# ADDENDUM NO. 1

**January 14, 2022** 

North Central High School Renovations and Additions Phase 2b — West Gym Addition Electrical & Technology and Centralized Bus Storage 1801 E. 86<sup>TH</sup> Street Indianapolis, IN 46240

# TO: ALL BIDDERS OF RECORD

This Addendum forms a part of and modifies the Bidding Requirements, Contract Forms, Contract Conditions, the Specifications and the Drawings dated December 6, 2021, by Schmidt Associates. Acknowledge receipt of the Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of Pages ADD 1-1 through ADD 1-2 and attached Schmidt Associates Addendum No. 1, dated January 14, 2022, consisting of four (4) pages and Addendum Drawings: S-001, SF101, S-501, AD101, AF101, A-300, PD101, PP101, ESD100.2, ESD101.2, ESD102.2, ESD103.2, ESD104.2, ESD105.2, ESD106.2, ESD107.2, ES100.2, ESL101.2, ESP101.2, ES102.2, ES103.2, ES104.2, ES105.2, ES106.2, ES107.2, ED1M1.2, ED1M2.2, EL1M1.2, EL1T1.2, EL1W1.2, EL1X1.2, EL1Y1.2, EL1Z1.2, EL1M2.2, EL1W2.2, EL1X2.2, EL1Z2.2, EP101.2, EP102.2, EP101.2, EP102.2, EP101.2, EP102.2, EP101.2, EP101.2, EP102.2, E-603.2, E-604.2, E-605.2, E-606.2, E-607.2, E-608.2, E-601, TF001.2, TF002.2, TD101.2, TD1M1.2, TD1T1.2, TD1U1.2, TD1Z1.2, TF101.2, TF1M1.2, TF1T1.2, F1W1.2, TF1X1.2, TF1Z1.2, TF102.2, TF1Z2.2, TF2M1.2, TF2W1.2, TF2X1.2, TF2Z1.2, TF2W2.2, T307.2, T405.2, T406.2, T500.2, TD101, TF101, TF203, T300, T500, T501.

# A. GENERAL INFORMATION:

1. Virtual Bid Opening link is:

Microsoft Teams meeting
Join on your computer or mobile app
Click here to join the meeting
Or call in (audio only)
+1 317-762-3960,,852284030#

2. The link below includes the bid document drawing sheets for Phase 2A. This includes all civil, structural, architectural, mechanical and plumbing.

 $\underline{\text{https://app.plangrid.com/projects/4c884a07-da8b-7238-b452-4f23ff5f2399/staple/16671c45-3bcf-4c89-8d05-bd795fdd1147}$ 

3. The Pre-Award Meeting schedule is attached herein.

# PRE-AWARD MEETING SCHEDULE

Pre-Award Meetings will be conducted on January 21, 2022 at the times designated below. A Microsoft TEAMS invite will be distributed prior:

9:00 AM Bid Category No. 19 – Electrical & Technology 10:00 AM Bid Category No. 20 – Transp. Maint. Building Reno

Bid Category No. 21 – Transp. Storage Building

11:00 AM







# ADDENDUM NO. 1 JANUARY 14, 2022

# PREPARED BY SCHMIDT ASSOCIATES FOR:

# NORTH CENTRAL HIGH SCHOOL – WEST GYM ADDITION ELECTRICAL & TECHNOLOGY AND CENTRALIZED BUS STORAGE WASHINGTON TOWNSHIP, M.S.D. OF

This Addendum consists of 4 Addendum pages and 113 attachment pages totaling 117 pages.

Acknowledge receipt of this Addendum by inserting its number on the Bid Form. Failure to do so may subject the Bid to disqualification. This Addendum is part of the Contract Documents.

Bidder is encouraged to verify with reprographer of record all Addenda issued (do not rely exclusively on third party plan room services).

# PART 1 - CHANGES TO PRIOR ADDENDA (NOT APPLICABLE)

# PART 2 - CHANGES TO THE PROJECT MANUAL

Modifications described herein shall be incorporated in the Project Manual. All other Work shall remain unchanged.

# 2.1 DIVISION 23 - HEATING, VENTILATING, AND AIR-CONDITIONING(HVAC)

### A. Section 230900.99 "DIRECT DIGITAL CONTROL SYSTEMS"

1. ADD Document MSDWT Transportation Bldg DR.O.PDF per the attached.

"Document MSDWT Transportation Bldg DR.O.PDF includes 24 pages of 11x17 Temperature Control Services (TCS) drawings dated 1/11/2022 under Project Number PAS1976-SRV2245 that include installation standards, riser diagrams, and temperature control schematic with points and wiring diagram details that shall be installed by the controls installation contractor (CIC) as performed by the mechanical, technology, and electrical contractors and indicated on the M-700 drawings up to and including this addendum."

# 2.2 DIVISION 26 – ELECTRICAL

# A. Section 262413 "SWITCHBOARDS"

1. ADD Document "NCHS Schneider Electric Retrofill Scope" per the attached.

# 2.3 DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

# A. Section 281600 "INTRUSION DETECTION"

# 1. MODIFY Paragraph 1.1.A. to read as follows:

"A. The work required under this section consists of providing labor, equipment, supplies, materials, and testing unless otherwise specified, to perform the following operations recognized as necessary for the installation, termination, and labeling of wiring to provide a complete and functional Intrusion Detection system serving the Bus Transportation Building and Transportation Storage Building. Intrusion Detection wiring includes cables for keypads, motion detectors, door sensors, and other system module requiring connectivity back to the system controller."

# **PART 3 - CHANGES TO THE DRAWINGS**

Modifications described herein shall be incorporated in the Drawings. All other Work shall remain unchanged.

# 3.1 DRAWING SHEETS: ADDITIONS, DELETIONS AND REPLACEMENTS

DRAWING NO.	INDICATE ACTION: REPLACE (R), ADD (A), DELETE (D)		
S-SERIES DRAWINGS			
2-S-001	DELETE AND REPLACE		
2-SF101	DELETE AND REPLACE		
2-S-501	DELETE AND REPLACE		
A-SERIES DRAWINGS			
1-AD101	DELETE AND REPLACE		
1-AF101	DELETE AND REPLACE		
2-A-300	DELETE AND REPLACE		
P-SERIES DRAWINGS			
1-PD101	DELETE AND REPLACE		
2-PP101	DELETE AND REPLACE		
E-SERIES DRAWINGS			
ESD100.2	DELETE AND REPLACE		
ESD101.2	DELETE AND REPLACE		
ESD102.2	DELETE AND REPLACE		
ESD103.2	DELETE AND REPLACE		
ESD104.2	DELETE AND REPLACE		
ESD105.2	DELETE AND REPLACE		
ESD106.2	DELETE AND REPLACE		
ESD107.2	ADD		
ES100.2	DELETE AND REPLACE		
ESL101.2	DELETE AND REPLACE		
ESP101.2	DELETE AND REPLACE		

DELETE AND REPLACE

ES102.2

ES103.2	DELETE AND REPLACE
ES104.2	DELETE AND REPLACE
ES105.2	DELETE AND REPLACE
ES106.2	DELETE AND REPLACE
ES107.2	ADD
ED1M1.2	DELETE AND REPLACE
ED1M2.2	DELETE AND REPLACE
EL1M1.2	DELETE AND REPLACE
EL1T1.2	DELETE AND REPLACE
EL1W1.2	DELETE AND REPLACE
EL1X1.2	DELETE AND REPLACE
EL1Y1.2	DELETE AND REPLACE
EL171.2	DELETE AND REPLACE
EL1M2.2	DELETE AND REPLACE
EL1W2.2	DELETE AND REPLACE
EL1X2.2	DELETE AND REPLACE
FL172.2	DELETE AND REPLACE
EP101.2	DELETE AND REPLACE
EP102.2	ADD
EP1M1.2	DELETE AND REPLACE
EP1W1.2	DELETE AND REPLACE
EP1Z1.2	DELETE AND REPLACE
EP1W2.2	DELETE AND REPLACE
EP1K3.2	DELETE AND REPLACE
ER101.2	DELETE AND REPLACE
E-501.2	DELETE AND REPLACE
E-502.2	DELETE AND REPLACE
E-504.2	DELETE AND REPLACE
E-601.2	DELETE AND REPLACE
E-603.2	DELETE AND REPLACE
E-604.2	DELETE AND REPLACE
E-605.2	DELETE AND REPLACE
E-606.2	DELETE AND REPLACE
E-607.2	DELETE AND REPLACE
E-608.2	DELETE AND REPLACE
1-E-601	DELETE AND REPLACE
T-SERIES DRAWINGS	
TF001.2	DELETE AND REPLACE
TF002.2	DELETE AND REPLACE
TD101.2	ADD
TD1M1.2	DELETE AND REPLACE
TD1T1.2	DELETE AND REPLACE
TD1U1.2	DELETE
TD1Z1.2	ADD
TF101.2	DELETE AND REPLACE

TF1M1.2	DELETE AND REPLACE
TF1T1.2	DELETE AND REPLACE
TF1W1.2	DELETE AND REPLACE
TF1X1.2	DELETE AND REPLACE
TF1Z1.2	DELETE AND REPLACE
TF102.2	DELETE AND REPLACE
TF1Z2.2	DELETE AND REPLACE
TF2M1.2	DELETE AND REPLACE
TF2W1.2	DELETE AND REPLACE
TF2X1.2	DELETE AND REPLACE
TF2Z1.2	DELETE AND REPLACE
TF2W2.2	DELETE AND REPLACE
T307.2	DELETE AND REPLACE
T405.2	DELETE AND REPLACE
T406.2	DELETE AND REPLACE
T500.2	DELETE AND REPLACE
1-TD101	DELETE AND REPLACE
1-TF101	DELETE AND REPLACE
2-TF203	DELETE AND REPLACE
1-T300	DELETE AND REPLACE
1-T500	DELETE AND REPLACE
1-T501	DELETE AND REPLACE

# **END OF ADDENDUM 1**



MSD TRANSPORTATION BUILDING **BUILDING AUTOMATION CONTROL SYSTEM DELTA CONTROLS PROJECT NUMBER** PAS1976-SRV2245

1785056 Ave Surrey, BC, CANADA V3S 1C7 Phone: +1 604-574-9444 Toll Free: +1 800-335-8221

DRAWING NUMBER	DRAWING DESCRIPTION	DRAWING NUMBER	DRAWING DESCRIPTION	
SECTION 00.00	TABLE OF CONTENTS			
SECTION 00.01	INSTALLATION STANDARDS - LEGEND			
SECTION 00.02	INSTALLATION STANDARDS - ELECTRICAL			
SECTION 00.03	INSTALLATION STANDARDS - NETWORK			
SECTION 00.04	INSTALLATION STANDARDS - MECHANICAL			
SECTION 01.00	NETWORK LAYOUT PG 1			
SECTION 05.00	HWS FLOW			
SECTION 05.01	HWS CONTROLLER IO I/O PG 1			
SECTION 10.00	VAV AHU-C1 FLOW			
SECTION 10.01	VAV AHU-C1 CONTROLLER IO I/O PG 1			
SECTION 12.00	SZ AHU-C2 FLOW			
SECTION 12.01	SZ AHU-V2 CONTROLLER IO I/O PG1			
SECTION 31.00	VAV-C01 FLOW			
SECTION 32.00	FPB-C01-C11 FLOW			
SECTION 32.01	VAV POWER DISTRIBUTION			
SECTION 40.00	EF-C1, EF-C2 FLOW			
SECTION 54.00	ANNUNCIATOR PANEL			
SECTION 54.01	ANNUNCIATOR PANEL CONTROLLER 10 I/O			
SECTION 54.02	MISC FIELD DEVICES			
SECTION 54.03	EXTERIOR LIGHTING CONTACTORS			
SECTION 98.00	DETAILS-1		OWNER	M.E.P. ENGINEERS
SECTION 98.01	DETAILS-2			
SECTION 98.02	VFD SCHEDULE			
SECTION 98.03	MASTER BOM			
			, -	, -
			ARCHITECT	MECHANICAL CONTRACTOR
			, -	, <del>-</del>
		PROJECTITLE		TM DRAWINGTITLE
		MSD TRANSPORT	ration Building Jel	TABLE OF CONTENTS
		PROJECT NUMBER	BY: KK CONTR	
		PAS1976-SRV224	PRELIMINARY: 2 PRINTED 01/11/2022 Ver. 4.8.0  A Delta Group C	ompany DWG 00.00

# **INSTALLATION STANDARDS - LEGEND**

TAG	DESCRIPTION	TAG	DESCRIPTION
AHU	AIR HANDLING UNIT	MA	MIXED AIR
ΑI	ANALOG INPUT	MOA	MINIMUM OUTSIDE AIR
ALM	ALARM	0	SPEED
AO	ANALOG OUTPUT	OA	OUTSIDE AIR
ВІ	BINARY INPUT	ОАН	OUTSIDE AIR HUMIDITY
во	BINARY OUTPUT	OAT	OUTSIDE AIR TEMPERATURE
BYP	BYPASS	осс	OCCUPANCY
С	START/STOP	PH	PREHEAT
CC	COOLING COIL	PLG	PANEL LIGHT GREEN
CFM	AIRFLOW	PLR	PANEL LIGHT RED
CIC	CONTROLS INSTALLATION CONTRACTOR	RA	RETURN AIR
CO2	CARBON DIOXIDE SENSOR	RE-#	RELAY
DA	DISCHARGE AIR	RF	RETURN FAN
DPR	DAMPER	S	STATUS
EA	EXHAUST AIR	SA	SUPPLY AIR
ERU	ENERGY RECOVERY UNIT	SD	SMOKE DETECTOR
ES	ENDSWITCH	SF	SUPPLY FAN
EW	HEAT WHEEL	SP	STATIC PRESSURE
FPB	FAN POWERED BOX	Т	TEMPERATURE
FPP	FREEZE PROTECTION	TCC	TEMPERATURE CONTROL CONTRACTOR
Н	HUMIDITY	VAV	VARIABLE AIR VOLUME
HL	HIGH LIMIT	VFD	VARIABLE FREQUENCY DRIVE
HTG	HEATING	VLV	VALVE
LL	LOW LIMIT	ZN	ZONE
LT	LOW TEMPERATURE		

# NAMING STRUCTURE PROCESS FLOW

**DEVICE TAGS** ARE ABBREVIATIONS USED TO CORRELATE AN OBJECT ON THE FLOW DIAGRAM TO A POINT ON THE CONTROLLER I/O WIRING DIAGRAM. THE SHAPE SURROUNDING THE ABBREVIATION DENOTES ITS I/O FUNCTION.

OUTPUT RE-1 INPUT TTE-1

NETWORK (BACNET-1) MATERIAL V-1

PROJECT TITLE

MSD TRANSPORTATION BUILDING

PROJECT NUMBER

PAS1976-SRV2245

PRELIMINARY: 2

A Delta Group Company

INSTALLATION STANDARDS - LEGEND

DWG 00.01

# INSTALLATION STANDARDS - ELECTRICAL

### MS/TP BUS CABLE LABELING

- THE LABELING SHOWN BELOW SHALL BE PROVIDED ON ALL MS/TP BUS CABLES RUNNING FROM ONE CONTROL PANEL TO ANOTHER, OR FROM A CONTROLLER TO A SPACE TEMPERATURE MS/TP BUS CABLES CONNECTING CONTROLLERS WITHIN A SINGLE CONTROL PANEL SHALL NOT BE LABELED.
- ON CABLES RUNNING BETWEEN CONTROL PANELS: EACH LABEL SHALL INDICATE THE NAMES OF THE CONTROLLERS CONNECTED AT EACH END OF THE CABLE. THE NAME PRINTED ON THE LEFT SIDE OF THE LABEL SHALL BE THE NAME OF THE CONTROLLER CONNECTED TO THE LEFT END OF THE CABLE & VICE-VERSA (SEE EXAMPLE BELOW). THE WORD "BUS' SHALL BE PRINTED NEAR THE MIDDLE OF THE LABEL TO IDENTIFY THE CABLE AS AN MS/TP BUS CABLE

TO VAV----TO AHU−3 CONTROLLER HU BUS VAV AHU BUS VAV

 ON CABLES RUNNING TO SPACE TEMPERATURE SENSORS: EACH LABEL SHALL INDICATE THE NAME OF THE CONTROLLER ON THE RIGHT SIDE AND THE LETTERS "ST" ON THE LEFT SIDE. THE CABLE SHALL BE INSTALLED AS SHOWN BELOW. THE WORD "BUS" SHALL BE PRINTED NEAR THE MIDDLE OF THE LABEL TO IDENTIFY THE CABLE AS AN MS/TP BUS CABLE.

TO SPACE TEMP SENSOR ST BUS VAV ST BUS VAV

- EACH LABEL SHALL BE MADE OF TRANSPARENT VINYL FILM BACKED WITH AN ACRYLIC PRESSURE-SENSITIVE ADHESIVE. THE LABEL MATERIAL SHALL BE OIL & SOLVENT RESISTANT WITH GOOD CONFORMABILITY & FLEXIBILITY. THE MEANS OF PRINTING ON THE LABEL SHALL RESULT IN A CLEARLY LEGIBLE, PERMANENT MARKING. LABELS SHALL REMAIN INTACT & CLEARLY LEGIBLE WHEN SUBJECTED TO ULTRAVIOLET LIGHT, EXTREME HUMIDITY & SURFACE TEMPERATURES FROM -40' F TO 150' F (-40' C TO 66' C).
- EACH CABLE SHALL BE IDENTIFIED WITH (2) LABELS. A LABEL SHALL BE LOCATED WITHIN 18" OF EACH END OF THE CABLE & SHALL BE VISIBLE WITHIN THE CONTROL ENCLOSURE. THE SAME NOTATION THAT APPEARS ON THE LABEL SHALL BE MARKED ON THE COVER OF EACH JUNCTION BOX THAT THE CABLE PASSES THROUGH.

### WIRING TERMINATION LEGEND - PANEL

= VDC TERMINATION AT CONTROL PANEL

L## = VAC TERMINATION AT CONTROL PANEL

1## = 120-460VAC INTRA-PANEL TERMINATION

2##, 4## = 24VAC INTRA-PANEL TERMINATION

3##, 5## = 24VDC INTRA-PANEL TERMINATION

# WIRING TERMINATION LEGEND - BACNet ID

##### XX ## (NOTE: LEADING ZEROS NOT USED)

EXAMPLES:

INSTANCE NUMBER: FROM PANEL I/O = PHYSICAL CONNECTION NUMBER N\* INSTANCE NUMBER INDICATES A NETWORK (SOFTWARE) POINT

I/O TYPE: AI=ANALOG INPUT, BI=BINARY INPUT, MI=MULTISTATE INPUT AO-ANALOG OUTPUT, BO-BINARY OUTPUT

DEVICE BASIC ADDRESS FROM SWITCH DEVICE BACNET ADDRESS - DEVICE SWITCH ADDRESS . DEVICE TYPE FACTOR

DEVICE TYPE: = AREA (FACTOR = 10000)

- = SYSTEM (FACTOR = 100)
- = SUBLAN (FACTOR = 1)
- = LINKNET DEVICE (BACNET ADDRESS USES HOSTPANEL\_ID)

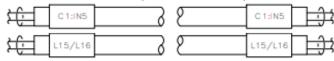
AREA DEVICE # 3, BINARY INPUT NUMBER 4: [BACNET ADDRESS = 30000.BI4]
LINKNET DEVICE # 2, BINARY INPUT NUMBER 3: [BACNET ADDRESS = HOSTPANEL\_ID.BI203]

# INPUT / OUTPUT WIRING STANDARDS

- ALL I/O CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS:
- STRANDED 18 GAUGE, TWISTED/SHIELDED-PAIR COPPER WIRE WITH 300 VOLT INSULATION PLENUM-BATED CABLE SHALL BE USED WHERE BEQUIRED BY LOCAL OR NATIONAL CODES.
- /O WRING SHALL NOT BE RUN IN THE SAME CONDUIT AS A.C. POWER WIRING THAT CARRIES MORE THAN 24
- I/O WRING SHALL NOT CROSS OVER A.C. POWER WRING THAT CARRIES MORE THAN 24
- I/O WRING SHALL NOT BE RUN IN THE SAME CABLE GROUP AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
- ONLY SHIELDED 24 VAC POWER WRING SHALL BE ALLOWED TO CROSS OVER, RUN IN THE SAME CONDUIT, OR RUN IN THE SAME CABLE GROUP AS I/O WIRING.
- WHERE UNAVOIDABLE, I/O WIRING MAY BE LOCATED NO CLOSER THAN 6" AND SHOULD BE LOCATED AS FAR APART AS POSSIBLE FROM POWER WIRING CARRYING MORE THAN 24 VOLTS. AVOID RUNNING PARALLEL TO POWER WIRING ANY FURTHER THAN NECESSARY, CROSS POWER WIRING AT 90 DEGREE ANGLES ONLY IF REQUIRED.
- SHIELDS ON INPUT AND OUTPUT WIRING TO BE GROUNDED AT PANEL (OR CONTROLLER) LOCATION ONLY. THEY SHOULD BE TIED TO A TRUE EARTH GROUND
- STRIP ONLY ENOUGH CABLE BACK TO ALLOW TERMINATION OF SHIELD AND WIRE.

### INPUT / OUTPUT CABLE LABELING

THE LABELING SHOWN BELOW SHALL BE PROVIDED ON ALL I/O WRING TO & FROM CONTROLLERS AND FIELD DEVICES. I/O WIRING CONTAINED WITHIN A CONTROL PANEL SHALL NOT BE LABELED. EACH LABEL SHALL INDICATE THE I/O WIRING TERMINATION AS SHOWN ON THE TEMPERATURE CONTROL DRAWINGS (SEE EXAMPLES BELOW).



- EACH LABEL SHALL BE MADE OF TRANSPARENT VINYL FILM BACKED WITH AN ACRYLIC, PRESSURE-SENSITIVE ADHESIVE. THE LABEL MATERIAL SHALL BE OIL & SOLVENT RESISTANT WITH GOOD CONFORMABILITY & FLEXIBILITY. THE MEANS OF PRINTING ON THE LABEL SHALL RESULT IN A CLEARLY LEGIBLE, PERMANENT MARKING. LABELS SHALL REMAIN INTACT & CLEARLY LEGIBLE WHEN SUBJECTED TO ULTRAVIOLET LIGHT, EXTREME HUMIDITY & SURFACE TEMPERATURES FROM -40° F TO 150° F (-40° C TO 66° C).
- EACH CABLE SHALL BE IDENTIFIED WITH (2) LABELS. A LABEL SHALL BE LOCATED WITHIN 18" OF EACH END OF THE CABLE & SHALL BE VISIBLE AT THE CONTROL PANEL OR FIELD DEVICE. THE SAME NOTATION THAT APPEARS ON THE LABEL SHALL BE MARKED ON THE COVER OF EACH JUNCTION BOX THAT THE CABLE PASSES THROUGH

### GENERAL ELECTRICAL STANDARDS

- ALL CURRENT SENSING DEVICES SHALL HAVE THE POWER WIRE LOOPED THROUGH THE SENSOR MULTIPLE IF NECESSARY, TO PROVIDE AN AMPERAGE THAT IS WELL WITHIN THE RANGE OF THE SENSOR (REFER TO MANUFACTURER'S LITERATURE FOR AMPERAGE RANGE).
- ALL FIELD WRING TO TERMINAL STRIPS IN CONTROL PANELS SHALL BE TERMINATED AT THE OUTERMOST TERMINALS. INNER TERMINALS OF TERMINAL STRIPS ARE RESERVED FOR INTERNAL WIRING TERMINATIONS.
- 120 VAC POWER WIRING SHALL ENTER ANY CONTROL PANEL AT THE UPPER RIGHT CORNER UNLESS OTHERWISE
- 240 VAC POWER WIRING SHALL ENTER ANY CONTROL PANEL AT THE LOWER LEFT CORNER UNLESS OTHERWISE
- THE GROUND WIRE CONNECTED TO ANY CONTROL PANEL MUST BE A CONTINUOUS CONDUCTOR BACK TO THE GROUND CONNECTION AT THE BREAKER PANEL. GROUNDING TO BUILDING STEEL IS NOT ACCEPTABLE.
- ALL JUMPER & DIP SWITCH CONFIGURATIONS SHOWN ON THE TEMPERATURE CONTROL DRAWINGS SHALL BE SET BY THE INSTALLER. IF NO SPECIFIC CONFIGURATION IS SHOWN FOR A DEVICE, NO CHANGE SHALL BE MADE TO THE DEFAULT SETTINGS.
- ALL FIELD WIRING THAT DIFFERS FROM THE WIRING SHOWN ON THE TEMPERATURE CONTROL DRAWINGS SHALL BE NOTED ON THE DRAWINGS (BY THE INSTALLER) WITH RED INK OR PENCIL. THE COMPLETE SET OF NOTED DRAWINGS SHALL BE PROVIDED TO THE PROJECT MANAGER UPON COMPLETION OF THE PROJECT OR SOONER UPON REQUEST.

