be verified.

D. Testing shall be performed on each cabling link (connector to connector).

E. Testing shall be performed on each cabling channel (equipment to equipment) that is identified by the owner.

1. Testing shall not include any active devices or passive devices within the link or channel other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.

F. All tests shall be documented including OLTS dual wavelength attenuation measurements and OTDR traces with event tables as well as OTDR maps.

1. Optionally, documentation shall also include optical length measurements and pictures of the connector end face.

1.3 QUALITY ASSURANCE

A. All testing procedures and field-test instruments shall comply with applicable requirements of:

1. ANSI Z136.2, ANS For Safe Use Of Optical Fiber Communication Systems Utilizing Laser Diode And LED Sources
2. ANSI/TIA 526 14-C, Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant with full OTDR descriptions
3. ANSI/TIA 526 7-A, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
4. TIA-TSB-4979, Practical Considerations for Implementation of Multimode Launch Conditions in the Field
5. ANSI/TIA-568.0-E, Generic Telecommunications Cabling for Customer Premises
6. ANSI/TIA-568.3-E, Optical Fiber Cabling and Components Standard
7. ANSI/TIA-606-D, Administration Standard for Commercial Telecommunications Infrastructure, including the requirements specified by the customer, unless the customer specifies their own labeling requirements

B. Trained technicians who have successfully attended an appropriate training program, which includes testing with an OLTS and an OTDR and have obtained a certificate as proof thereof shall execute the tests. These certificates may have been issued by any of the following organizations or an equivalent organization:

1. Manufacturer of the fiber optic cable and/or the fiber optic connectors.
2. Manufacturer of the test equipment used for the field certification or representative.
3. Training organization e.g. BICSI

C. The Owner or the Owner's representative shall be invited to witness and/or review field-testing.

1. The Owner or the Owner's representative shall be notified of the start date of the testing phase five (5) business days before testing commences.
2. The Owner or the Owner's representative will select a random sample of 5% of the installed links. The Owner or the Owner's representative shall test these randomly selected links and the results are to be stored in accordance with Part 3 of this document. The results obtained shall be compared to the data provided by the installation contractor. If more than 2% of the sample results differ in terms of the pass/fail determination, the installation contractor under supervision of the representative shall repeat 100% testing at no cost to the Owner.

1.4 SUBMITTALS

A. Manufacturers catalog sheets and specifications for fiber optic field-test instruments including optical loss test sets (OLTS; power meter and source), optical time domain reflectometer (OTDR) and video microscope for the equipment used on this project.

B. A schedule (list) of all optical fibers to be tested.

C. Sample test reports.

1.5 ACCEPTANCE OF TEST RESULTS

A. Unless otherwise specified by the Owner or the Owners representative, each cabling link shall be in compliance with the following test limits:

1. Optical loss testing

a. Multimode and Singlemode links

1) The link attenuation shall be calculated by the following formulas as specified in ANSI/TIA-568.3-E.

a) Link Attenuation (dB) = Cable_Attn (dB) + Connector_Attn (dB) + Splice_Attn (dB)
b) Cable_Attn (dB) = Attenuation_Coefficient (dB/km) * Length (Km)

c) Connector_Attn (dB) = number_of_connector_pairs * connector_loss (dB)
d) Maximum allowable connector_loss = 0.75 dB
e) Use of Reference Grade connectors in Test Reference Cords. *Test Reference Cords shall use Reference Grade connectors and the mated loss budget value (first and last) for these cords for Multimode shall be 0.30 dB and for Single-Mode shall be 0.50 dB.*
f) Splice_Attn (dB) = number_of_splices * splice_loss (dB)
g) Maximum allowable splice_loss = 0.3 dB
h) The values for the Attenuation_Coefficient (dB/km) are listed in the table below:

Type of Optical Fiber	Wavelength (nm)	Attenuation coefficient (dB/km)	Wavelength (nm)	Attenuation coefficient (dB/km)
Multimode 62.5/125 µm	850	3.5	1300	1.5
Multimode 50/125 µm	850	3.0	1300	1.5
Single-mode (OS2)	1310	0.5	1550	0.5

2. OTDR testing

a. Reflective events (connections) shall not exceed:

1) 0.75 dB in optical loss when bi-directionally averaged
2) -35 dB Reflectance for multimode connections
3) -40 dB reflectance for UPC singlemode connections
4) -55 dB reflectance for APC singlemode connections

b. Non-reflective events (splices) shall not exceed 0.3 dB.

3. Magnified end face inspection

a. Fiber connections shall be visually inspected to IEC 61300-3-35 Edition 1.0 for end face quality.
b. Scratched, pitted or dirty connectors shall be diagnosed and corrected.