### ELECTRICAL NOTES

- ALL CONTROL DEVICES & WIRING SHALL BE INSTALLED IN ACCORDANCE WITH: MANUFACTURER'S INSTALLATION INSTRUCTIONS, AND INSTALLATION STANDARDS PROVIDED ON THE "INSTALLATION STANDARDS" SHEET. - THESE DRAWINGS PROVIDE SCHEMATIC REPRESENTATIONS OF EQUIPMENT & FIELD DEVICES BASED ON THE BID PROPOSAL. ACTUAL INSTALLATION OF ALL CONTROL DEVICES IS SUBJECT TO FIELD VERIFICATION. ANY CHANGES THAT MAY RESULT IN A DEVIATION FROM THE GENERAL INTENT OF THE CONTROL SYSTEM DESIGN SHALL BE APPROVED BY THE DESIGNER PRIOR TO INSTALLATION
- FIELD VERIFICATION OF WIRING TERMINATIONS REQUIRED.
- GROUND CIRCUIT MUST BE A CONTINUOUS PATH BACK TO THE BREAKER
- ELECTRICAL NOTE: CONTROLLER GROUND CONNECTION MUST BE A COMPLETE PATH BACK TO BREAKER PANEL.

REMOVE SHUNT JUMPER IF SHIELD IS GROUNDED DIRECTLY AT ANY OTHER POINT OR SHUNT IS INSTALLED AT OTHER END OF NETWORK.

- ADP-45-MSTP-TB-Y AND ADP-45-MSTP-Y BOARDS MAY BE FLUSH MOUNTED ONTO METAL PANELBOARDS WITHOUT AN INSULATOR BETWEEN THE

- FIELD DEVICES SHOULD ONLY BE GROUNDED IN THE CONTROL PANEL. DO NOT GROUND I/O WIRING IN BOTH THE FIELD AND THE PANEL. THESE DRAWINGS PROVIDE SCHEMATIC REPRESENTATIONS OF EQUIPMENT & FIELD DEVICES BASED ON THE CHILDREN'S EDUCATION ADDITION PROPOSAL. ACTUAL INSTALLATION OF ALL CONTROL DEVICES IS SUBJECT TO FIELD VERIFICATION. ANY CHANGES THAT MAY RESULT IN A DEVIATION FROM THE GENERAL INTENT OF THE CONTROL SYSTEM DESIGN SHALL BE APPROVED BY THE DESIGNER PRIOR TO INSTALLATION. - SEE FIELD DEVICE TERMINATION DETAIL SHEET(S) FOR POINT WIRING

### FROM BAPI-

REQUIREMENTS.

· BAPI recommends using twisted pair of at least 22AWG and sealant filled connectors for all wire connections. Larger gauge wire may be required for long runs. All wiring must comply with the National Electric Code (NEC) and local codes.

Do NOT run this device's wiring in the same conduit as AC power wiring of NEC class 1, NEC class 2, NEC class 3 or with wiring used to supply highly inductive loads such as motors, contactors and relays. BAPI's tests show that fluctuating and inaccurate signal levels are possible when AC power wiring is present in the same conduit as the signal lines. If you are experiencing any of these difficulties, please contact your BAPI representative.

	Cable Requirements:					
	Cable Type	Equal to	Max Cable Length	Wiring Precautions		
RS-485 Network	22-24 AWG twisted pair, shielded, jacketed communication cable	Belden 9841, 82841	4000 ft (1220 m)	- Braided or Aluminum foil shield, Impedence 100-200 Ω, Capacitance 17 pF/ft or less. - Use for BACnet MS/TP, LINKNet, V2 Subnet, MODBUS-RTU		
Ethernet	10/100 Base T, Cat5e, Cat6		no limit (w/ switches)	Follow IEEE 802.3 standards		
Fiber Optic	Grade 3 (62.5/125µ) / Grade 4 (50/125µ), min 2 fiber, Multimode, SC connector	Belden FDxM006P0	1000 ft (550 m) for Gigabit Ethernet	Suggest 4 or more fibers for redundancy in case of damage		
10k \(\Omega\) / Dry Contact Input	2 conductor 18 AWG	Belden 8461NH	3900 ft (1200 m)	Ground only at controller input GND terminal		
20K / Dry Contact Input	2 conductor 22 AWG	Belden 88442	1500 ft (450 m)	Ground only at controller input GND terminal		
5 V Input	2 conductor 22 AWG shielded 2 conductor 20 AWG shielded 3 conductor 20 AWG shielded	Belden 83552 Belden 83602 Belden 8772	100 ft (30 m) 330 ft (100m) w 20 kΩ load resistor	Keep Cable Short Use dedicated shielded cable		

Cable Requirements:					
	Cable Type	Equal to	Max Cable Length	Wiring Precautions	
10 V Input	3 conductor 18 AWG unshielded	Belden 88870	330 ft (100 m)		
4-20 mA Input	2 conductor 18 AWG unshielded	Belden 8461NH	3300 ft (1000 m)		
+-zo mw input	4 conductor 18 AWG unshielded	Belden 88489	3300 II (1000 III)		
Digital Input	2 conductor 18 AWG	Belden 8461NH	3900 ft (1200 m)		
Digital Input	2 conductor 22 AWG	Belden 88442	1500 ft (450 m)		
DTD	2 conductor 18 AWG	Belden 8461NH		Ground only at controller input GND	
RTD Input	2 conductor 22 AWG	Belden 88442	No practical limit	terminal	
Analog 0-10 VDC Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)		
A I A 30 A 0	2 conductor 18 AWG unshielded	Belden 8461NH	Depends upon	ft = 1000 (500 - end dev imp) / 12.8	
Analog 4-20 mA Output	2 conductor 18 AWG unshielded	Beiden 8461NH	impedence	m = 1000 (500 - end dev imp) / 42	
Binary Triac Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	min turn-on current = 25 mA	
Diagon CC Dalaw Custows	2 4:	Daldan 9461NU	220 (4/100)	No min turn-on current, Max External	
Binary SS Relay Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	Voltages: 28 VAC, 28 VDC	
Binary Relay Output	2 conductor 18 AWG unshielded	Belden 8461NH	330 ft (100 m)	Max External Voltages: 28 VAC, 28 VDC	

INSTALLATION STANDARDS - ELECTRICAL

A Delta Group Company

OJECT TITLE MSD TRANSPORTATION BUILDING ROJECT N UM BE R CONTROLS RELIMINARY: 2 PAS1976-SRV2245

INSTALLATION STANDARDS -**ELECTRICAL** DWG 00.02

# **INSTALLATION STANDARDS - NETWORK**

### BACNET MS/TP (RS-485) BUS STANDARDS

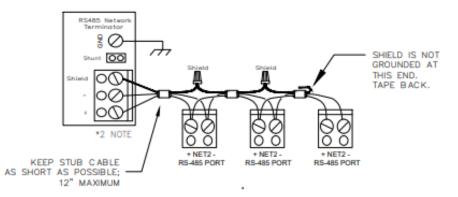
- THE MS/TP BUS SHIELD MUST BE KEPT SEPARATE FROM OTHER SHIELDS & MUST NOT BE GROUNDED. THE MS/TP BUS SHIELD SHALL BE PROTECTED FROM CONTACTING ANY SURFACE OTHER THAN THE TERMINATION BLOCK.
- SPLICES IN MS/TP BUS WIRING ARE NOT ACCEPTABLE. MS/TP BUS WIRING SHALL BE TERMINATED ONLY AT A CONTROLLER, REPEATER, OR TRM-768: RS-485 LAN TERMINATOR.
- THE BLACK WIRE IN AN MS/TP BUS CABLE SHALL ALWAYS BE CONNECTED TO THE (-) BUS TERMINAL ON THE DEVICE AT EACH END OF THE CABLE.
- ALL 2-CONDUCTOR MS/TP BUS CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS:
   22-24 GAUGE, SINGLE TWISTED-PAIR, TINNED, SHIELDED COPPER WIRE WITH GREEN JACKET
- NOMINAL IMPEDANCE = 100-120 OHMS BETWEEN CONDUCTORS
- CAPACITANCE < OR = TO 17 pF/FT BETWEEN GROUNDED CONDUCTOR & NEXT CONDUCTOR</li>
   ACCEPTABLE CABLE = BELDEN 9841, 82841 OR WINDY CITY WIRE 42002-S.
   (PLENUM-RATED)
- \*\*APPROVAL OF EQUIVALENT CABLE IS REQUIRED PRIOR TO INSTALLATION\*\*
- 5. PLENUM-RATED CABLE SHALL BE USED WHERE REQUIRED BY LOCAL OR NATIONAL CODES.
- MS/TP BUS WIRING SHALL NOT BE RUN IN THE SAME CONDUIT AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
- 7. WITHIN ANY CONTROL PANEL:
- MS/TP BUS WIRING SHALL NOT CROSS OVER A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
- MS/TP BUS WIRING SHALL NOT BE RUN IN THE SAME CABLE GROUP AS A.C. POWER WIRING THAT CARRIES MORE THAN 24 VOLTS.
- ONLY SHIELDED 24 VAC POWER WIRING SHALL BE ALLOWED TO CROSS OVER, RUN IN THE SAME CONDUIT, OR RUN IN THE SAME CABLE GROUP AS MS/TP BUS WIRING.

# BACNET MS/TP (RS-485) BUS NOTES

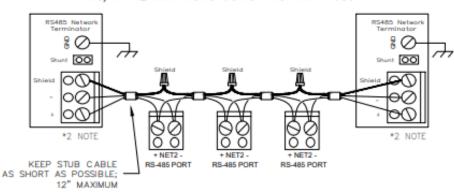
- EACH SEGMENT OF THE DZNT COMMUNICATION BUS CAN HAVE UP TO 50 DEVICES AND 2,000' TOTAL CATS CABLE LENGTH (COMBINED DISTANCE BETWEEN TERMINATION BOARDS AND FROM TERMINATION BOARD TO DZNT-TO-VAV (THE WALL MOUNTED DEVICE)) TO A MAXIMUM OF 99 DEVICES TOTAL.
- TOTAL NETWORK LENGTH IS DETERMINED BY SUM OF CABLE LENGTHS BETWEEN TERMINATION BOARDS, PLUS THE SUM OF THE DROP CABLES BETWEEN TERMINATION BOARD AND THERMOSTAT.
- IF ONLY 1 SEGMENT IS REQUIRED, AN ADP45-MSTP-TB-Y MAY BE USED INSTEAD OF AN ADP45-MSTP-Y.
- THERE IS NO HARD LIMIT TO THE NUMBER OF BRANCHES CREATED BY ADP45-MSTP-Y CONNECTORS, PROVIDED TOTAL OF ALL BRANCHES IS WITHIN THE LENGTH AND DEVICE LIMIT FOR THE SEGMENT. DAISY CHAIN STRUCTURE IS MAINTAINED DUE TO THE DESIGN OF THE CABLING SYSTEM.
- AFTER SPLITTING A NETWORK INTO TWO (2) BRANCHES, DO NOT RECOMBINE TO A SINGLE BRANCH AT THE OPPOSITE END OR NETWORK PROBLEMS WILL OCCUR.
- LOOPBACK TERMINATION, ADP45-MSTP-ENDLOOP, MUST BE USED AT THE END OF EACH NETWORK BRANCH OR SEGMENT. NETWORK WILL CONTINUE TO FUNCTION IF ON LOOPBACK OR DEVICE IS REMOVED FROM THE NETWORK BUT DEVICES WILL DROP OFF THE NETWORK BETWEEN ANY TWO (2) REMOVED DZNT-TO-VAV OR ADP45-MSTP-LOOP.
- 12" LENGTH OF NETWORK CABLE ATTACHED TO THE ADP45-MSTP-TB-Y IS MAXIMUM ALLOWED. TERMINATE GROUND LEAD TO GND ON THE CONTROLLER TO MAINTAIN NETWORK INTEGRITY.
- CABLING IS DESIGNED TO USE STANDARD STRAIGHT—THROUGH UNSHIELDED TWISTED PAIR (UTP) CAT3 OR HIGHER CABLES (CAT5, CAT5e, CAT6) TO CONNECT BOXES TO BOXES, AND INDIVIDUAL BOXES TO THEIR THERMOSTATS.
- CABLING IS DESIGNED TO MAINTAIN THE REQUIRED DAISY-CHAIN CONFIGURATION EVEN WITH THE USE OF NETWORK Y's.
- DO NOT EXCEED (64) NODES ON A NETWORK SEGMENT. THERE IS A MAXIMUM OF 99 NOTES ALLOWED ON A SINGLE MS/TP NETWORK. ANY MORE THAN (64) NODES ON A NETWORK REQUIRES THE USE OF A REPEATER!
- DO NOT EXCEED 4,000 FEET (1,220 m) TOTAL LENGTH ON ANY SINGLE TWISTED PAIR RS-485 NETWORK SEGMENT.
- DO NOT EXCEED 2,000 FEET (610 m) TOTAL LENGTH ON ANY SINGLE CATS RS-485 NETWORK SEGMENT.
- DO NOT EXCEED (3) NODES ON A SINGLE LINKNET SEGMENT.
- DO NOT EXCEED (3) NODES ON A SINGLE LINKNET SEGMENT.
   DO NOT EXCEED 100 FEET (30 m) TOTAL LENGTH ON ANY SINGLE LINKNET NETWORK.
- SHIELD FOR MS/TP BUS MUST BE KEPT SEPARATE FROM OTHER SHIELDS AND FROM GROUND TERMINATIONS.
- MS/TP BUS SHIELD MUST BE TIED THROUGH EACH NODE TO MAKE A CONTINUOUS SHIELD THAT RUNS THE ENTIRE LENGTH OF THE RS-485 SEGMENT. DO NOT CONNECT THE SHIELD TO GROUND AT THE NODE.
- PROTECT FROM CONTACT WITH ANY SURFACE OTHER THAN THE TRM-768 TERMINAL BOARD OR DNZR-768 REPEATER.
- COMMUNICATION WRING MUST NOT BE SPLICED. ALL TERMINATIONS MUST OCCUR AT CONTROLLERS UNLESS SPECIFICALLY NOTED OTHERWISE.
- BLACK COMMUNICATION WIRE SHALL ALWAYS BE CONNECTED TO (-) TERMINAL AT ALL CONTROLLERS.
- REFER TO "INSTALLATION STANDARDS" SHEET FOR ACCEPTABLE CABLE SPECIFICATIONS AND WIRING PRACTICES.
- ALL DEVICES CONNECTED TO THE MS/TP NETWORK MUST BE PROPERLY GROUNDED.
- ALL DEVICES ON THE NETWORK MUST RUN AT THE SAME BAUD RATE.
- THE LAYOUTS REPRESENTED ARE EXAMPLES OF HOW THE NETWORK MAY BE CONFIGURED.
   THERE IS NO REQUIREMENT TO FOLLOW THESE PROPOSED LAYOUTS, OTHER THAN MAINTAINING
   THE GROUPING UNDER EACH SYSTEM CONTROLLER.
- EACH APPLICATION CONTROLLER ON A GIVEN MS/TP BUS (UNDER EACH SYSTEM CONTROLLER) MUST HAVE UNIQUE ADDRESSING SET VIA THE DIP SWITCHES.

# BACNET MS/TP (RS-485) BUS TERMINATIONS

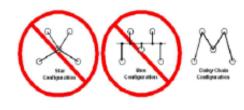
MS/TP TERMINATIONS USING ONE TRM-768 AND BUILT-IN TERMINATION



MS/TP TERMINATIONS USING TWO TRM-768s



ONLY A DAISY-CHAIN RS-485 MS/TP TOPOLOGY IS ALLOWED!



### ETHERNET CABLE CONNECTIONS -Or/Wh-Or/Wh - Or/Wh--0r-—Gr/Wh Or/Wh= (RD+ Gr/Wh - Gr/Wh= -Bu-—Bu/Wh -Bu/Wh--Bu/Wh-Bu/Wh-—Gr-- Or -(RD-- Br/Wh-—Br/Wh —Br/Wh— Br/Wh— -Br--Br-(END VIEW) CROSSOVER CABLE STRAIGHT-THRU CABLE 00000000 8P8C (RJ-45) CONNECTOR THE CONNECTIONS SHOWN ARE FOR CATS TWISTED-PAIR CABLE

### ETHERNET CABLE STANDARDS

- ALL ETHERNET CABLE SHALL MEET THE FOLLOWING SPECIFICATIONS:

   10/100-BASE-T: 22 OR 24 AWG, (4) TIMSTED-PAIR, 500D COPPER WIRE (CAT-5 EQUIV.)
  - MAX. SEGMENT LENGTH = 330 FT (100 m) MAX. NETWORK LENGTH = 2,000 FT (610 m)
- 10/100-BASE-F: 62.5/125 MICRON CABLE
- MAX. SEGMENT LENGTH = 1,351 FT (412 m)
  2. PLENUM-RATED CABLE SHALL BE USED WHERE REQUIRED BY LOCAL OR NATIONAL CODES.

PROJECT TITLE

MSD TRANSPORTATION BUILDING

PROJECT NUMBER

PAS1976-SRV2245

PRELIMINARY: 2

PRINTED 01/14/2022 Nov. 4.8



DRAWING TITLE
INSTALLATION STANDARDS NETWORK
DRAWING NUMBER

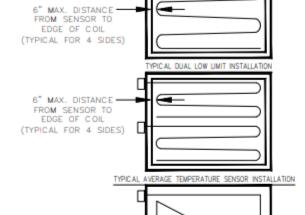
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# **INSTALLATION STANDARDS - MECHANICAL**

### GENERAL MECHANICAL STANDARDS

- VALVE PORT DETAILS SHOWN ON THE TEMPERATURE CONTROL DRAWINGS DO NOT NECESSARILY INDICATE THE ACTUAL VALVE CONFIGURATION. REFER TO MANUFACTURER'S LITERATURE FOR ACTUAL VALVE PORT
- ALL LIQUID PRESSURE SENSORS SHALL BE INSTALLED ON VERTICAL PIPING OR BELOW THE CENTERLINE OF HORIZONTAL PIPING TO PREVENT AIR ENTRAPMENT AT THE SENSOR.

# DUCT/COIL TEMPERATURE SENSOR INSTALLATION TYPICAL SINGLE LOW LIMIT INSTALLATION



- ALL SENSORS SHALL BE PROTECTED FROM DAMAGE AT THE POINT OF ENTRY INTO THE DUCT/CABINET. EACH SENSOR SHALL BE PROTECTED BY A RUBBER GROMMET, BUSHING, PLASTIC TUBING OR ELECTRICAL TAPE AT THE POINT OF ENTRY.

8" MAX. DISTANCE -FROM SENSOR TO DUCT/CABINET WALL (TYPICAL FOR 4 SIDES)

ALL SENSORS SHALL BE SECURELY ANCHORED ALONG THE FULL LENGTH TO PREVENT DAMAGE CAUSED BY VIBRATION.

# PNEUMATIC TERMINATION LEGEND



= PNEUMATIC SIGNAL TERMINATION AT CONTROL PANEL





# = INTRA-PANEL SUPPLY AIR TERMINATION (## = PSI)

ALL SUBCONTRACTORS ARE REQUIRED TO SUBMIT DETAILED RED-LINE MODIFICATIONS TO THESE PRINTS FOR INCLUSION IN THE AS-BUILT SET. RED-LINES MUST INCLUDE BUT ARE NOT NECESSARILY LIMITED TO:

RED-LINE REQUIREMENTS

- ACCURATE EQUIPMENT LOCATIONS INDICATED ON FLOOR PLANS, INCLUDING ROOF MOUNTED EQUIPMENT RELATIVE TO THE UPPERMOST FLOOR IF NO ROOF PLAN IS PROVIDED.
- SENSOR LOCATIONS INDICATED ON FLOOR PLANS.
   EXACT MS/TP AND ETHERNET BUS WRING CONFIGURATION SHOWN ON FLOOR PLANS (WHEN PROVIDED) AS WELL AS IN TABLE FORMAT.
- 4. ALL WRING AND EQUIPMENT CHANGES MADE ON ANY PORTION OF
- 5. FOR JOBS WITH NO FLOOR PLANS, ALL EQUIPMENT (INCLUDING
- SENSORS) WILL BE NOTED WITH ROOM NAME AND NUMBER.

  6. ALL BACKUP BATTERY TABS ARE TO BE PULLED AT TIME OF CONTROLLER INSTALLATION.
- ALL CONTROLLER SERIAL NUMBERS ARE TO BE RECORDED BY INSTALLING CONTRACTOR AT TIME OF INSTALLATION. THIS INFORMATION IS TO BE PASSED TO TEMPERATURE CONTROL SERVICES, LLC., AS THE JOB PROGRESSES.

### MECHANICAL NOTES

- NOT ALL PANELS MAY CONTAIN THE TRM-768 END-OF-LINE TERMINATION BOARD. SEE CONTROLLER WRING AND/OR SCHEDULE SHEETS FOR DETAILS.
  - VAV CONTROLLERS MAY OPERATE IN A STAND-ALONE CONFIGURATION. HOWEVER, THIS
- PROJECT CALLS FOR BUS COMMUNICATION BETWEEN CONTROLLERS.

   FOR CLARITY, NOT ALL FACTORY PROVIDED ELECTRICAL WRING AND COMPONENTS WHICH
- INTERFACE WITH THIRD-PARTY CONTROLLERS ARE SHOWN. FIELD VERIFICATION OF INSTALLED COMPONENTS AND WIRING CONNECTIONS REQUIRED!
- ZONE PRESSURE SENSOR LOCATED IN CONTROL PANEL. DX UNITS WILL BE CONTROLLED BY FACTORY-PROVIDED ZONE SENSOR, WIRED TO FACTORY SUPPLIED CONTROLLERS. WRING TO BE INSTALLED BY OTHERS.

INSTALLATION STANDARDS - MECHANICAL

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INSTALLATION STANDARDS -

**MECHANICAL** 

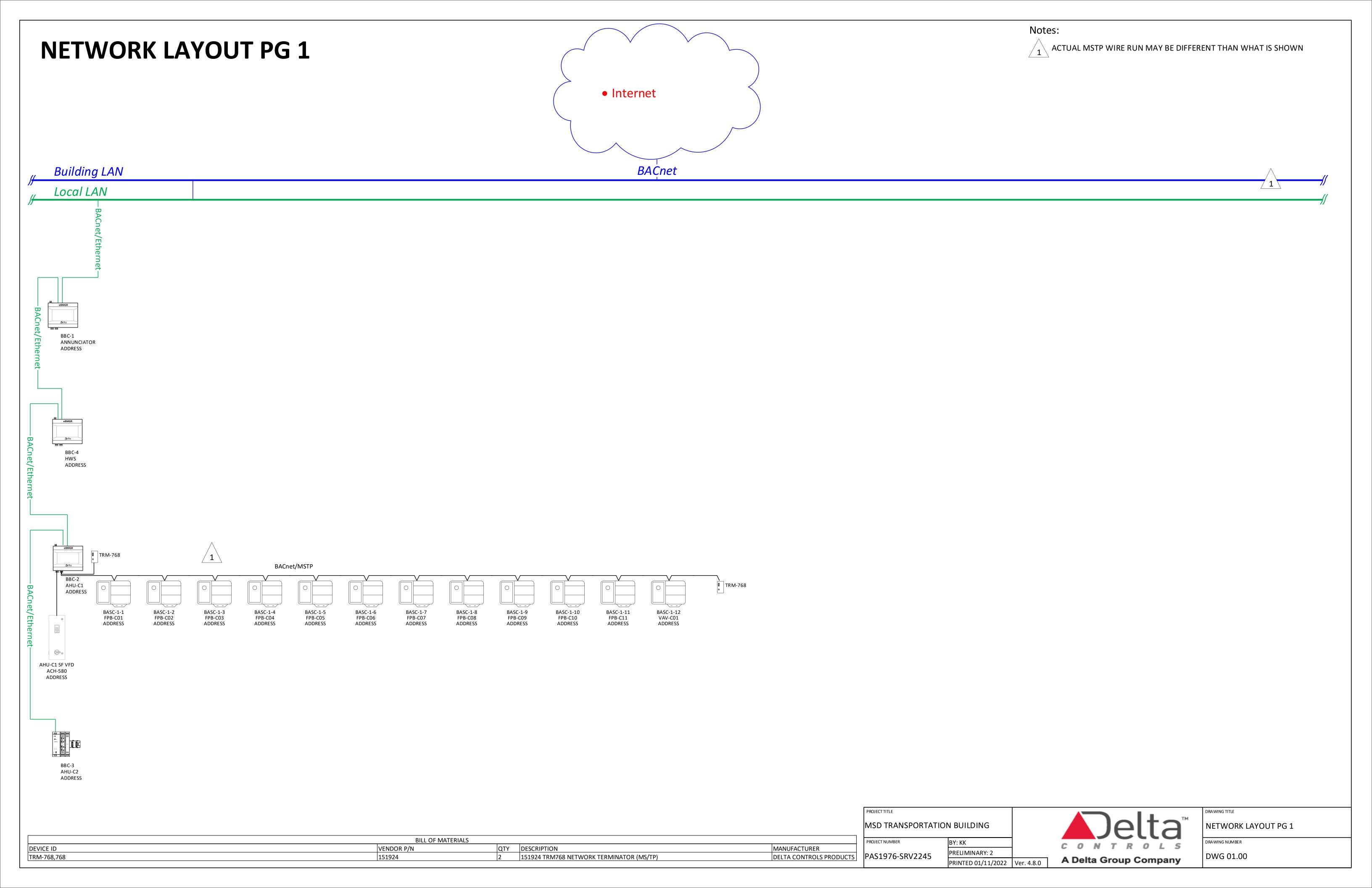
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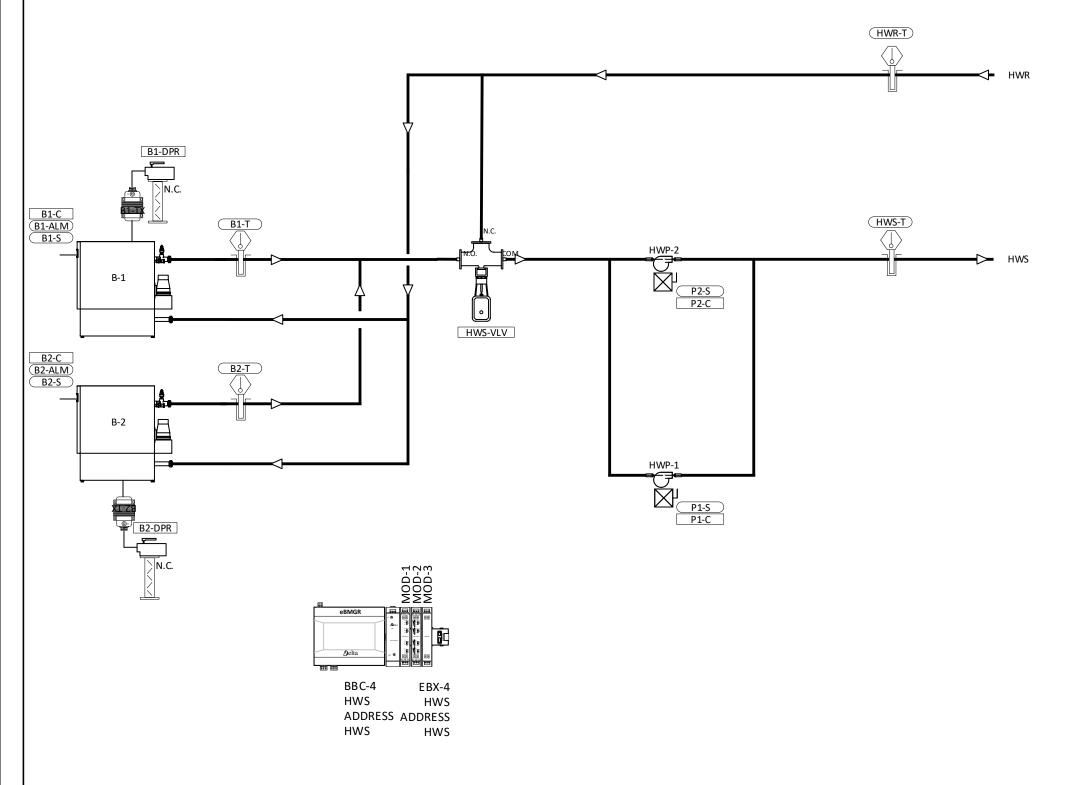
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PRELIMINARY: 2

PAS1976-SRV2245



# **HWS FLOW**



	Point Summary						
Syste	Qty.	Тур.	Device ID	Point Name	Point Type		
HW	1	1	B1-ALM	Boiler 1 Alarm	BI		
HW	1	1	B1-C	Boiler 1 Enable	ВО		
HW	1	1	B1-DPR	Boiler 1 Combustion Damper	HARDWIRE		
HW	1	1	B1-S	Boiler 1 Status	BI		
HW	1	1	B1-T	Boiler 1Temperature	AI		
HW	1	1	B1-TX	Boiler 1 Damper Transformer	HARDWIRE		
HW	1	1	B2-ALM	Boiler 2 Alarm	BI		
HW	1	1	B2-C	Boiler 2 Enable	ВО		
HW	1	1	B2-DPR	Boiler 2 Combustion Damper	HARDWIRE		
HW	1	1	B2-S	Boiler 2 Status	BI		
HW	1	1	B2-T	Boiler 2 Temperature	AI		
HW	1	1	B2-TX	Boiler 2 Damper Transformer	HARDWIRE		
HW	1	1	HWR-T	Hot Water Return Temperature	AI		
HW	1	1	HWS-T	Hot Water Supply Temperature	AI		
HW	1	1	HWS-VLV	Hot Water System Mixing Valve	AO		
HW	1	1	P1-C	Pump 1Start/Stop	ВО		
HW	1	1	P1-S	Pump 1Status	BI		
HW	1	1	P2-C	Pump 2 Start/Stop	ВО		
HW	1	1	P2-S	Pump 2 Status	BI		

Devices	Points	PointType
4	4	AI
1	1	AO
6	6	ВІ

	BILL OF MATERIALS			
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION	MANUFACTURER
B1-ALM,C,DPR,S,T,TX,B2-ALM,C,DPR,S,T,TX,HWR-T,HWS-T,VLV,P1-C,S,P2-C,S	*EXISTING	15	DEVICE EXISTING	
BBC-4	301604	1	301604 EBM GR-2 ENTELIBUS SYSTEM CONTROLLER	DELTA CONTROLS PRODUCTS
EBX-4	311601	1	311601 EBX-04 ENTELIBUS EXPANDER BACKPLANE (4 SLOT	DELTA CONTROLS PRODUCTS
MOD-1	375604	1	375604 EBM-404-HENTELIBUS MODULE (4 UIS,4 BOS WIT	DELTA CONTROLS PRODUCTS
MOD-2	375601	1	375601EBM-440-M ENTELIBUS MODULE (4 UIS,4 AOS WIT	DELTA CONTROLS PRODUCTS
MOD-3	375606	1	375606 EBM-800 ENTELIBUS MODULE (8 UIS)	DELTA CONTROLS PRODUCTS

PROJECT LITILE

MSD TRANSPORTATION BUILDING

PROJECT NIMER

DV: VV

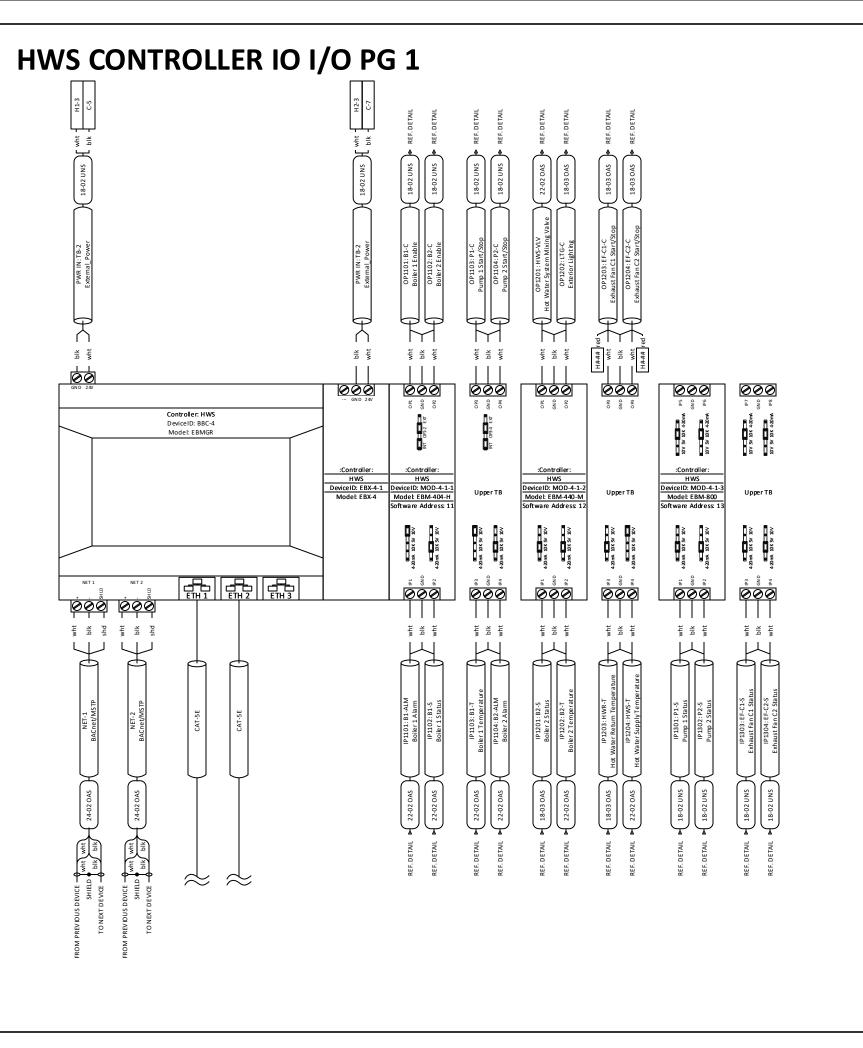
PAS1976-SRV2245

PRELIMINARY: 2
PRINTED 01/11/2022 Ver. 4.8.0

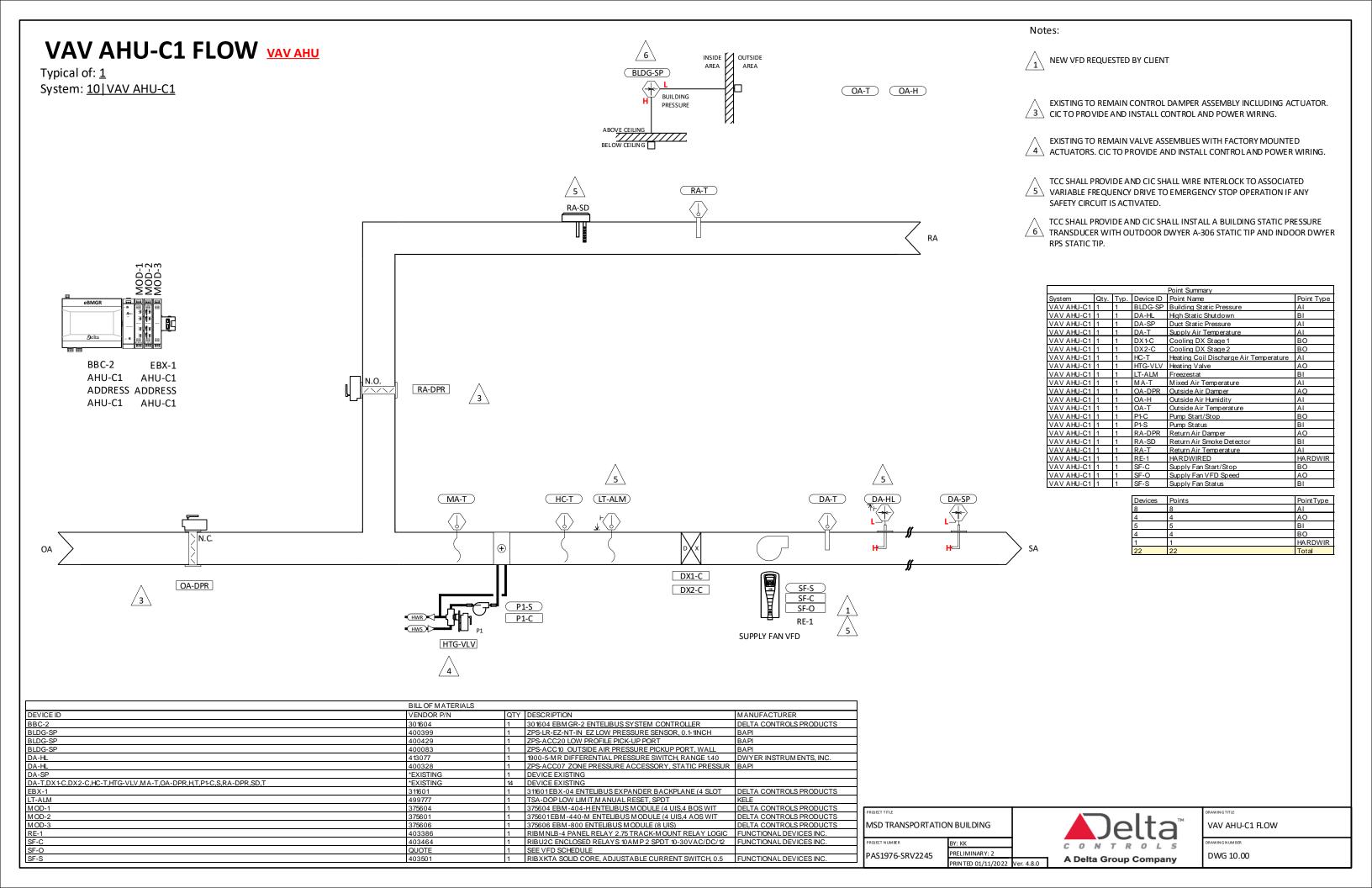
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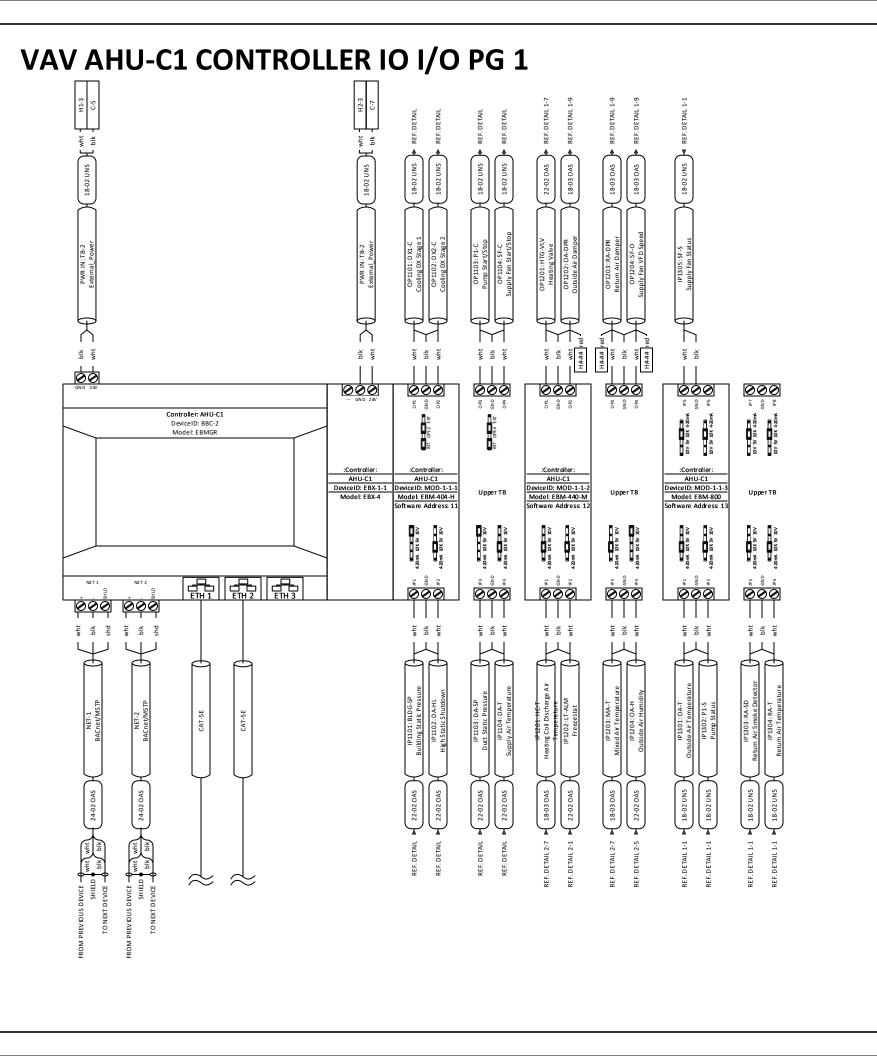
DRAWINGTITLE
HWS FLOW

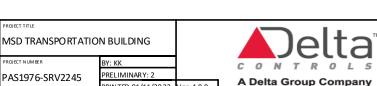
DRAWING NUMBER
DWG 05.00









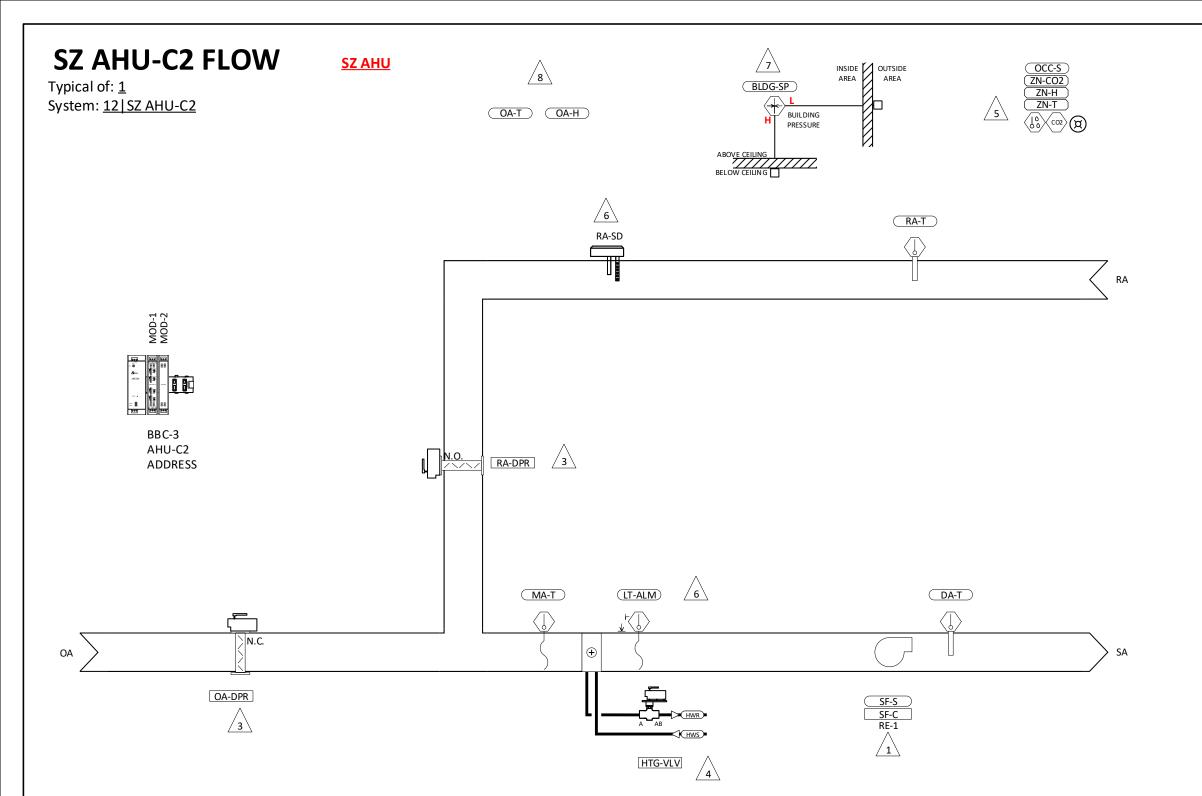


PRAWINGTITLE

VAV AHU-C1 CONTROLLER IO I/O PG 1

DRAWING NUMBER

DWG 10.01



# Notes:

EXISTING TO REMAIN MOTOR STARTER, INSTALLATION, AND POWER. SEE 1 MECHANICAL DRAWINGS FOR UNIT OR WALL MOUNTED LOCATIONS. CIC RESPONSIBLE FOR AUX CONTACT SAFETY WIRING FROM DISCONNECT.



EXISTING TO REMAIN CONTROL DAMPER ASSEMBLY INCLUDING ACTUATOR. 2 CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.



EXISTING TO REMAIN VALVE ASSEMBLIES WITH FACTORY MOUNTED EXISTING TO REMAIN VALVE ASSEMBLIES WITH FACTORY MOUNTED ACTUATORS. CIC TO PROVIDE AND INSTALL CONTROL AND POWER WIRING.



CC SHALL PROVIDE AND CIC SHALL INSTALL NEW ZONE SENSOR WITH 5 TEMPERATURE, HUMIDITY, AND CO2 SENSING.