B. All installed cabling links and channels shall be field-tested and pass the test requirements and analysis as described in Part 3. Any link or channel that fails these requirements shall be diagnosed and corrected. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link or channel meets performance requirements. The final and passing result of the tests for all links and channels shall be provided in the test results documentation in accordance with Part 3.

C. Acceptance of the test results shall be given in writing after the project is fully completed and tested in accordance with Contract Documents and to the satisfaction of the Owner.

Note: High Bandwidth applications such as 10GBASE-SR, FC1200, and 40GBASE-SR4 impose stringent channel loss limits. Where practical, certification should consider loss length limits that meet maximum channel (transmitter to receiver) loss. 0.75 dB per connector pair loss may not support the intended application.

D. Performance specification for multimode fiber links at 850 nm.

Fiber Type		Bandwidth	10GBASE-SR		FibreChannel 1200-MX-SN-I		40GBASE-SR4	
	µm	(MHz• Km)	Length (m)	Loss (dB)	Length (m)	Loss (dB)	Length (m)	Loss (dB)
OM1	62.5	200	33	2.5	33	2.4	N/A	N/A
OM2	50	500	82	2.3	82	2.2	N/A	N/A

OM3	50	2000	300	2.6	300	2.6	100	1.9
OM4	50	4700	400	2.9	N/A	N/A	150	1.5
OM5	50	4700	400	2.9	N/A	N/A	150	1.5

PART 2 - PRODUCTS

2.1 OPTICAL FIBER CABLE TESTERS

A. The field-test instrument shall be within the calibration period recommended by the manufacturer and a copy of the calibration certificate made available.

B. Optical loss test set (OLTS)

1. Multimode optical fiber light source

a. Provide dual LED light sources with central wavelengths of 850 nm and 1300 nm. VCSEL sources are not permitted per ANSI/TIA-526-14-C.
b. Output power of –20 dBm minimum.
c. The launch shall meet the Encircled Flux launch requirements of ANSI/TIA 526-14-C.
d. The test reference cords must demonstrate an insertion loss ≤ 0.15 dB when mated against each other, and this test shall be stored and delivered with the other test results.
e. Acceptable manufacturers

1) Fluke Networks, or equivalent.

2. Singlemode optical fiber light source

a. Provide dual laser light sources with central wavelengths of 1310 nm and 1550 nm.
b. Output power of –10 dBm minimum.
c. The test reference cords must demonstrate an insertion loss ≤ 0.25 dB when mated against each other, and this test shall be stored and delivered with the other test results.
d. Acceptable manufacturers

1) Fluke Networks, or equivalent.

3. Power Meter

a. Provide 850 nm, 1300 nm, 1310 nm, and 1550 nm wavelength test capability.
b. Power measurement uncertainty of 0.25 dB.
c. Store reference power measurements.
d. Save at least 10,000 results to internal memory.
e. PC interface (USB).
f. Acceptable manufacturers

1) Fluke Networks, or equivalent.

4. Optional length measurement

a. It is preferable to use an OLTS that is capable of measuring the optical length of the fiber using time-of-flight techniques.

C. Optical Time Domain Reflectometer (OTDR)

1. Shall have a bright, color LCD display with backlight.
2. Shall have rechargeable Li-Ion battery for 8 hours of normal operation.
3. Weight with battery and module of not more than 4.5 lb and volume of not more 200 in^3.
4. Internal non-volatile memory with capacity for storing at least 2,000 OTDR bi-directionally tested fiber links.
5. USB port to transfer data to a PC or thumb drive/memory stick.
6. Multimode OTDR

    a. Wavelengths of 850 nm and 1300 nm.
    b. Event dead zones not to exceed 0.7 m at 850 nm and 1300 nm.
    c. Attenuation dead zones not to exceed 2.5 m at 850 nm and 4.5 m at 1300 nm.
    d. Distance range not less than 9,000 m.
    e. Dynamic range at least 28 dB for 850 nm and 30 dB at 1300 nm.
    f. Allow bi-directional testing without moving the OTDR to the far end.
    g. Perform on-board bi-directional averaging.

7. Singlemode OTDR

    a. Wavelengths of 1310 nm and 1550 nm.
    b. Event dead zones not to exceed 0.6 m at 1310 nm and 1550 nm.
    c. Attenuation dead zones not to exceed 3.7 m at 1310 nm and 1550 nm.
    d. Distance range not less than 80 km at 1310 nm and 130 km at 1550 nm.
    e. Dynamic range at least 32 dB for 1310 nm and 30 dB at 1550 nm.
    f. Allow bi-directional testing without moving the OTDR to the far end.
    g. Perform on-board bi-directional averaging.