TCC SHALL PROVIDE AND CIC SHALL WIRE INTERLOCK TO ASSOCIATED MOTOR 5 STARTER TO EMERGENCY STOP OPERATION IF ANY SAFETY CIRCUIT IS



TCC SHALL PROVIDE AND CIC SHALL INSTALL A BUILDING STATIC PRESSURE TRANSDUCER WITH OUTDOOR DWYER A-306 STATIC TIP AND INDOOR DWYER RPS STATIC TIP.



OA-T AND OA-H TO BE TRANSFERED OVER THE NETWORK FROM ANOTHER 8 DEVICE

	Point Summary				
System	Qty.	Typ.	Device ID	Point Name	Point Type
SZ AHU-C2	1	1	BLDG-SP	Building Static Pressure	Al
SZ AHU-C2	1	1	DA-T	Supply Air Temperature	Al
SZ AHU-C2	1	1	HTG-VLV	Heating Valve	AO
SZ AHU-C2	1	1	LT-ALM	Freezestat	BI
SZ AHU-C2	1	1	MA-T	Mixed Air Temperature	Al
SZ AHU-C2	1	1	OA-DPR	Outside Air Damper	AO
SZ AHU-C2	1	1	OA-H	Outside Air Humidity	SOFTWARE
SZ AHU-C2	1	1	OA-T	Outside Air Temperature	SOFTWARE
SZ AHU-C2	1	1	OCC-S	Occupancy Sensor	LINKNET
SZ AHU-C2	1	1	RA-DPR	Return Air Damper	AO
SZ AHU-C2	1	1	RA-SD	Return Air Smoke Detector	BI
SZ AHU-C2	1	1	RA-T	Return Air Temperature	Al
SZ AHU-C2	1	1	RE-1	HARDWIRED	HARDWIRE
SZ AHU-C2	1	1	SF-C	Supply Fan Start/Stop	ВО
SZ AHU-C2	1	1	SF-S	Supply Fan Status	BI
SZ AHU-C2	1	1	ZN-CO2	Space CO2 Levels	LINKNET
SZ AHU-C2	1	1	ZN-H	Space Humidity	LINKNET
SZ AHU-C2	1	1	ZN-T	Space Temperture	LINKNET

Devices	Points	PointType
4	4	AI
3	3	AO
3	3	BI
1	1	ВО
1	1	HARDWIRE
4	4	LINKNET
2	2	SOFTWARE
18	18	Total

	BILL OF MATERIALS			
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION	MANUFACTURER
BBC-3	311596	1	311596 EBCON-2 ENTELIBUS SYSTEM CONTROLLER W/ETHE	R DELTA CONTROLS PRODUCTS
BLDG-SP	400399	1	ZPS-LR-EZ-NT-IN EZ LOW PRESSURE SENSOR, 0.1-1INCH	BAPI
BLDG-SP	400429	1	ZPS-ACC20 LOW PROFILE PICK-UP PORT	BAPI
BLDG-SP	400083	1	ZPS-ACC10 OUTSIDE AIR PRESSURE PICKUP PORT, WALL	BAPI
DA-T,HTG-VLV,MA-T,OA-DPR,H,T,RA-DPR,SD,T,SF-C,S	*EXISTING	8	DEVICE EXISTING	
LT-ALM	499777	1	TSA-DOP LOW LIMIT, MANUAL RESET, SPDT	KELE
MOD-1	375601	1	375601EBM-440-M ENTELIBUS MODULE (4 UIS,4 AOS WIT	DELTA CONTROLS PRODUCTS
MOD-2	375606	1	375606 EBM-800 ENTELIBUS MODULE (8 UIS)	DELTA CONTROLS PRODUCTS
OCC-S,ZN-CO2,H,T	337370	1	337370 EZNS-T100CHM-ND-SC-000-WWG ENTELIZONE	DELTA CONTROLS PRODUCTS
RE-1	403386	1	RIBM NLB-4 PANEL RELAY 2.75 TRACK-MOUNT RELAY LOGI	FUNCTIONAL DEVICES INC.

MSD TRANSPORTATION BUILDING

ROJECT NUMBER PRELIMINARY: 2 PAS1976-SRV2245



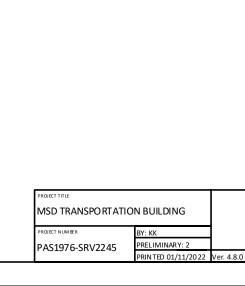
SZ AHU-C2 FLOW

DWG 12.00

# SZ AHU-V2 CONTROLLER IO I/O PG1 000 000 000 - GND 24V :Controller: AHU-C2 DeviceID: MOD-3-1-2 Model: EBM-800 Software Address 12 :Controller: AHU-C2 DeviceID: MOD-3-1-1 Model: EBM-440-M Software Address: 11 :Controller: AHU-C2 DeviceID: BBC-3 Model: EBCON

10V 5V 10K 4-20mA

4.20mk 10K SV 10V



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SZ AHU-V2 CONTROLLER IO I/O PG1

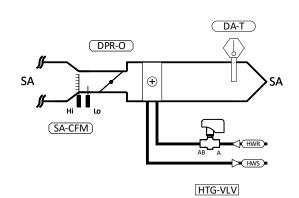
DWG 12.01

# **VAV-C01 FLOW**

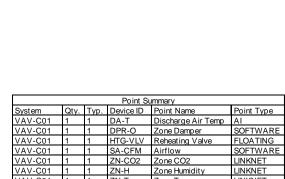
# **TU-VAV W/HW REHEAT EZVP-440**

Typical of: 1

System: 31 VAV-C01 W/REHEAT



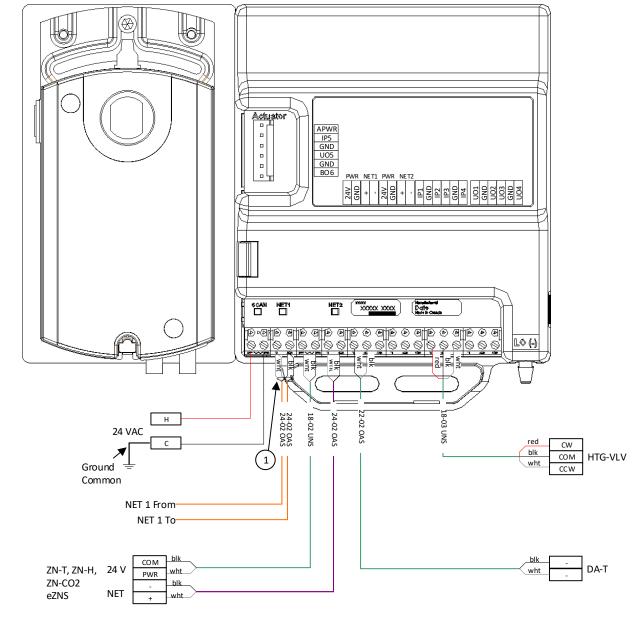




	SK-CI W	AIITIOW	SOLIVARE
1	ZN-CO2	Zone CO2	LINKNET
1	ZN-H	Zone Humidity	LINKNET
1	ZN-T	Zone Temp	LINKNET
		•	•
	Devices	Points	PointType
	1	1	AI
	1	1	FLOATING
	3	3	LINKNET
	2	2	SOFTWARE
	7	7	Total



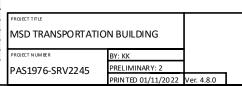
BASC-1-12 VAV-C01 ADDRESS



Installation Notes:

(1) CONNECT SHIELDS.

	BILL OF MATERIALS			
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION	MANUFACTURER
BASC-1-12,DPR-O,SA-CFM	333010	1	333010 EZVP-440-AB ENTELIZONE VAV CONTROLLER (PROG	DELTA CONTROLS PRODUCTS
DA-T	400160	1	BA/10K-3-D-4" DUCT TEMP SENSOR, 4 STAINLESS STEEL	BAPI
HTG-VLV	*EXISTING	1	DEVICE EXISTING	
ZN-CO2,H,T	337364	1	337364 EZNS-T100CH-ND-SC-000-WWG ENTELIZONE NETWOR	DELTA CONTROLS PRODUCTS



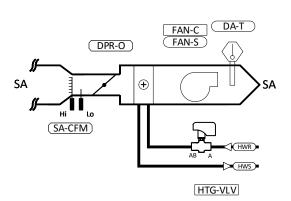


# FPB-C01-C11 FLOW

# **TU-SFPB w/HW Reheat EZVP-440**

Typical of: 11

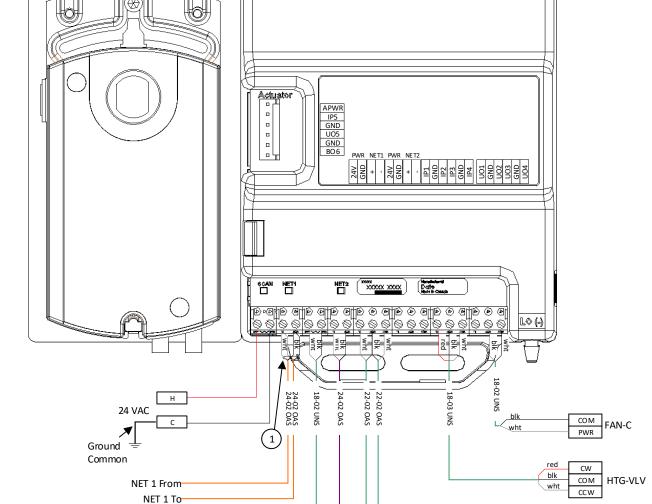
System: <u>32| FPB-C01-C11 W/HW</u>

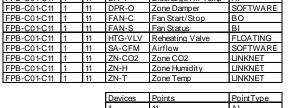






BASC-1-1 TO BASC-1-12 FPB-C# ADDRESS





Point Summary

Qty. Typ. Device ID Point Name

System Q FPB-C01-C11 1

Devices	Points	PointType
1	11	AI
1	11	BI
1	11	во
1	11	FLOATING
3	33	LINKNET
2	22	SOFTWARE
9	99	Total

Discharge Air Temp AI

Installation Notes:

1 CONNECT SHIELDS.

	BILL OF MATERIALS				_
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION M	IANUFACTURER	PR
BASC-1-1TO BASC-1-12, DPR-O, SA-CFM	333010	11	333010 EZVP-440-AB ENTELIZONE VAV CONTROLLER (PROG D	ELTA CONTROLS PRODUCTS	I۸
DA-T	400160	11	BA/10K-3-D-4" DUCT TEM P SENSOR, 4 STAINLESS STEEL B.	API	1
FAN-C,S,HTG-VLV	*EXISTING	33	DEVICE EXISTING		PR
ZN-CO2,H,T	337364	11	337364 EZNS-T100CH-ND-SC-000-WWG ENTELIZONE NETWOR D	ELTA CONTROLS PRODUCTS	
					P

PROJECT TITLE			
MSD TRANSPORTATIO	N BUILDING		
PROJECT N UM BE R	BY: KK		
PAS1976-SRV2245	PRELIMINARY: 2		
. 7 6 25 7 6 6 1 7 2 2 16	PRINTED 01/11/2022	Ver. 4.8.0	

NET 1 From-NET 1 To-

COM blk

PWR wht

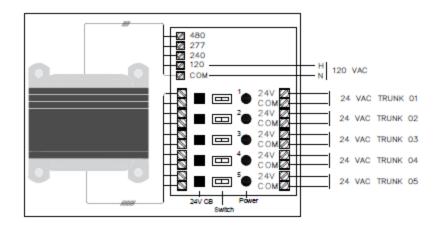
ZN-T, ZN-H, 24 V

ZN-CO2 eZNS



# **VAV POWER DISTRIBUTION**

TX1



# 24 VAC Power Trunks:

- 1. Typically utilizes #14 Gauge or heaver cable.
- 2. Typically, each leg is intended to support four (4) to five (5) VAV box controllers maximum.
- 3. See table for cable requirements for long runs and/or high VA requirements.

# 24 VAC Power Cable Sizing - Maximum allowable voltage drop

- 1. Supply voltage deviation should not exceed 2 VAC at any given terminal controller.
- 2. Table indicates the maximum one-way distance for power wiring based on load and wire size.
  - a. These values will limit the voltage drop as indicated above.
- 3. To calculate the required wire size and maximum length:
  - a. Determine power requirements for the controller and all connected devices including but not limited to:
    - i. The controller itself with all onboard devices.
    - ii. LINKNet controllers and devices
    - iii. eZNS T-100 room sensors powered from the controller
    - iv. Valve and damper actuators.
    - v. Powered sensors.
    - vi. Control relays.
- 4. Data for 18 AWG and greater wire in the accompanying table are from Chapter 9, Table 8 of the 2005 NEC. Resistance values based on a temperature of 75°C.
- 5. Data in the following table is based on the formula:
  - a. Wire length (ft) = (Voltage Drop / (ohms per kFt \* load in amps) \* 1000) /2

# Typical Power Calculations:

eZV-440 11 VA eZFC-424R4-24 15 VA DVC-V322A-B 15 VA DNS-24L/LB/H24LB 1.5 VA DNS-C24/CH24 eZNS-T100 (ST) 2 VA (no backlight) eZNS-T100 (ST)

4 VA (with backlight) eZNS-T100 (ST/CO2) 6 VA (with backlight)

CQB24-SR 1 VA LF24-SR 5 VA TFB24-S 5 VA

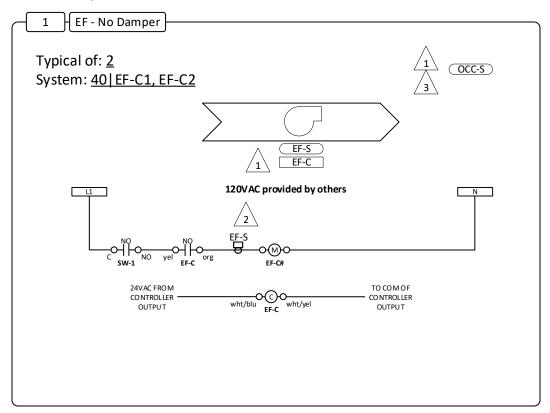
				AWG	(ohms	/ kFt)		
		22 Ga	20 Ga	18 Ga	16 Ga	14 Ga	12 Ga	10 Ga
		16.46	10.35	7.95	4.99	3.14	1.98	1.24
Α	VA		Max	x One-Wa	y Distanc	e to Load	(ft)	
0.11	2.5	552	878	1144	1822	2895	4591	7331
0.21	5	289	460	599	954	1517	2405	3840
0.42	10	145	230	302	481	764	1212	1935
0.83	20	73	116	151	240	382	606	968
1.25	30	49	77	101	160	255	404	645
1.67	40	36	58	75	120	191	303	484
2.08	50	29	46	60	96	153	242	387
2.5	60	24	39	50	80	127	202	323
2.92	70	21	33	43	69	109	173	276
3.33	80	18	29	38	60	96	152	242
3.75	90	16	26	34	53	85	135	215
4	96	15	24	31	50	80	126	202

	BILL OF MATERIALS			
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION	MANUFACTURER
TX1	403195	1	PSH500A ENCLOSED 5-100VA 120/240 TO 24VAC UL CLASS	FUNCTIONAL DEVICES INC.

MSD TRANSPORTATION BUILDING PRELIMINARY: 2 PAS1976-SRV2245

VAV POWER DISTRIBUTION DWG 32.01 A Delta Group Company

# EF-C1, EF-C2 FLOW





1 IO TO BE PICKED UP ON HWS CONTROLLER.



UNKNOWN IF CT IS EXISTING OR A NEW ONE IS REQUIRED. PROVIDED CT IN 2 BOM IN CASE THERE IS NOT ONE ALREADY EXISTING.



UNKNOWN IF OCCUPANCY SENSOR IS EXISTING OR A NEW ONE IS REQUIRED.
PROVIDED EZNS WITH MOTION IN BOM IN CASE THERE IS NOT ONE ALREADY

Point Summary						
System Qty. Typ. Device ID Point Name Point Type						
EF-C1, EF-C2	1	2	EF-C	Exhaust Fan Start/Stop	ВО	
EF-C1, EF-C2	1	2	EF-S	Exhaust Fan Status	BI	
EF-C1, EF-C2	1	2	OCC-S	Occupancy Status	LINKNET	

Devices	Points	PointType
1	2	BI
1	2	ВО
1	2	LINKNET
3	6	Total

	BILL OF MATERIALS			
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION	MANUFACTURER
EF-C	*EXISTING	2	DEVICE EXISTING	
EF-S	403501	2	RIBXKTA SOLID CORE, ADJUSTABLE CURRENT SWITCH, 0.5	FUNCTIONAL DEVICES INC.
OCC-S	335368	2	335368 EZNS-T100M-ND-SM-000-WWG ENTELIZONE	DELTA CONTROLS PRODUCTS

MSD TRANSPORTATION BUILDING

PAS1976-SRV2245

PRELIMINARY: 2

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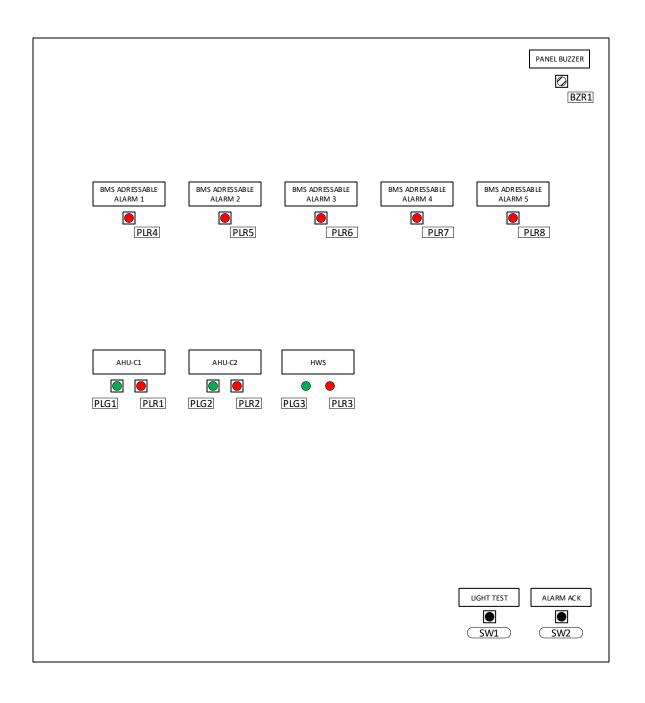
EF-C1, EF-C2 FLOW

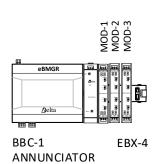
DWG 40.00

# **ANNUNCIATOR PANEL**

Typical of: 1

System: 54 ANNUNCIATOR PANEL





**ADDRESS** 

Point Summary							
System	Qty.	Typ.	Device ID	Point Name	Point Type		
ANNUNCIATOR	1	1	BZR1	Panel Buzzer BO			
ANNUNCIATOR	1	1	PLG1	AHU-C1Normal	HARDWIRE		
ANNUNCIATOR	1	1	PLG2	AHU-C2 Normal HARDWIR			
ANNUNCIATOR	1	1	PLG3	HWS Normal	HARDWIRE		
ANNUNCIATOR	1	1	PLR1	AHU-C1Alarm	ВО		
ANNUNCIATOR	1	1	PLR2	AHU-C2 Alarm	ВО		
ANNUNCIATOR	1	1	PLR3	HWS Alarm	ВО		
ANNUNCIATOR	1	1	PLR4	Addressable Red Light 1	ВО		
ANNUNCIATOR	1	1	PLR5	Addressable Red Light 2	ВО		
ANNUNCIATOR	1	1	PLR6	Addressable Red Light 3	ВО		
ANNUNCIATOR	1	1	PLR7	Addressable Red Light 4	ВО		
ANNUNCIATOR	1	1	PLR8	Addressable Red Light 5	ВО		
ANNUNCIATOR	1	1	SW1	Light Test	BI		
ANNUNCIATOR	1	1	SW2	Acknowledge Alarm	BI		

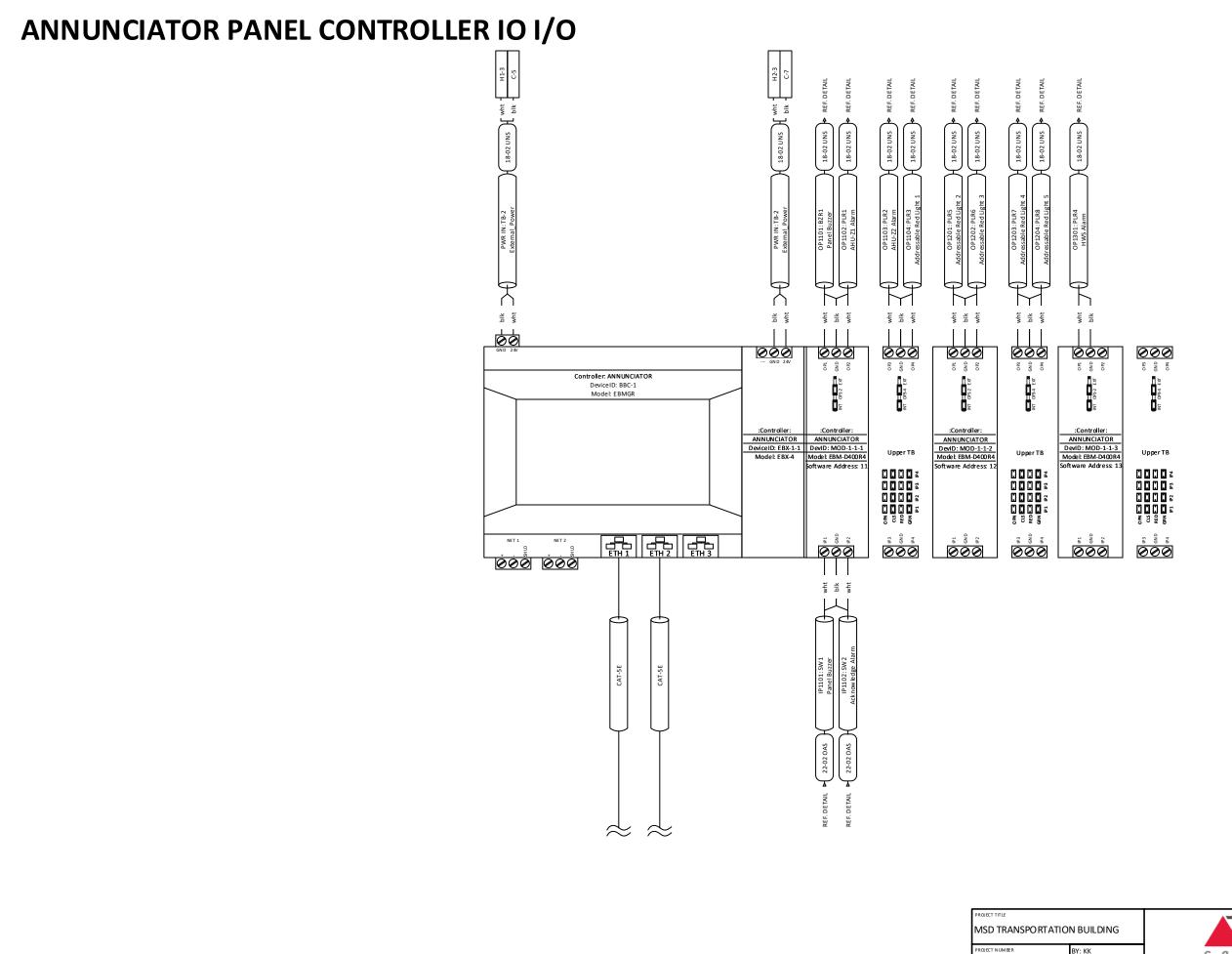
Devices	Points	PointType
2	2	BI
9	9	ВО
3	3	HARDWIRE
1/	14	Total

	BILL OF MATERIALS			
DEVICE ID	VENDOR P/N	QTY	DESCRIPTION	MANUFACTURER
BBC-1	301604	1	301604 EBM GR-2 ENTELIBUS SYSTEM CONTROLLER	DELTA CONTROLS PRODUCTS
BZR1	QUOTE	1	ECX2070-24 BUZZER, 25MA, 24VAC/DC, 80DB	AUTOMATION DIRECT
EBX-4	311601	1	311601 EBX-04 ENTELIBUS EXPANDER BACKPLANE (4 SLOT	DELTA CONTROLS PRODUCTS
MOD-1,2,3	375609	3	375609 EBM-D400R4-HENTELIBUS MODULE (4 BIS,4 RELA	DELTA CONTROLS PRODUCTS
PLG1,PLG2,PLG3	AP8M 122-G	3	PILOT LIGHT M INIATURE 8MM FLAT LENS ACDC 24V GREE	IDEC
PLG1,PLG2,PLG3	403319	3	RIBRL1C DIN MOUNT RELAY 10 AM P SPDT WITH 10-30 VAC	FUNCTIONAL DEVICES INC.
PLR1,PLR2,PLR3,PLR4,PLR5,PLR6,PLR7,PLR8	AP8M 122-R	8	PILOT LIGHT M INIATURE 8MM FLAT LENS AC/DC 24V RED	IDEC
SW1,SW2	499915	2	ABW111 PUSHBUTTON 1NO 1NC MOMENTARY FLUSH-3 COLO	KELE

MSD TRANSPORTATION BUILDING

PRELIMINARY: 2 PAS1976-SRV2245 A Delta Group Company

ANNUNCIATOR PANEL DWG 54.00



el C O N T R O L S A Delta Group Company

PRELIMINARY: 2

PAS1976-SRV2245

DRAWINGTITLE
ANNUNCIATOR PANEL CONTROLLER 101/0

DWG 54.01

# **MISC FIELD DEVICES** Notes: CABINET/UNIT HEATERS EXISTING FIELD DEVICES ARE STAND ALONE, CONTROLLED BY STAND ALONE LINE TYPICAL FOR 15 - EXCEPT AS NOTED ${\color{blue} {f 1}}$ VOLTAGE THERMOSTAT AND NOT TIED BACK TO DDC. 120VAC N-BY E.C. H-0 LR24-1 3WHT CLS 老上去 FR21 1BLK TX1 NOTE: FR22 HWR BYO CH-C1 DOES 老上主 NOT REQUIRE FAN RELAY. W/Y W/Blu FAN IS TO BE WIRED TO RUN V2 V3 V1 CONTINUOUSLY. V5 V4 V6

VALVE

V2

V4

V5

V5

V3

V1

V3

V1

V3

V3

V4

V6

V6

V6

V6

4.5

6.9

6.9

2.8

1.1

2.8

1.1

2.8

2.8

5.0

5.0

5.0

5.0

5.0

RO

UNIT

CH-C1

UH-C1

UH-C2

UH-C3

UH-C4

UH-C5

UH-C6

UH-C7

UH-CB

UH-C9

UH-C10 | C2

LOCATION

C201 MECHANICAL ROOM

C101 VESTIBULE

C129 BUS WASH

C129 BUS WASH

C202 STORAGE

C3 STAIR

C127 FLUIDS

C124 PARTS

C124 PARTS

UH-C10 C123 GARAGE

UH-C11 C123 GARAGE

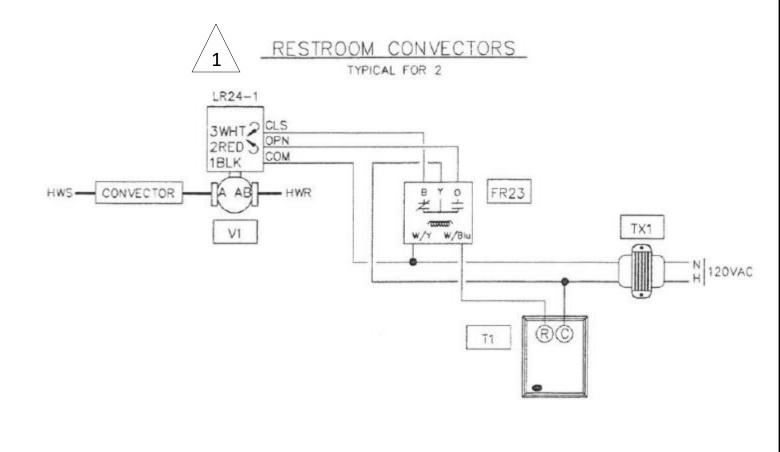
UH-C12 C123 GARAGE

UH-C13 C123 GARAGE

C126 ELECTRICAL

STAIR

T1



MISC FIELD DEVICES

DWG 54.02

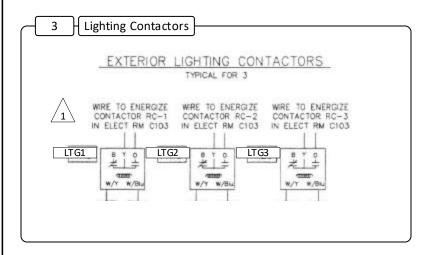
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MSD TRANSPORTATION BUILDING

PAS1976-SRV2245

PRELIMINARY: 2

# **EXTERIOR LIGHTING CONTACTORS**



# Notes:

EXISTING LIGHTING CONTACTORS TO BE PICKED UP FROM SINGLE OUTPUT ON NEW HWS CONTROLLER

Point Summary								
System	Qty.	Typ.	Device ID	Point Name	Point Type			
M ISC-LIGHTING	1	1	LTG1	Lighting Contactor Relay 1	ВО			
M ISC-LIGHTING	1	1	LTG2	Lighting Contactor Relay 2	HARDWIRE			
M ISC-LIGHTING	1	1	LTG3	Lighting Contactor Relay 3	HARDWIRE			

Davissa	Deinte	DeintTune
Devices	Points	PointType
1	1	во
2	2	HARDWIRE
3	2	Total

PROJECT TITLE MSD TRANSPORTATION BUILDING

PROJECT NUMBER PAS1976-SRV2245

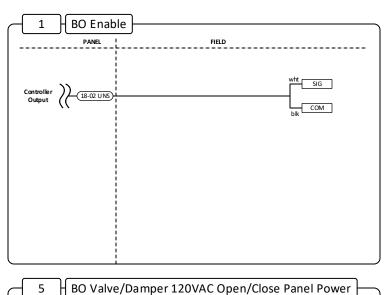
PRELIMINARY: 2

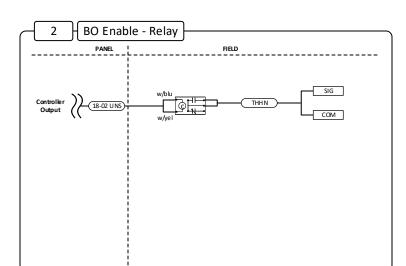
A Delta Group Company

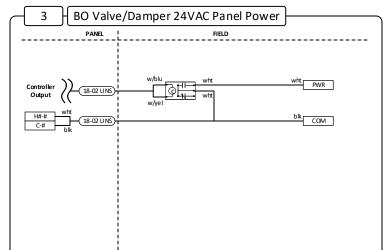
EXTERIOR LIGHTING CONTACTORS

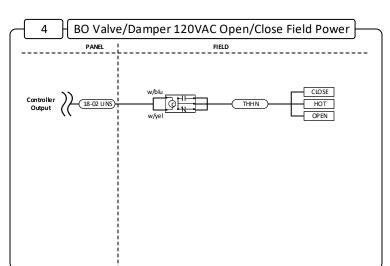
DWG 54.03

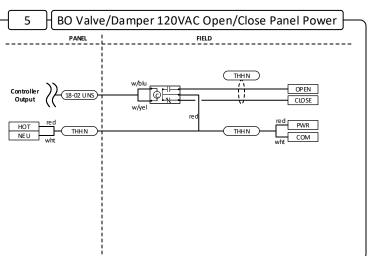
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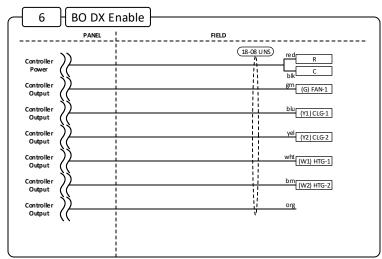


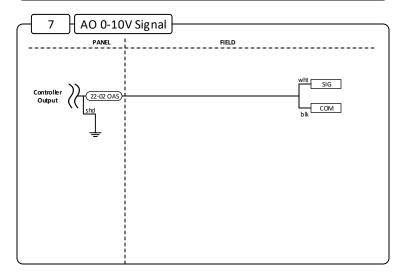


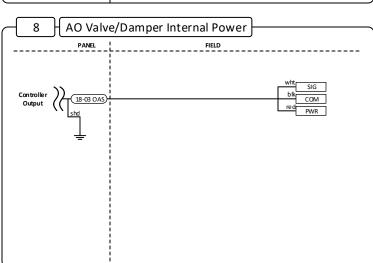


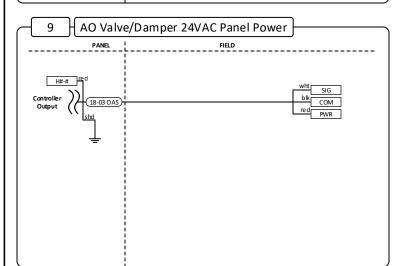


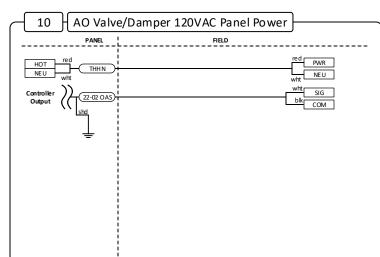


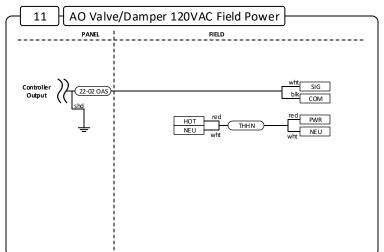






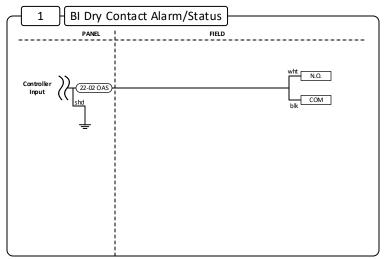


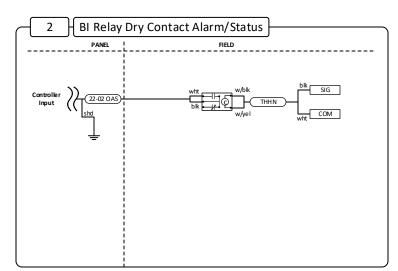


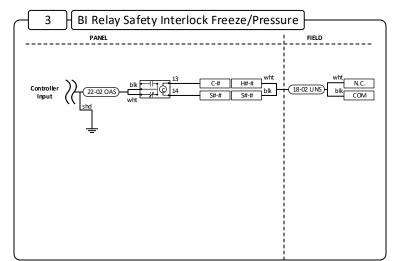


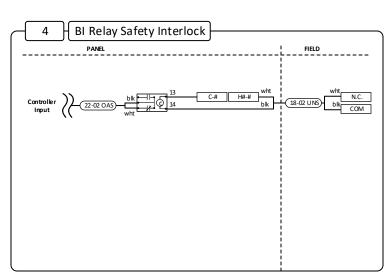


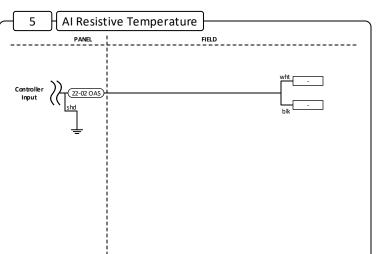
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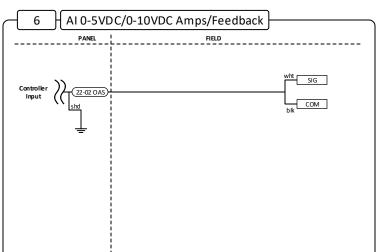


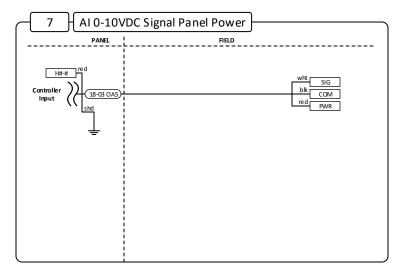


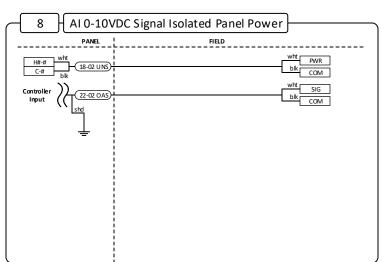


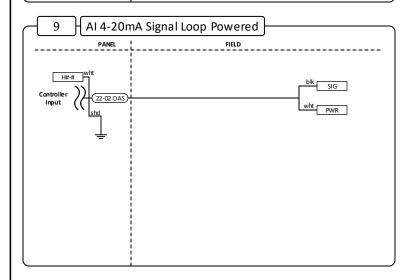


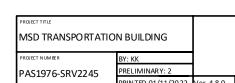














# **VFD SCHEDULE**

VFD SCHEDU	LE														
					MOTOR							VFD			
MARK	<b>EQUIPMENT SERVED</b>	location	room #	room nam	HP	ВНР	RPM	VOLTS	PH	MCA	FLA	VFD	DISCONNECT	BYPASS	VFD Model
Supply Fan V	AHU-C1	?	?	?	?	?	?	480	3	3 ?	?	YES	?	?	ACH-580

MSD TRANSPORTATION BUILDING

PROJECT NUMBER

PAS1976-SRV2245

BY: KK

PRELIMINARY: 2

PRINTED 01/11/2022 | Ver. 4.8.0

A Delta Group Company

DRAWINGTITLE
VFD SCHEDULE
DRAWINGNUMBER
DWG 98.02

# **MASTER BOM**

		BILL	OF MATERIALS	
MANUFACTURER	VENDOR	VENDOR P/N	DESCRIPTION	QTY
	TEAM SOLU	QUOTE	SEE VFD SCHEDULE	1
AUTOM ATION DIRECT	TEAM SOLU	QUOTE	ECX2070-24 BUZZER, 25MA, 24VAC/DC, 80DB	1
BAPI	DELTACON	400083	ZPS-ACC10 OUTSIDE AIR PRESSURE PICKUP PORT, WALL	2
BAPI	DELTACON	400160	BA/10K-3-D-4" DUCT TEMP SENSOR, 4 STAINLESS STEEL	12
BAPI	DELTACON	400328	ZPS-ACC07 ZONE PRESSURE ACCESSORY, STATIC PRESSUR	1
BAPI	DELTACON	400399	ZPS-LR-EZ-NT-IN EZ LOW PRESSURE SENSOR, 0.1-1INCH	2
BAPI	DELTACON	400429	ZPS-ACC20 LOW PROFILE PICK-UP PORT	2
DELTA CONTROLS PRODUCTS	DELTACON	151924	151924 TRM 768 NETWORK TERM INATOR (M S/TP)	2
DELTA CONTROLS PRODUCTS	DELTACON	301604	301604 EBM GR-2 ENTELIBUS SYSTEM CONTROLLER W/ETHER	3
DELTA CONTROLS PRODUCTS	DELTACON	311596	311596 EBCON-2 ENTELIBUS SYSTEM CONTROLLER W/ETHER	1
DELTA CONTROLS PRODUCTS	DELTACON	311601	311601 EBX-04 ENTELIBUS EXPANDER BACKPLANE (4 SLOT	3
DELTA CONTROLS PRODUCTS	DELTACON	333010	333010 EZVP-440-AB ENTELIZONE VAV CONTROLLER (PROG	12
DELTA CONTROLS PRODUCTS	DELTACON	335368	335368 EZNS-T100M-ND-SM-000-WWG ENTELIZONE	2
DELTA CONTROLS PRODUCTS	DELTACON	337364	337364 EZNS-T100CH-ND-SC-000-WWG ENTELIZONE NETWOR	12
DELTA CONTROLS PRODUCTS	DELTACON	337370	337370 EZNS-T100CHM-ND-SC-000-WWG ENTELIZONE NETWO	1
DELTA CONTROLS PRODUCTS	DELTACON	375601	375601EBM-440-M ENTELIBUS MODULE (4 UIS,4 AOS WIT	3
DELTA CONTROLS PRODUCTS	DELTACON	375604	375604 EBM-404-HENTELIBUS MODULE (4 UIS,4 BOS WIT	2
DELTA CONTROLS PRODUCTS	DELTACON	375606	375606 EBM-800 ENTELIBUS MODULE (8 UIS)	3
DELTA CONTROLS PRODUCTS	DELTACON	375609	375609 EBM-D400R4-HENTELIBUS MODULE (4 BIS,4 RELA	3
DWYER INSTRUMENTS, INC.	DELTACON	413077	1900-5-MR DIFFERENTIAL PRESSURE SWITCH, RANGE 1.40	1
FUNCTIONAL DEVICES INC.	DELTACON	403195	PSH500A ENCLOSED 5-100VA 120/240 TO 24VAC UL CLASS	1
FUNCTIONAL DEVICES INC.	DELTACON	403319	RIBRL1C DIN MOUNT RELAY 10 AMP SPDT WITH 10-30 VAC	3
FUNCTIONAL DEVICES INC.	DELTACON	403386	RIBM NLB-4 PANEL RELAY 2.75 TRACK-MOUNT RELAY LOGIC	2
FUNCTIONAL DEVICES INC.	DELTACON	403464	RIBU2C ENCLOSED RELAYS 10AM P 2 SPDT 10-30VAC/DC/12	1
FUNCTIONAL DEVICES INC.	DELTACON	403501	RIBXKTA SOLID CORE, ADJUSTABLE CURRENT SWITCH, 0.5	3
IDEC	KELE	AP8M 122-G	PILOT LIGHT M INIATURE 8MM FLAT LENS ACDC 24V GREE	3
IDEC	KELE	AP8M 122-R	PILOT LIGHT M INIATURE 8MM FLAT LENS AC/DC 24V RED	8
KELE	DELTACON	499777	TSA-DOP LOW LIMIT, MANUAL RESET, SPDT	2
KELE	DELTACON	499915	ABW 111 PUSH BUTTON 1NO 1NC M OM ENTARY FLUSH-3 COLO	2

MSD TRANSPORTATION BUILDING

PRELIMINARY: 2
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PAS1976-SRV2245

A Delta Group Company

DRAWING TITLE

MASTER BOM

DRAWING NUMBER

DWG 98.03



# NCHS SCHNEIDER ELECTRIC RETROFILL SCOPE

### **Switchboard MDPA**

# Sections #1, 4, 7 - Retrofills

- Remove the (3) existing 2500A fused Square D Bolted Pressure switches and install with new breakers.
- Breakers shall be the following (no equal):
  - Square D Masterpact NW
  - Micrologic 6.0P trip unit (LSIG)
  - Rated at 100 kA
  - Kirk Key
  - MDGF interface module w/ MDGF current transformers
  - ERMS switch for each breaker

# Section #2 - Retrofill

- Remove the existing 1600A P-Frame breaker and install with a new R-Frame breaker
- Breaker shall be the following (no equal):
  - Square D R-Frame Breaker
  - Micrologic 5.0P trip unit (LSI)
  - Rated at 65 kA
  - ERMS switch

# Section #3 - Retrofill

- Remove the existing 1600A P-Frame breaker and install with a new R-Frame breaker
- Breaker shall be the following (no equal):
- Square D R-Frame Breaker
- Micrologic 6.0P trip unit (LSIG)
- Rated at 65 kA
- ERMS switch

# Section #6 - Retrofill

- Remove the existing 1200A N-Frame breaker and install with a new P-Frame breaker
- Breaker shall be the following (no equal):
- Square D R-Frame Breaker
- Micrologic 5.0P trip unit (LSI)
- Rated at 65 kA
- ERMS switch

# **Breaker Retrofills Notes**

- All circuit breaker retrofill work to be done by Square D Field Services no equal.
- Electrical contractor will need to provide labor for the duration of work done by Square D Field Services.
- Work to be done during normal working hours (Monday-Friday, 8am-5pm). An outage of approximately 10 to 12 hours per day per lineup is expected to perform the work.

- Site measurements will be required for the retrofills. This will require a full bus outage of up to 8 to 10 hours per day per lineup.

# **Molded Case Breaker Replacement**

- Electrical contractor to remove the existing molded case circuit breakers and replace with the following Square D breakers (no equal).
  - Qty 2 150A H-Frame
  - Qty 3 800A M-Frame
  - Qty 1 1200A P-Frame
  - Qty 1 350A M-Frame
  - Qty 1 60A H-Frame
  - Qty 1 250A J-Frame

# **Power Metering**

- Square D Field Services will provide and install (2) PM8000 Power Meters (no equal) for the two new main breakers.
- Electrical contractor will need to provide labor for the duration of work done by Square D Field Services.

# **Additional Notes**

- A system coordination study is required for the new breaker settings.
- A power factor analysis is required. This analysis will require an additional outage.
- Please contact Chris Katzfey @ CED for a quote.

Chris Katzfey

chris@cedindy.com

Cell - 317-827-9584

# **Switchboard MDPB**

# Sections #2, 5, 8 - Retrofills

- Remove the (3) existing 2500A fused Square D Bolted Pressure switches and install with new breakers.
- Breakers shall be the following (no equal):
  - Square D Masterpact NW
  - Micrologic 6.0P trip unit (LSIG)
  - Rated at 100 kA
  - Kirk Key
  - MDGF interface module w/ MDGF current transformers
  - ERMS switch for each breaker.

# Section #3 - Retrofill

- Remove the existing 1600A P-Frame breaker and install with a new R-Frame breaker
- Breaker shall be the following (no equal):
  - Square D R-Frame Breaker
  - Micrologic 5.0P trip unit (LSI)
  - Rated at 65 kA
  - ERMS switch

# Section #9 - Retrofill

- Remove the existing 2000A P-Frame breaker and install with a new R-Frame breaker
- Breaker shall be the following (no equal):

- Square D R-Frame Breaker
- Micrologic 5.0P trip unit (LSI)
- Rated at 65 kA
- ERMS switch

### Section #10 - Retrofill

- Remove the existing 1200A N-Frame breaker and install with a new P-Frame breaker
- Breaker shall be the following (no equal):
  - Square D P-Frame Breaker
  - Micrologic 5.0P trip unit (LSI)
  - Rated at 65 kA
  - ERMS switch

# Section #1 (HD2) - Retrofill

- Remove the existing 1600A P-Frame breaker and install with a new R-Frame breaker
- Breaker shall be the following (no equal):
  - Square D R-Frame Breaker
  - Micrologic 5.0P trip unit (LSI)
  - Rated at 65 kA
  - ERMS switch

# **Breaker Retrofills Notes**

- All circuit breaker retrofill work to be done by Square D Field Services no equal.
- Electrical contractor will need to provide labor for the duration of work done by Square D Field Services.
- Work to be done during normal working hours (Monday-Friday, 8am-5pm). An outage of approximately 10 to 12 hours per day per lineup is expected to perform the work.
- Site measurements will be required for the retrofills. This will require a full bus outage of up to 8 to 10 hours per day per lineup.