8. Acceptable manufacturers

    a. Fluke Networks, or equivalent.

D. Fiber Microscope

1. Field of view 420 µm x 320 µm

    a. Video camera systems are preferred.
    b. Camera probe tips that permit inspection through adapters are required.
    c. Test equipment shall be capable of saving and reporting the end face image to IEC 613003-3-35.

2. Acceptable manufacturers

    a. Fluke Networks, or equivalent.

E. Integrated OLTS, OTDR and fiber microscope

1. Test equipment that combines into one instrument an OLTS, an OTDR and a fiber microscope may be used.
2. Acceptable manufacturers

    a. Fluke Networks, or equivalent.

2.2 IDENTIFICATION

A. Labels

1. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.
2. Shall be preprinted using a mechanical means of printing (e.g., laser printer).

3. Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, preferably orange or yellow – so that the labels are easily distinguishable.
4. Where insert type labels are used provide clear plastic cover over label.
5. Provide plastic warning tape 6 inches wide continuously printed and bright colored 18” above all direct buried services, underground conduits and duct-banks.
6. Acceptable Manufacturers:

    a. Panduit, or equivalent.
    b. Silver Fox, or equivalent.
    c. W.H. Brady, or equivalent.
    d. d-Tools, or equivalent.
    e. Brother, or equivalent.
    f. Dymo, or equivalent.
    g. Epson, or equivalent.

2.3 ADMINISTRATION

A. Administration of the documentation shall include test results of each fiber link and channel.

B. The test result information for each link shall be recorded in the memory of the field-test instrument upon completion of the test.

C. The test result records saved within the field-test instrument shall be transferred into a Windows™-based and/or cloud-based database utility that allows for the maintenance, inspection and archiving of these test records.

PART 3 - EXECUTION

3.1 GENERAL

A. All tests performed on optical fiber cabling that use a laser or LED in a test set shall be carried out with safety precautions in accordance with ANSI Z136.2.

B. All outlets, cables, patch panels and associated components shall be fully assembled and labeled prior to field-testing. Any testing performed on incomplete systems shall be redone on completion of the work.

3.2 OPTICAL FIBER CABLE TESTING

A. Field-test instruments shall have the latest software and firmware installed.

B. Link and channel test results from the OLTS and OTDR shall be recorded in the test instrument upon completion of each test for subsequent uploading to a PC and/or a cloud-based service in which the administrative documentation (reports) may be generated.

C. Fiber end faces shall be inspected using a video scope with a field of view not less than 425 µm x 320 µm.

    1. It is preferable that the end face images be recorded in the memory of the test instrument for subsequent uploading to a PC and reporting.

D. Testing shall be performed on each cabling segment (connector to connector).

E. Testing shall be performed on each cabling channel (equipment to equipment) that is planned for use per the owner’s instructions.

F. Testing of the cabling shall be performed using high-quality test reference cords of the same core size as the cabling under test, terminated with reference grade connectors. Reference grade connectors are defined as having a loss not exceeding 0.1 dB for multimode and 0.2 dB for singlemode. The test reference cords for OLTS testing shall be between 2 m and 5 m in length. The length of the launch and tail fibers for multimode OTDR testing shall be at a least 100 m

(328 ft.). For singlemode, the length of the launch and tail fibers will depend on the link under test. As a guide, the following table can be used for determining the length of the launch and tail fibers.

Maximum Length of Link (km)		Typical Pulse Width (ns)	Minimum Launch and Tail Cord Length (m)
1310 nm	1550 nm only		
0 to 35	0 to 50	≤ 1,000	130
35 to 45	50 to 65	3,000	400
45 to 50	65 to 75	10,000	1,000
≥ 50	≥ 75	20,000	2400

G. Optical loss testing

1. Horizontal/Backbone link

   a. Multimode links shall be tested in one direction at 850 nm and 1300 nm in accordance with ANSI/TIA-526-14-C, one-cord reference method, with an Encircled Flux compliant launch.
   b. Singlemode backbone links shall be tested in one direction at 1310 nm and 1550 nm in accordance with ANSI/TIA-526-7-A, Method A.1 (One-cord reference method).
   c. Link attenuation does not include any active devices or passive devices other than cable, connectors, and splices, i.e. link attenuation does not include such devices as optical bypass switches, couplers, repeaters, or optical amplifiers.