# **Molded Case Breaker Replacement**

- Electrical contractor to remove the existing molded case circuit breakers and replace with the following Square D breakers (no equal).
  - Qty 2 150A H-Frame
  - Qty 4 800A M-Frame
  - Qty 3 1200A P-Frame
  - Qty 2 350A M-Frame
  - Qty 2 60A H-Frame
  - Qty 2 250A J-Frame
  - Qty 1 400A M-Frame
  - Qty 2 600A M-Frame
  - Qty 1 200A J-Frame
  - Qty 1 700A M-Frame

# **Power Metering**

- Square D Field Services will provide and install (2) PM8000 Power Meters (no equal) for the two new main breakers.

- Electrical contractor will need to provide labor for the duration of work done by Square D Field Services.

### **Additional Notes**

- A system coordination study is required for the new breaker settings.
- A power factor analysis is required. This analysis will require an additional outage.
- Please contact Chris Katzfey @ CED for a quote.

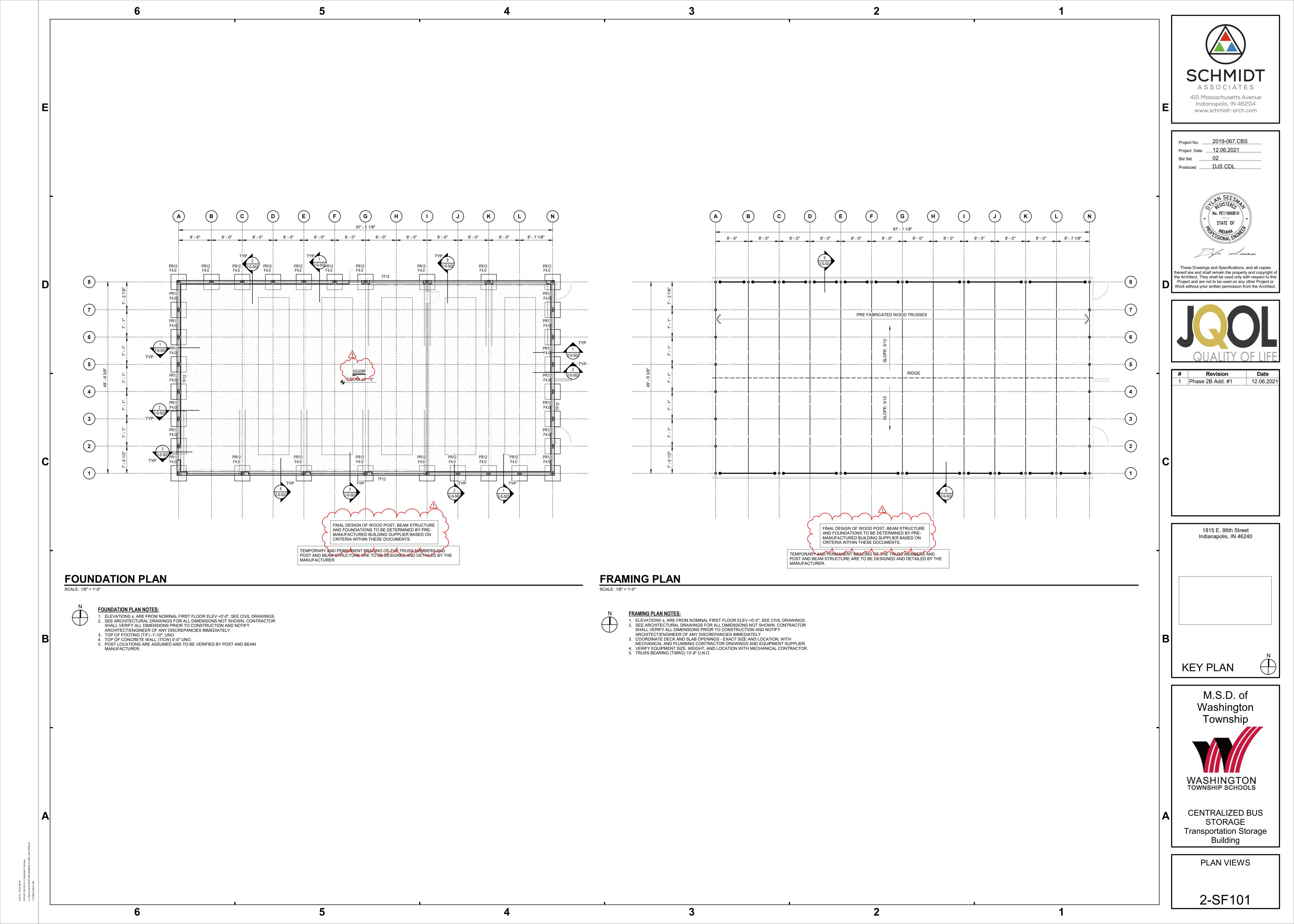
Chris Katzfey

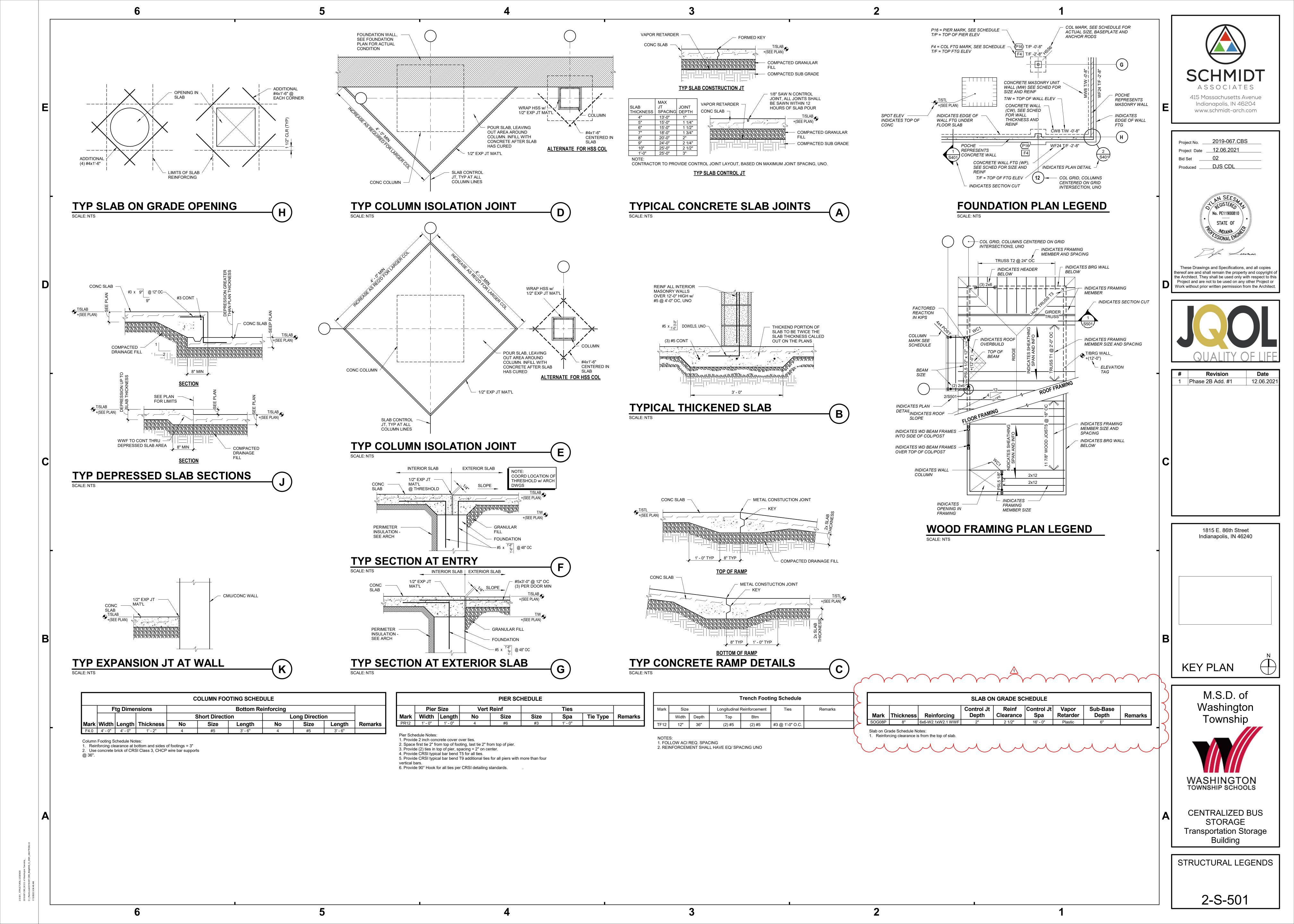
chris@cedindy.com

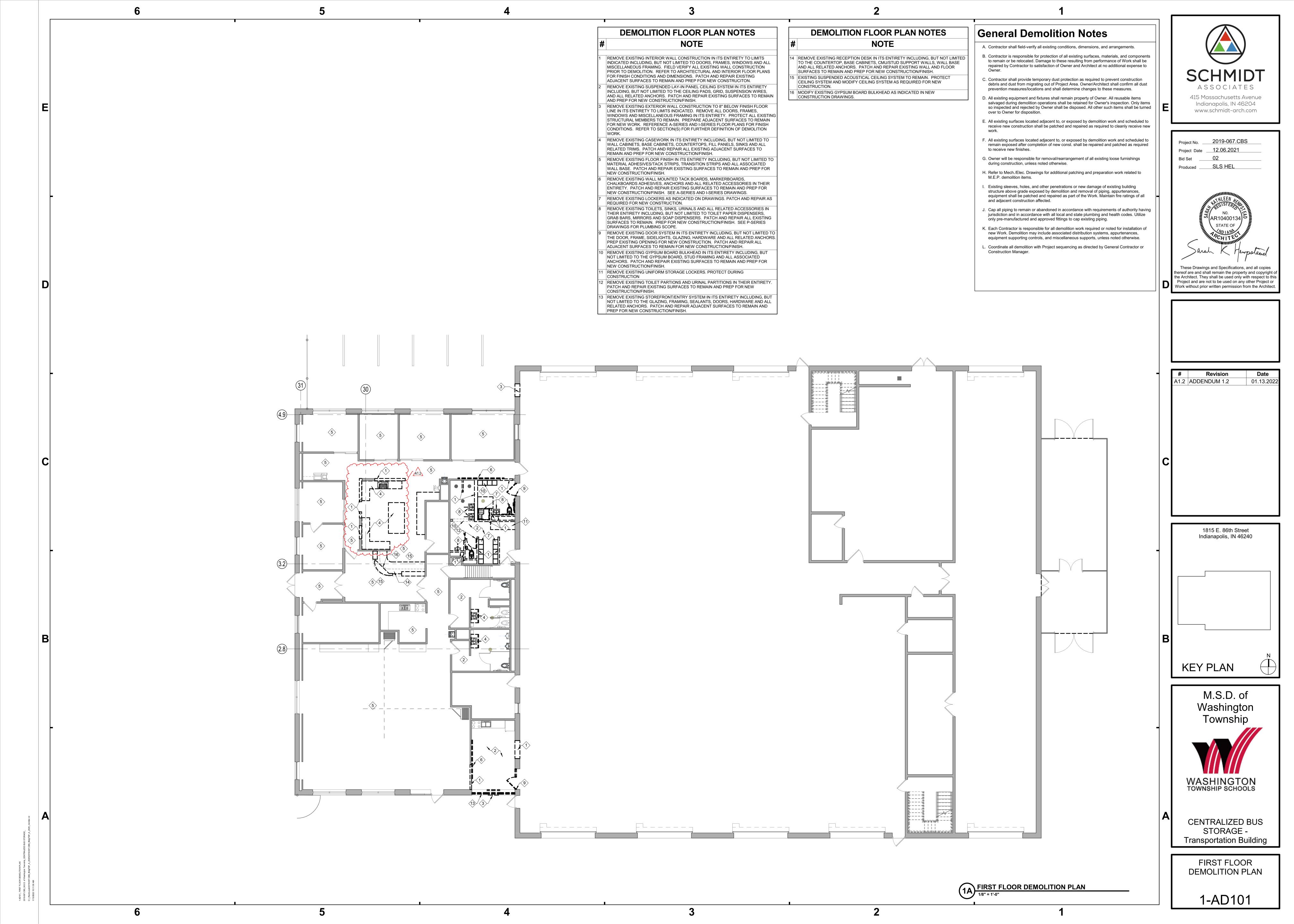
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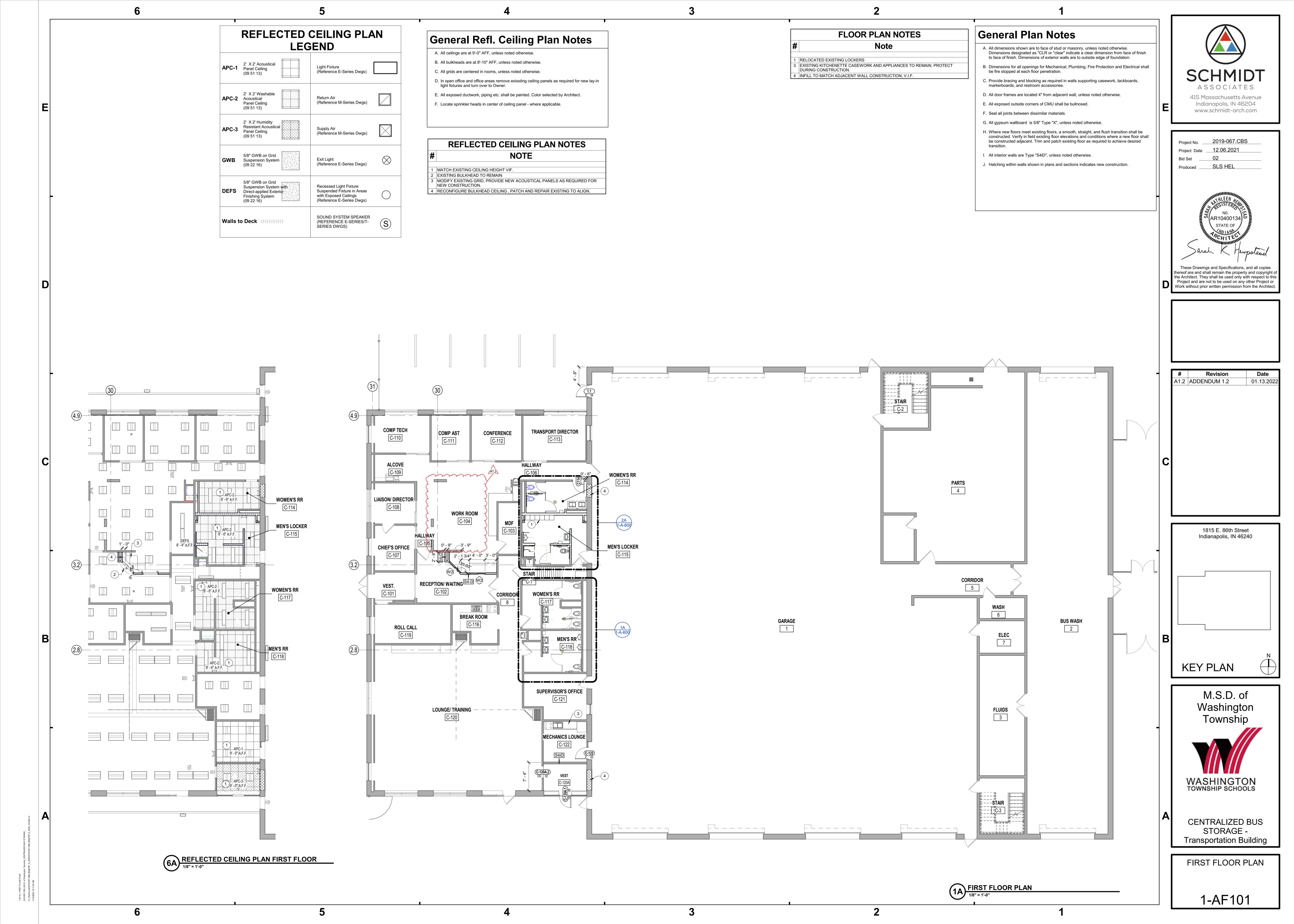
# **Electrical Contractor Responsibilities**

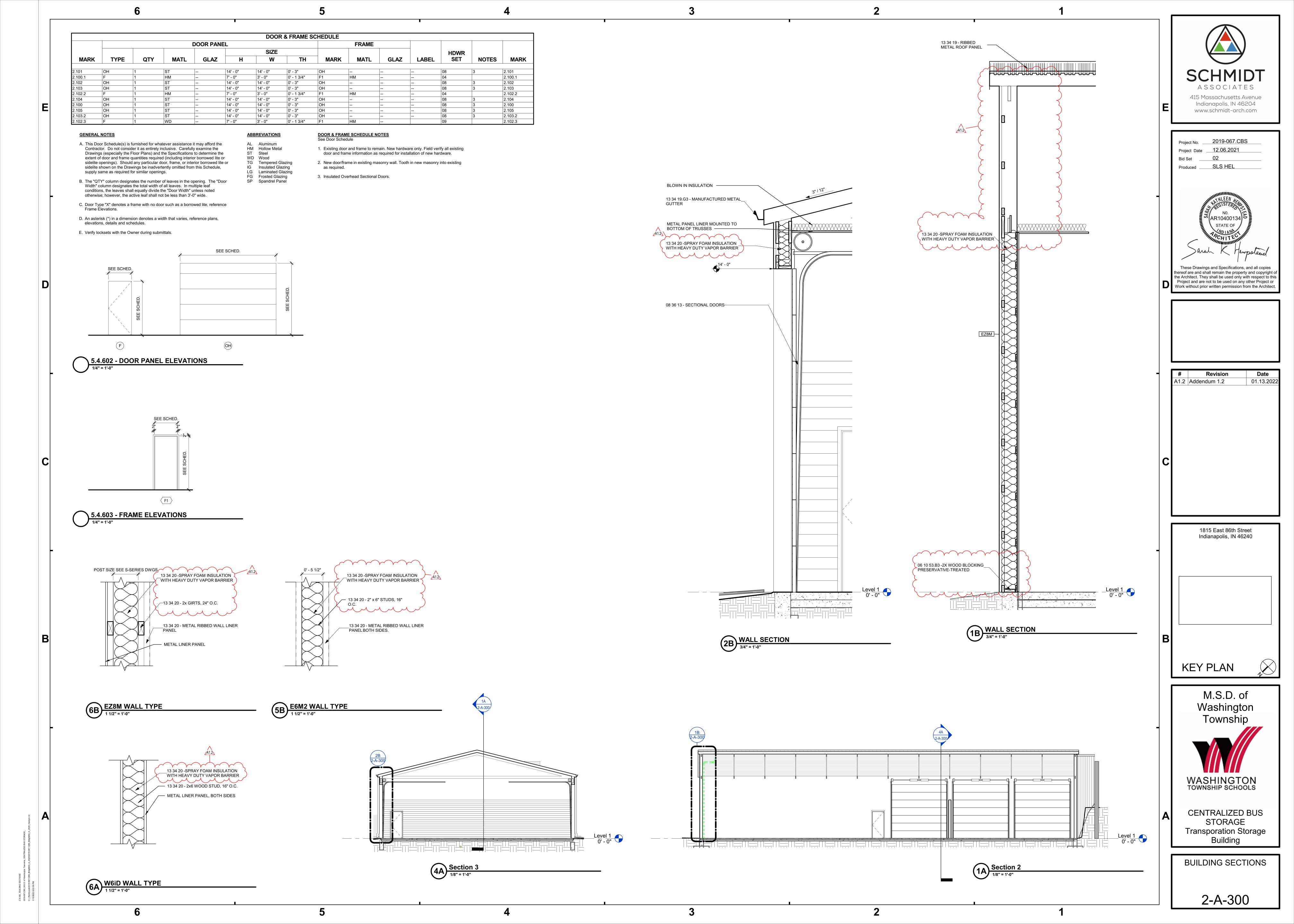
- Schedule power outage with the local utility or production and absorb all related costs.
- Electrical contractor will need to provide labor for the duration of work done by Square D Field Services.
- Provide backup power plan during power outage.
- Provide lighting and 120V power with GFI for Field Services' on site electrical equipment, if required.
- Provide qualified personnel to de-energize / re-energize equipment as defined by NFPA70E.
- Provide qualified personnel to lock out equipment and verify zero energy state as defined by NFPA70E.
- Provide qualified individual for grounding of equipment as required.
- Provide proper workspace clear of obstruction with adequate temporary lighting for the walk ways and emergency exits. \*Work will not commence until adequate lighting is in place. \*
- Provide a phone with defined emergency contact and site location in event of an emergency.
- Provide an authorized person to sign all manifests for asbestos and PCB wastes (if any)
- To receive and store all material in safe, secure, temperature-controlled facility.
- Identification, labeling, and removal of all hazardous wastes.
- Labor and expense cost over runs due to:
  - Delays by others
  - Lack of equipment readiness for services outline herein