H. OTDR Testing

1. Fiber links shall be tested at these wavelengths for anomalies and to ensure uniformity of cable attenuation, connector insertion loss and reflectance.

   a. Multimode: 850 nm and 1300 nm.
   b. Singlemode: 1310 nm and 1550 nm.

2. Each fiber link and channel shall be tested in both directions.

   a. The launch and tail fibers shall remain in place for the measurement in the opposite direction – failing to do so will result in an increase in measurement uncertainty.
   b. The use of a loop back fiber at the far end with a tail fiber at the near end on the adjacent fiber is permitted for bi-directional testing, so long as the OTDR is able to split the trace automatically into two traces for the two fibers under test.

3. A launch cable shall be installed between the OTDR and the first link connection.
4. A tail cable shall be installed after the last link connection.

I. Magnified End face Inspection

1. Fibers shall be inspected using a video scope with a minimum field of view 425 µm x 320 µm to IEC 61300-3-35 Edition 1.0. The following test limits shall be used:

   a. Multimode connectors; Table 6 of IEC 61300-3-35 Edition 1.0
   b. Singlemode field polished connectors; Table 5 of IEC 61300-3-35 Edition 1.0
   c. Singlemode factory polished connectors; Table 3 of IEC 61300-3-35 Edition 1.0
   d. Angled Physical Contact (APC) connectors; Table 4 of IEC 61300-3-35 Edition 1.0

J. Length Measurement

1. The length of each fiber shall be recorded.
2. It is preferable that the optical length be measured using an OLTS or OTDR.

K. Polarity Testing

1. Paired duplex fibers in multi-fiber cables shall be tested to verify polarity in accordance with Clause E.5.3 of ANSI/TIA-568.3-E. The polarity of the paired duplex fibers shall be verified using an OLTS.

3.3 IDENTIFICATION

A. Labeling

1. Labeling shall conform to the requirements specified within ANSI/TIA-606-D or to the requirements specified by the Owner or the Owner's representative.

3.4 ADMINISTRATION

A. Test results documentation

1. The database for the complete project shall be stored and delivered in PDF Format prior to Owner acceptance of the building.
2. The test results documentation shall be available for inspection by the Owner or the Owner's representative during the installation period and shall be passed to the Owner's representative within 5 working days of completion of tests on cabling served by a telecommunications room or of backbone cabling. The installer shall retain a copy to aid preparation of as built information.
3. The database for the complete project, including twisted-pair copper cabling links, if applicable, shall be stored and delivered in an electronic format or, preferably through a cloud-based service, prior to Owner acceptance of the building in the original format used by the cabling vendors' software.
4. Circuit IDs reported by the test instrument should match the specified label ID (see 3.3 of this Section).
5. The detailed test results documentation data is to be provided in an electronic database for each tested optical fiber and shall contain the following information

a. The identification of the customer site as specified by the end-user.
b. The name of the test limit selected to execute the stored test results.
c. The name of the personnel performing the test.
d. The date and time the test results were saved in the memory of the tester.
e. The manufacturer, model and serial number of the field-test instrument.
f. The version of the test software and the version of the test limit database held within the test instrument.
g. The fiber identification number.
h. The length for each optical fiber.
i. The index of refraction used for length calculation when using length capable OLTS.
j. The backscatter coefficient of the fiber under test when using an OTDR.
k. Test results to include OLTS attenuation link and channel measurements at the appropriate wavelength(s) and the margin (difference between the measured attenuation and the test limit value).
l. Test results to include OTDR link and channel traces, event tables at the appropriate wavelength(s) and a map of the link tested.
m. The length for each optical fiber as calculated by the OTDR.
n. The overall Pass/Fail evaluation of the link-under-test for OLTS and OTDR measurements
o. Optional

1) A picture or image of each fiber end-face
2) A pass/fail status of the end-face using IEC 61300-3-35 Edition 1.0

B. Record copy and as-built drawings

1. Provide record copy drawings periodically throughout the project as requested by the Construction Manager or Owner, and at end of the project on CD/DVD. Record copy drawings at the end of the project shall be in CAD format and include notations reflecting the as built conditions of any additions to or variation from the drawings provided such as, but not limited to cable paths and termination point. CAD drawings are to incorporate test data imported from the test instruments.
2. The as built drawings shall include, but are not limited to block diagrams, frame and cable labeling, cable termination points, equipment room layouts and frame installation details. The as built shall include all field changes made up to construction completion:

a. Field directed changes to pull schedule.
b. Field directed changes to cross connect and patching schedule.
c. Horizontal cable routing changes.
d. Backbone cable routing or location changes.
e. Associated detail drawings.

END OF SECTION 271800