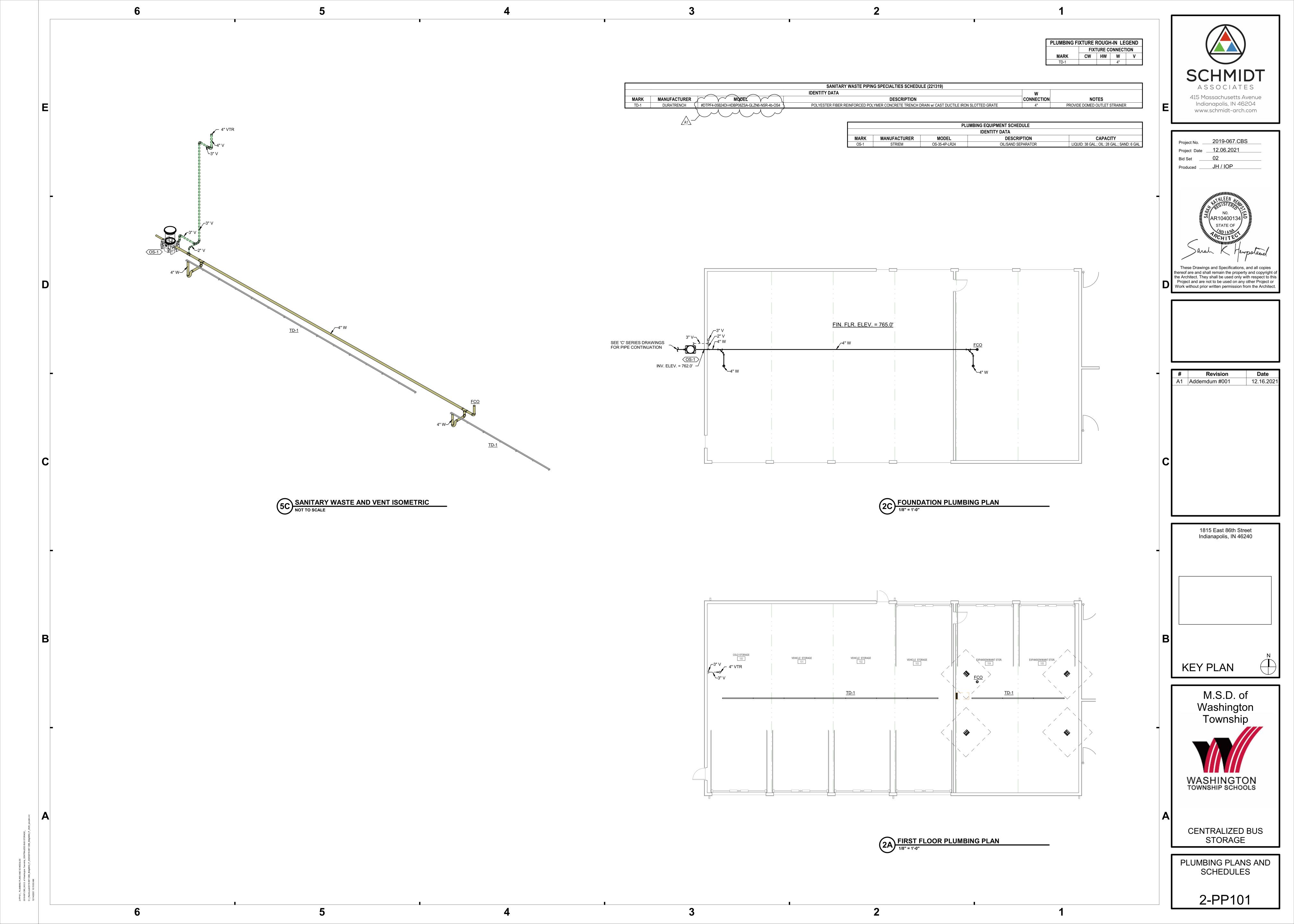


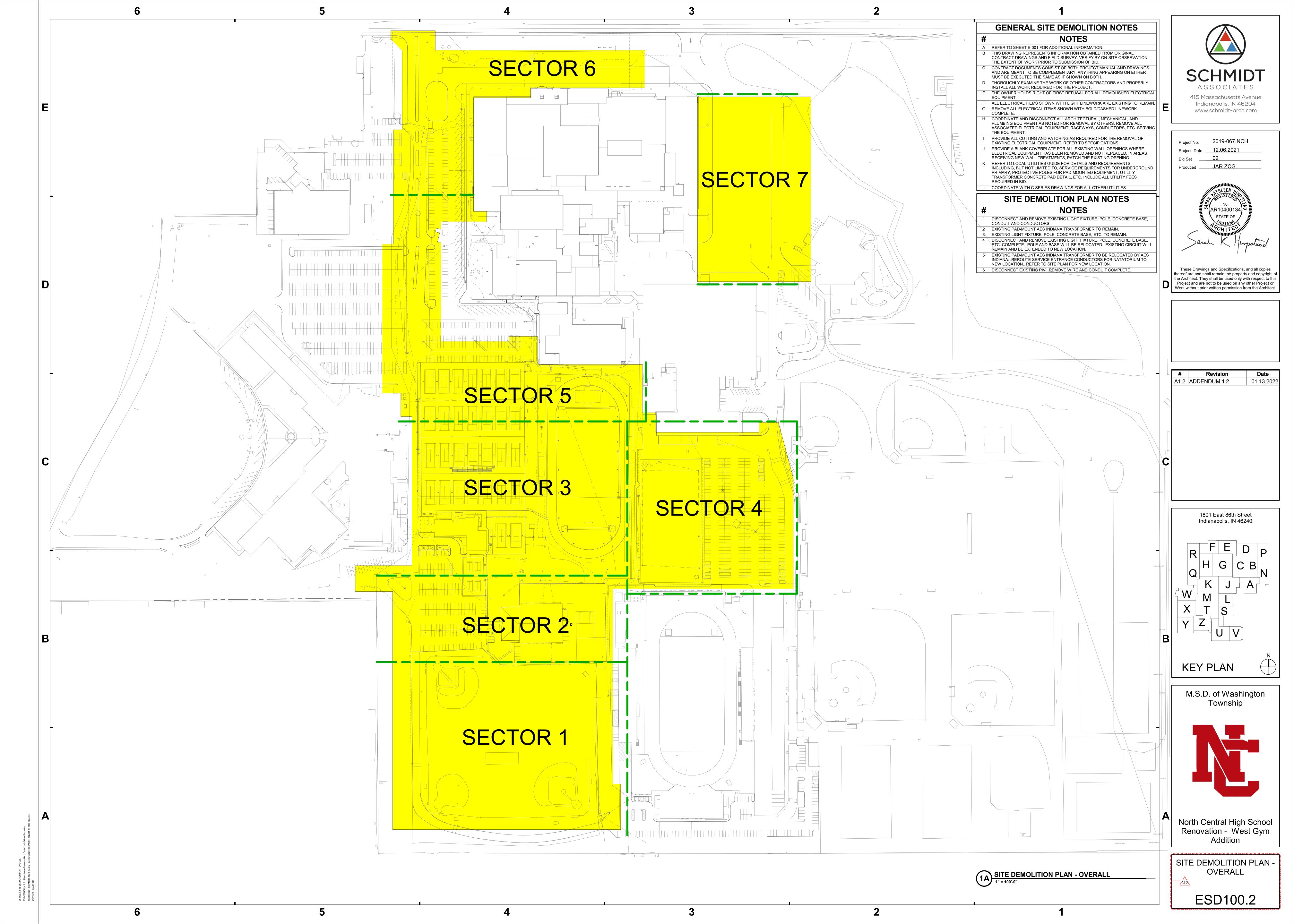


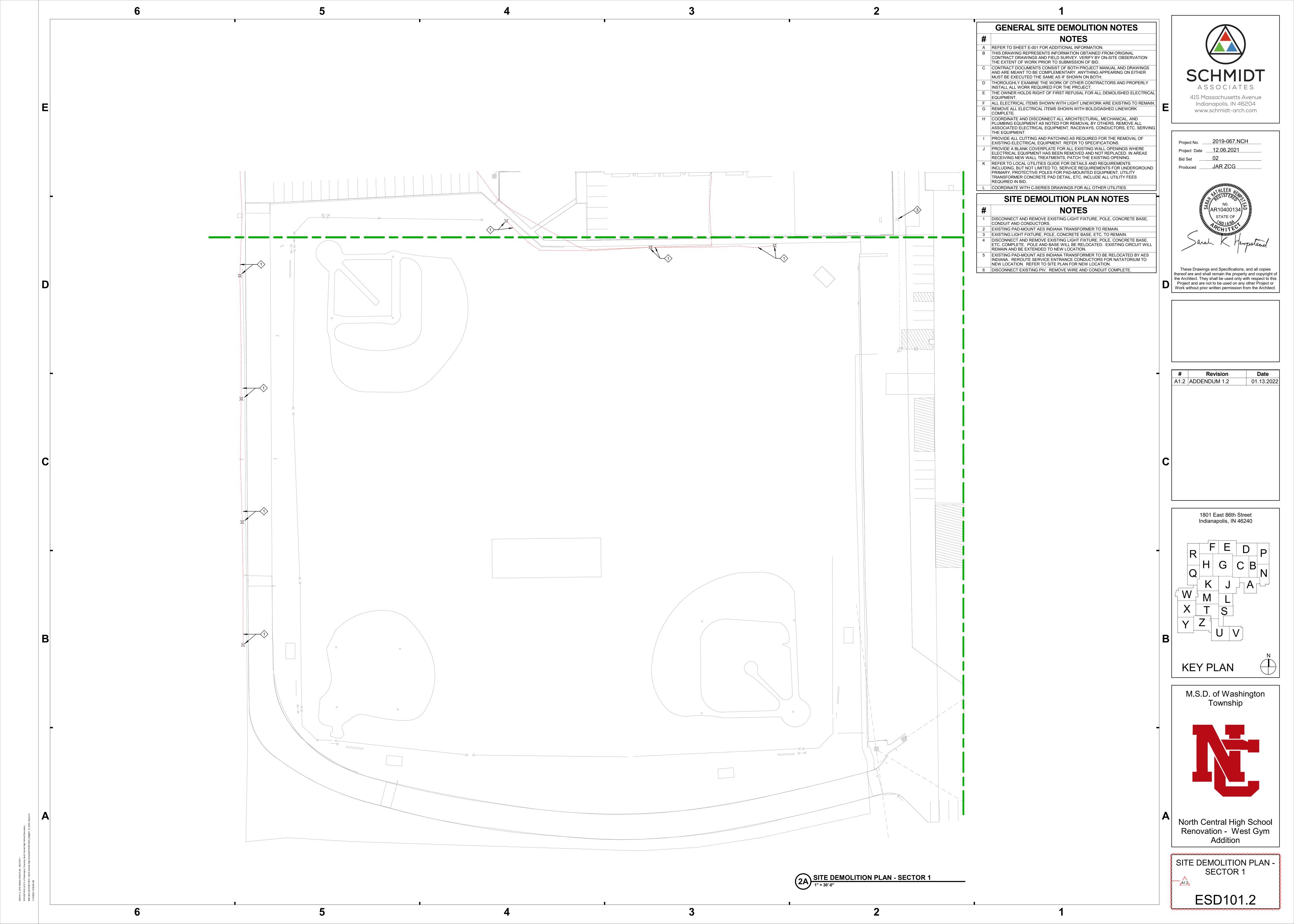


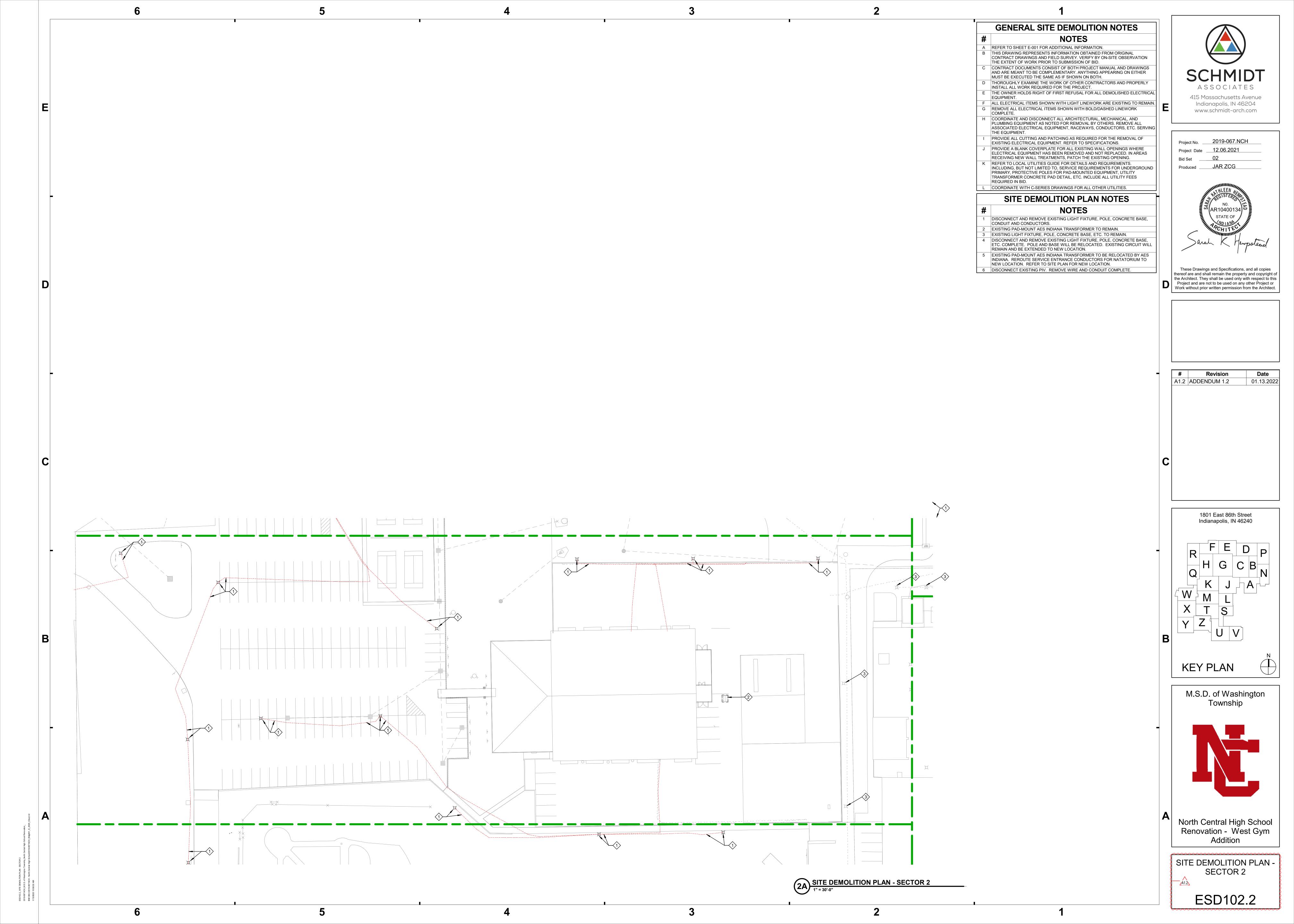


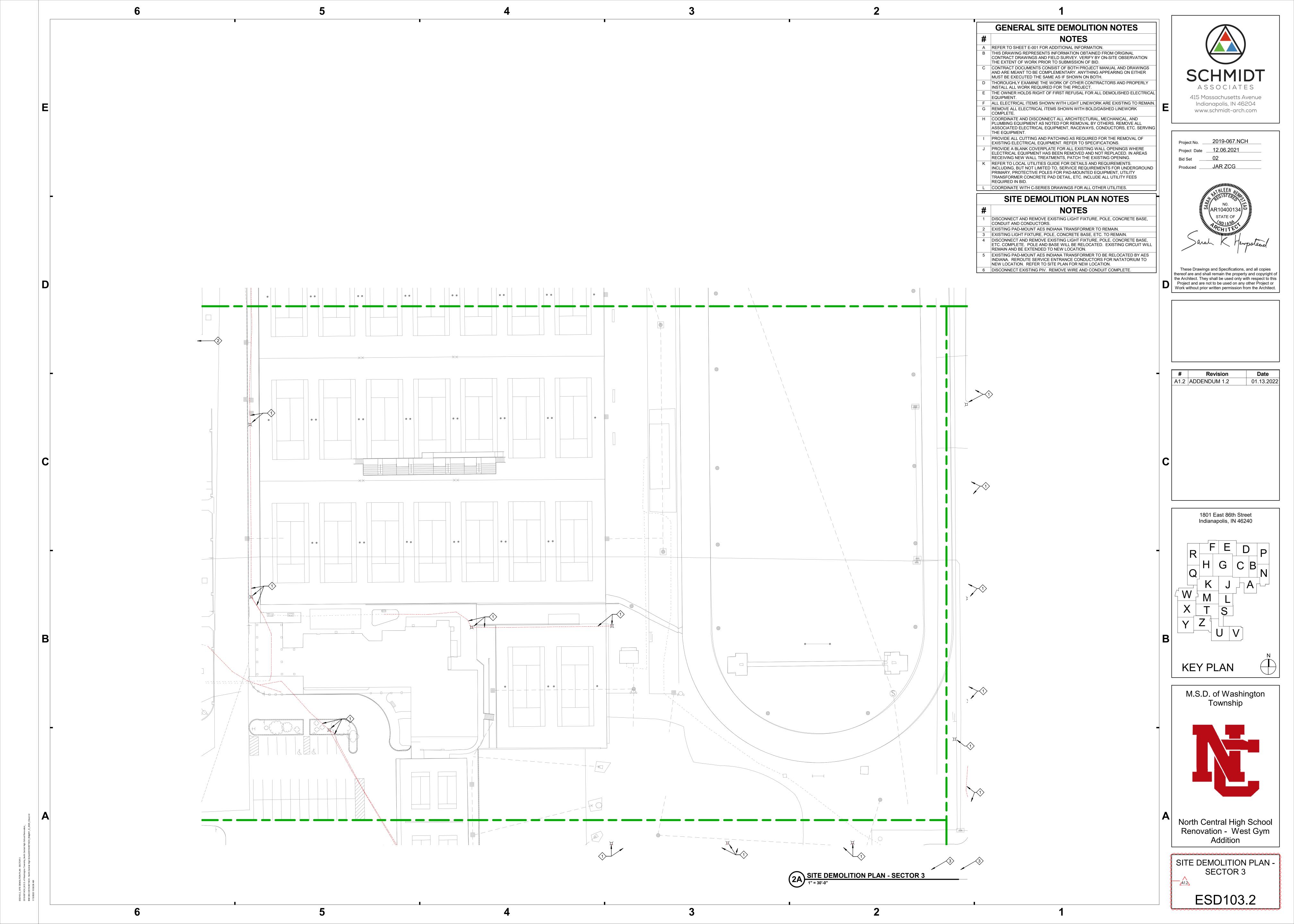


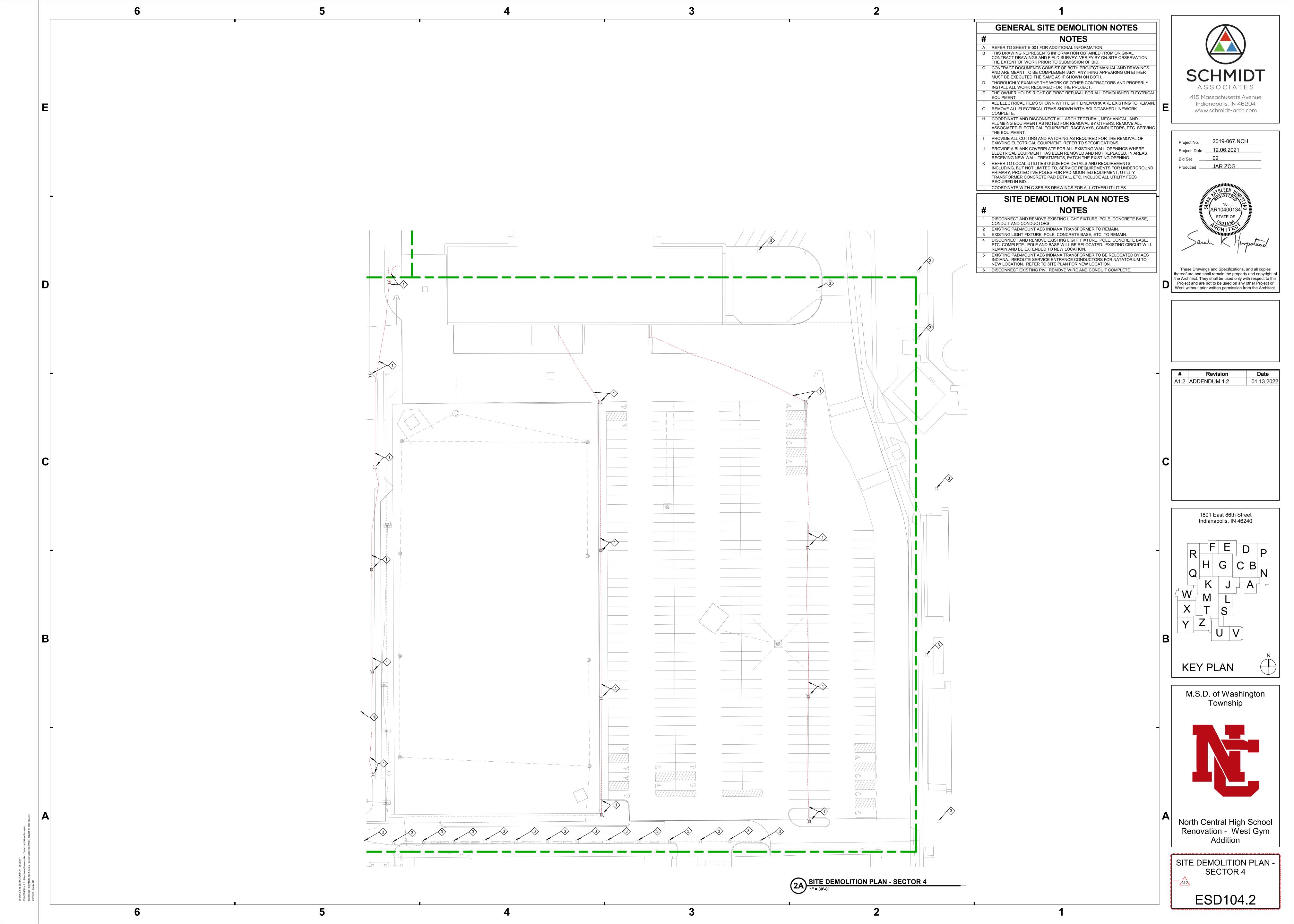


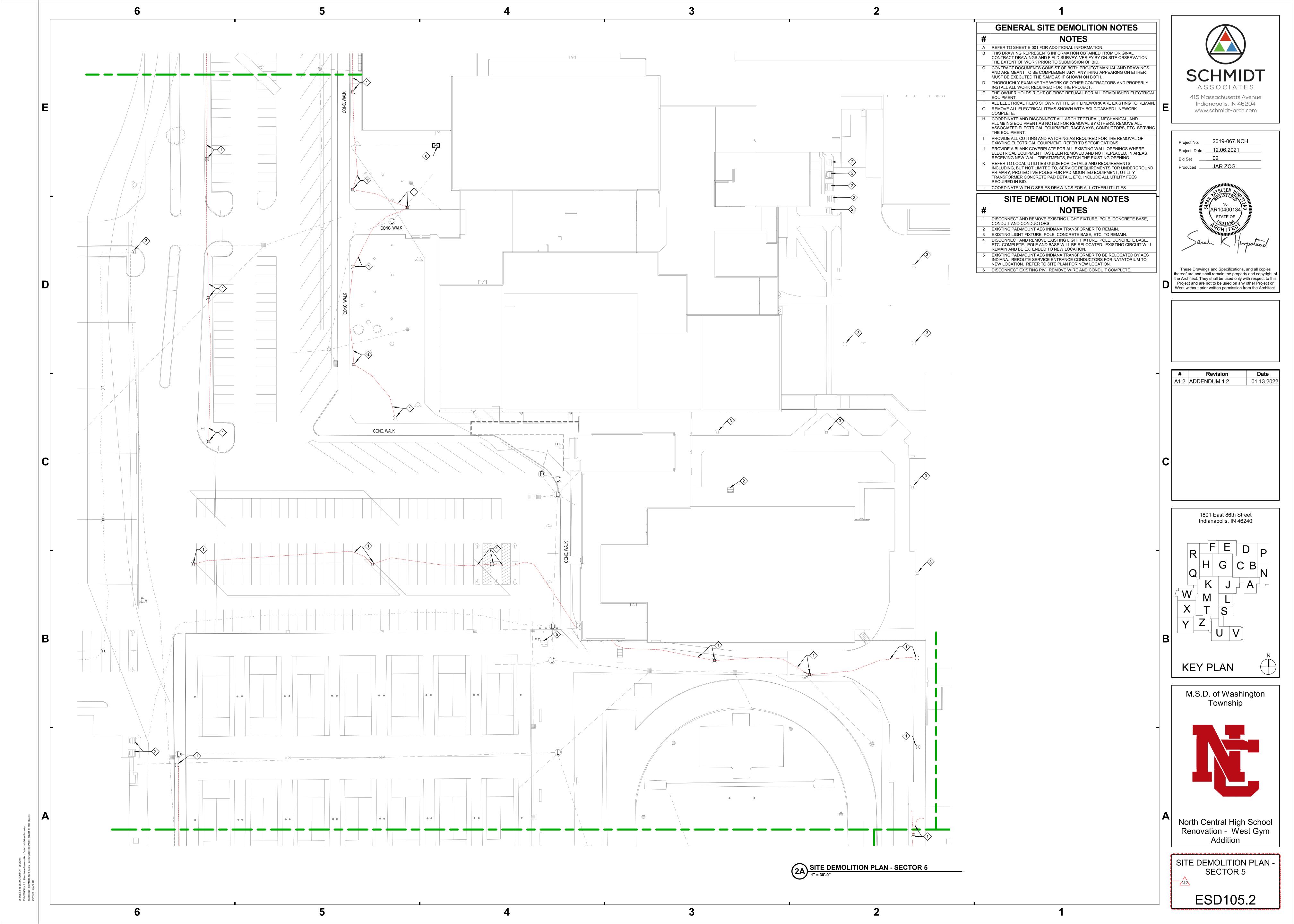


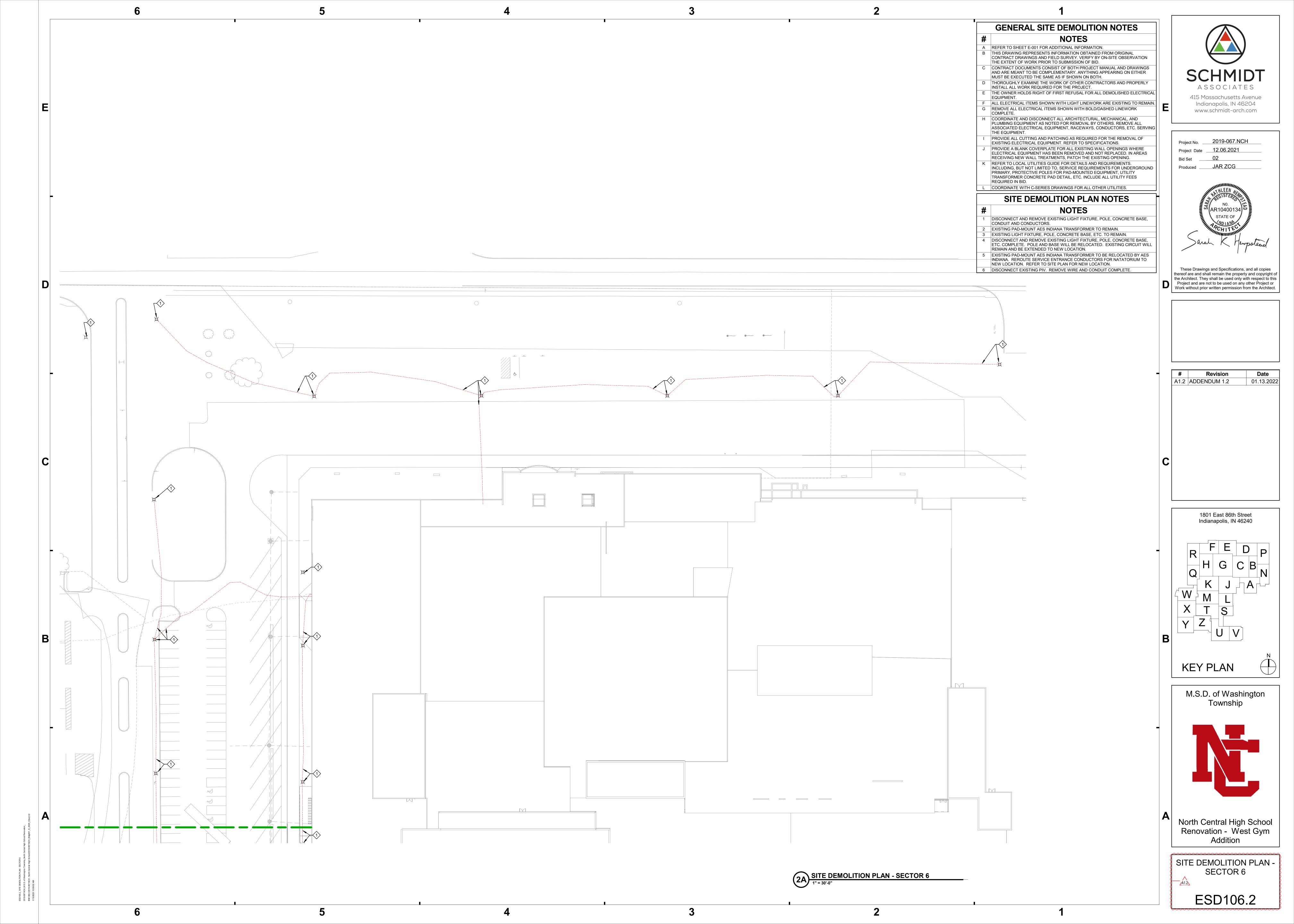


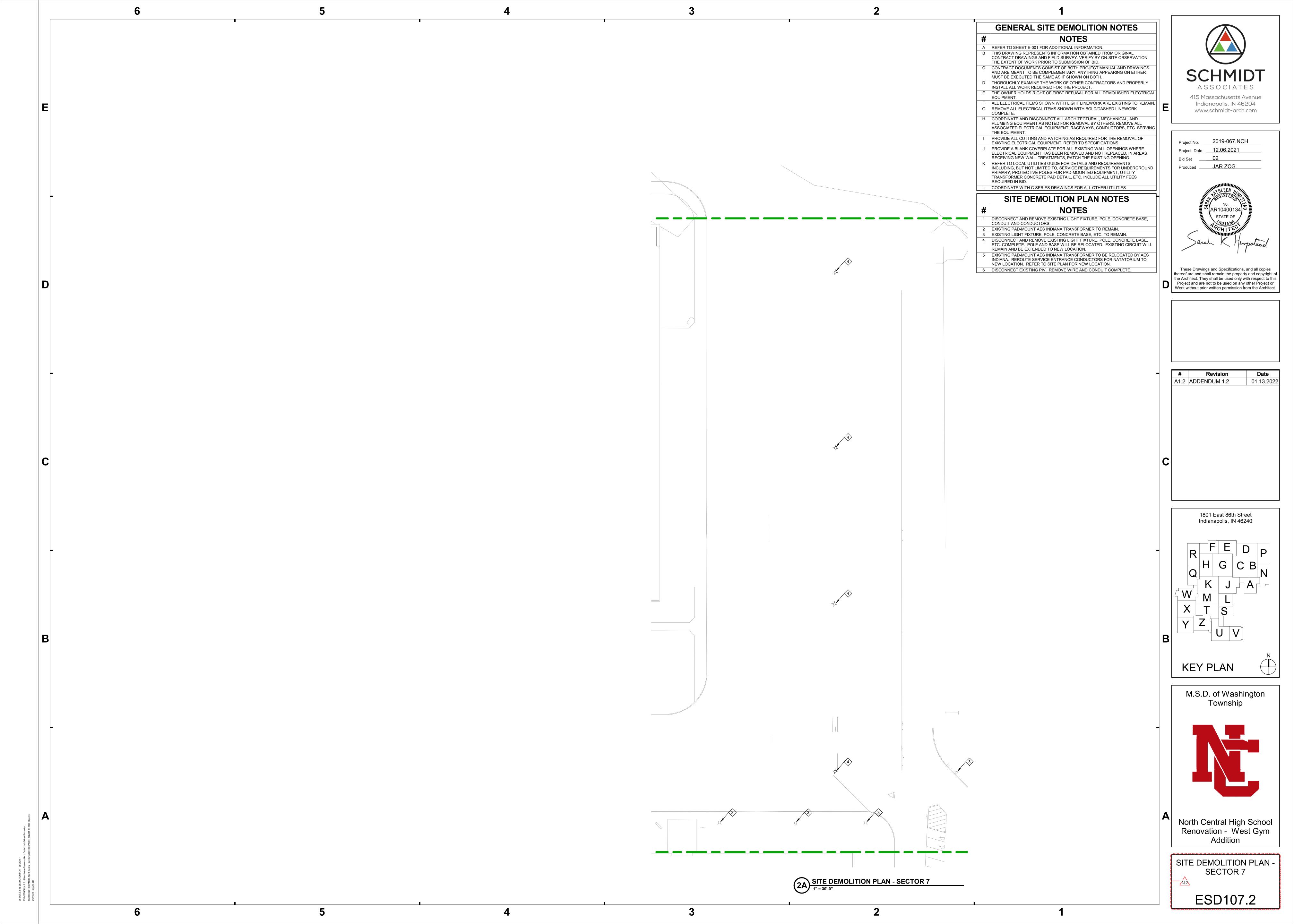


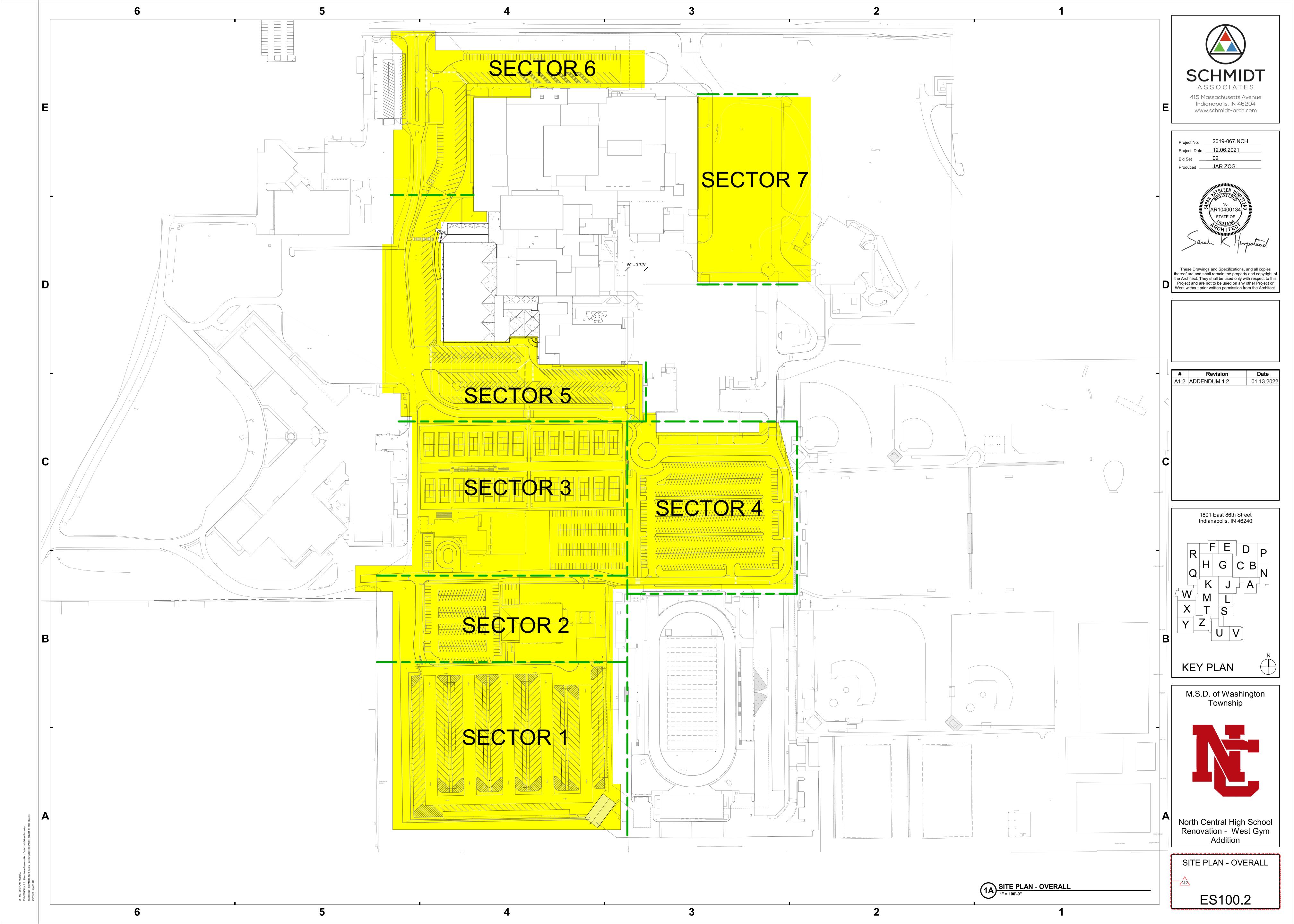


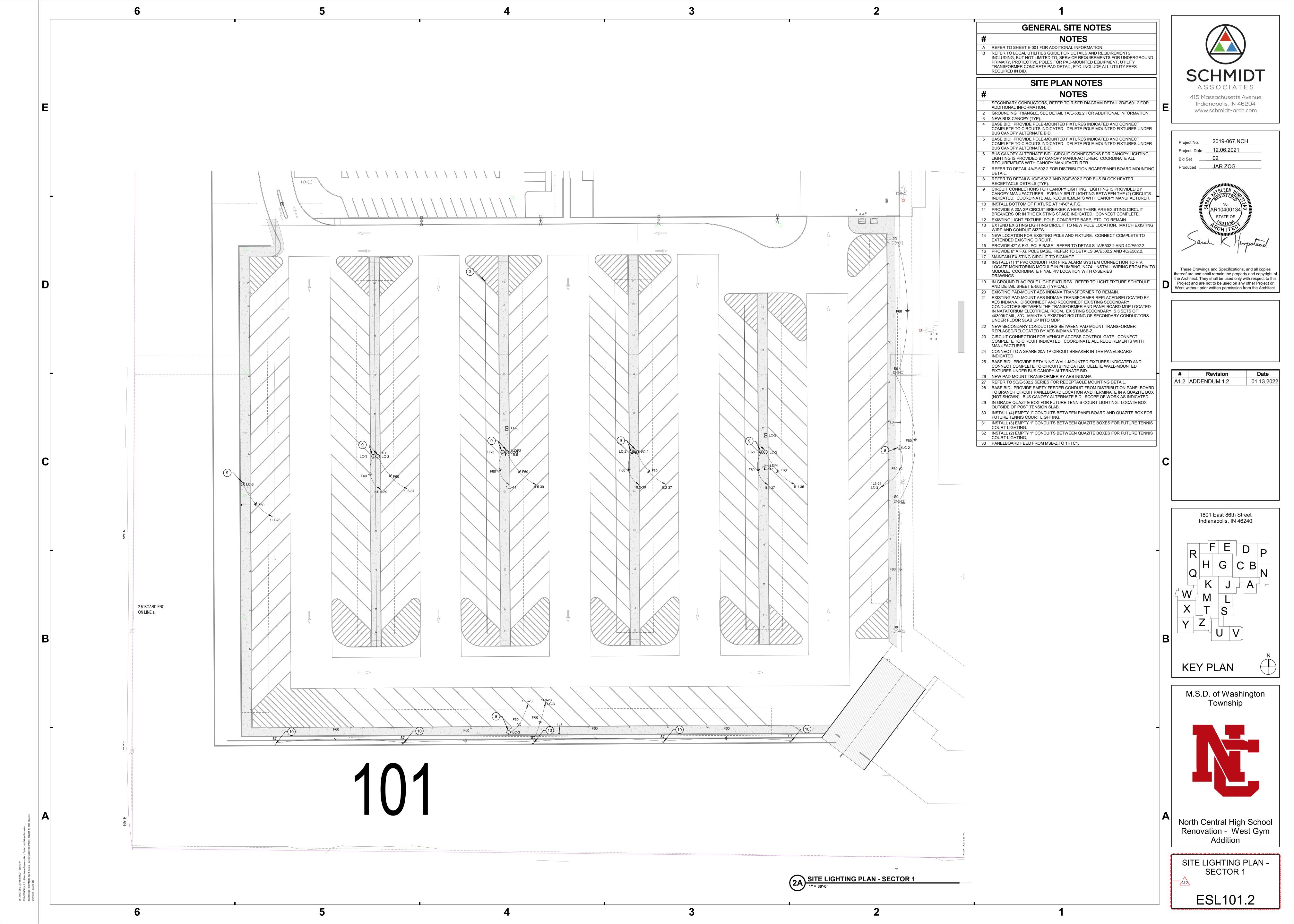


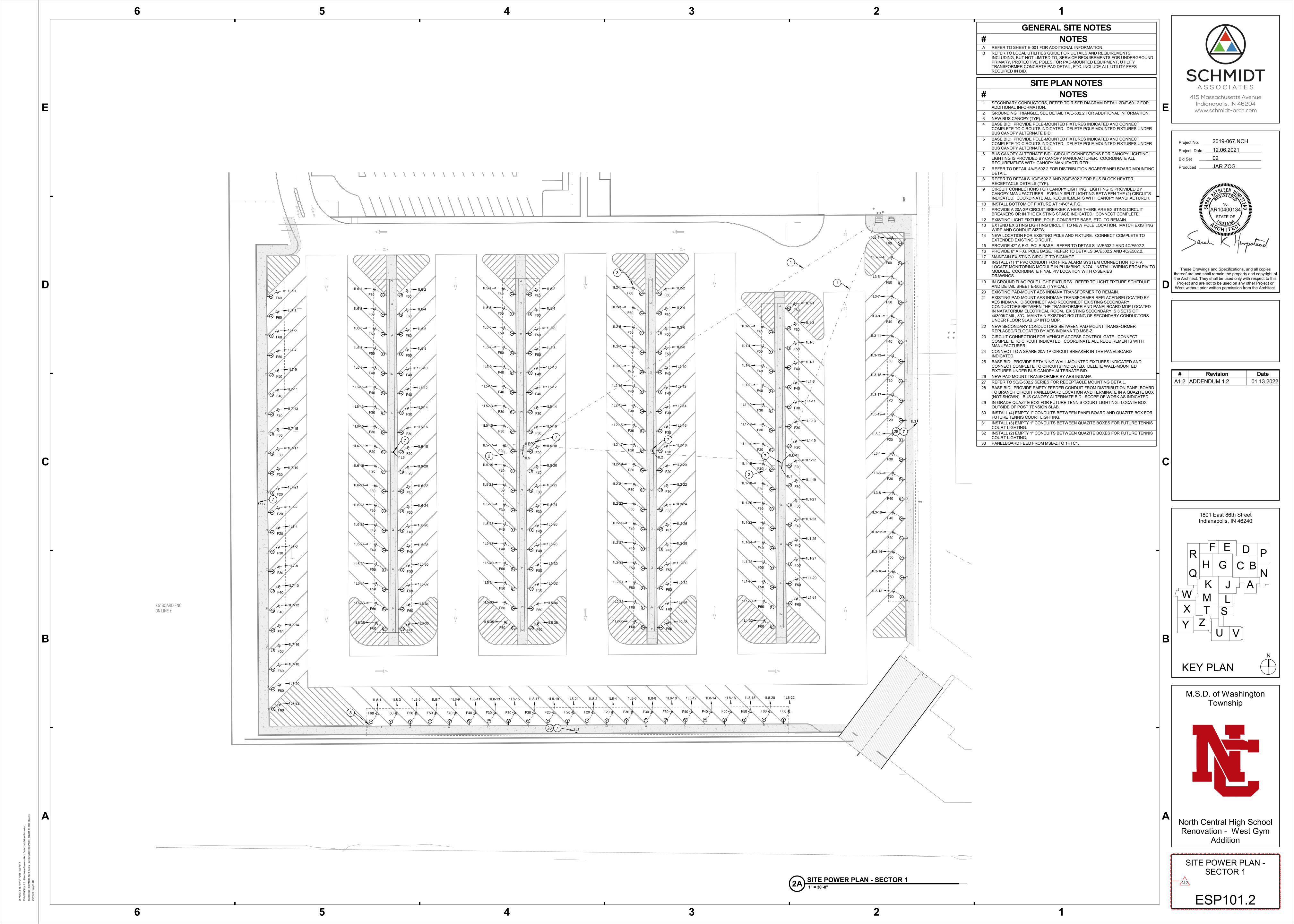


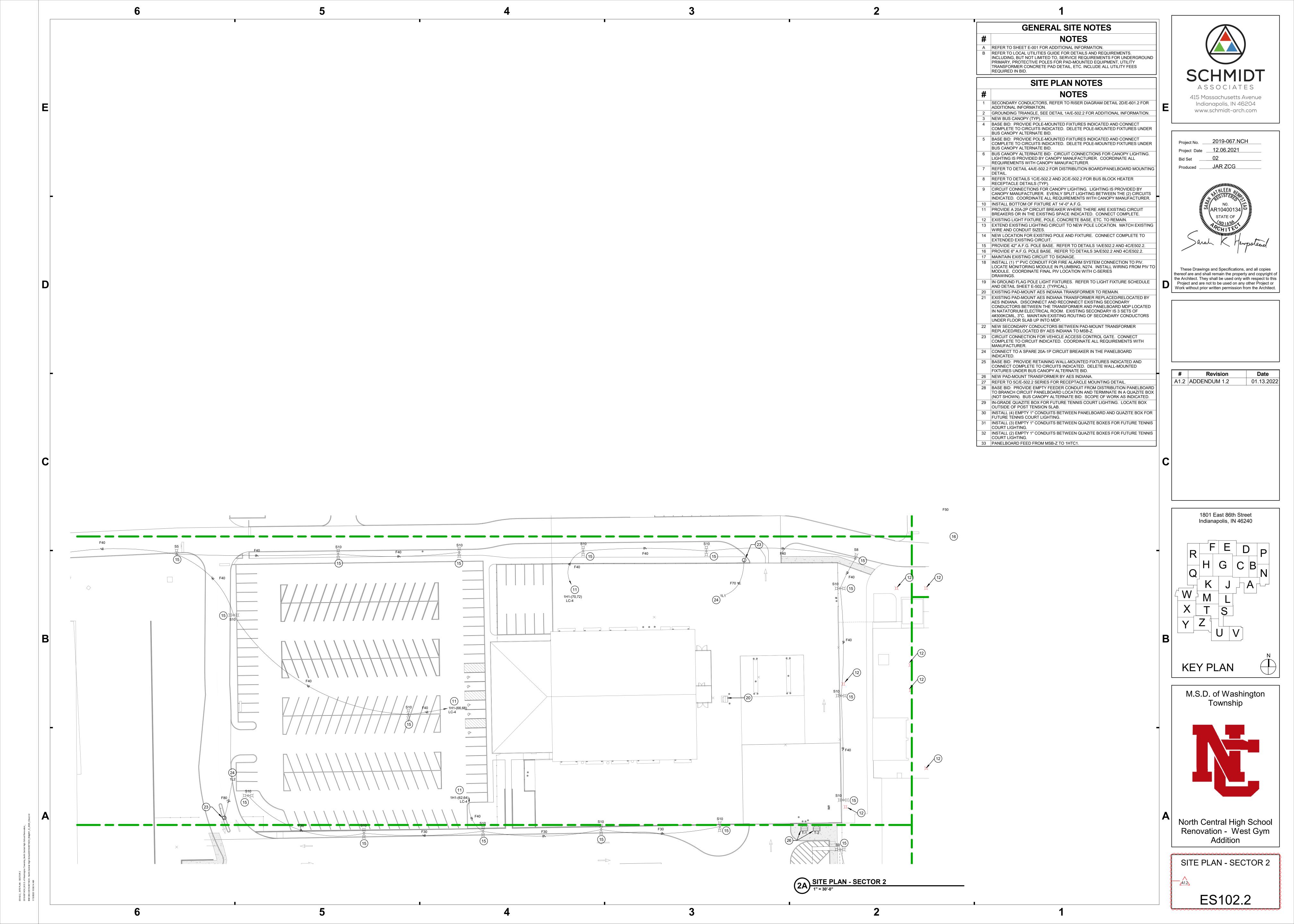


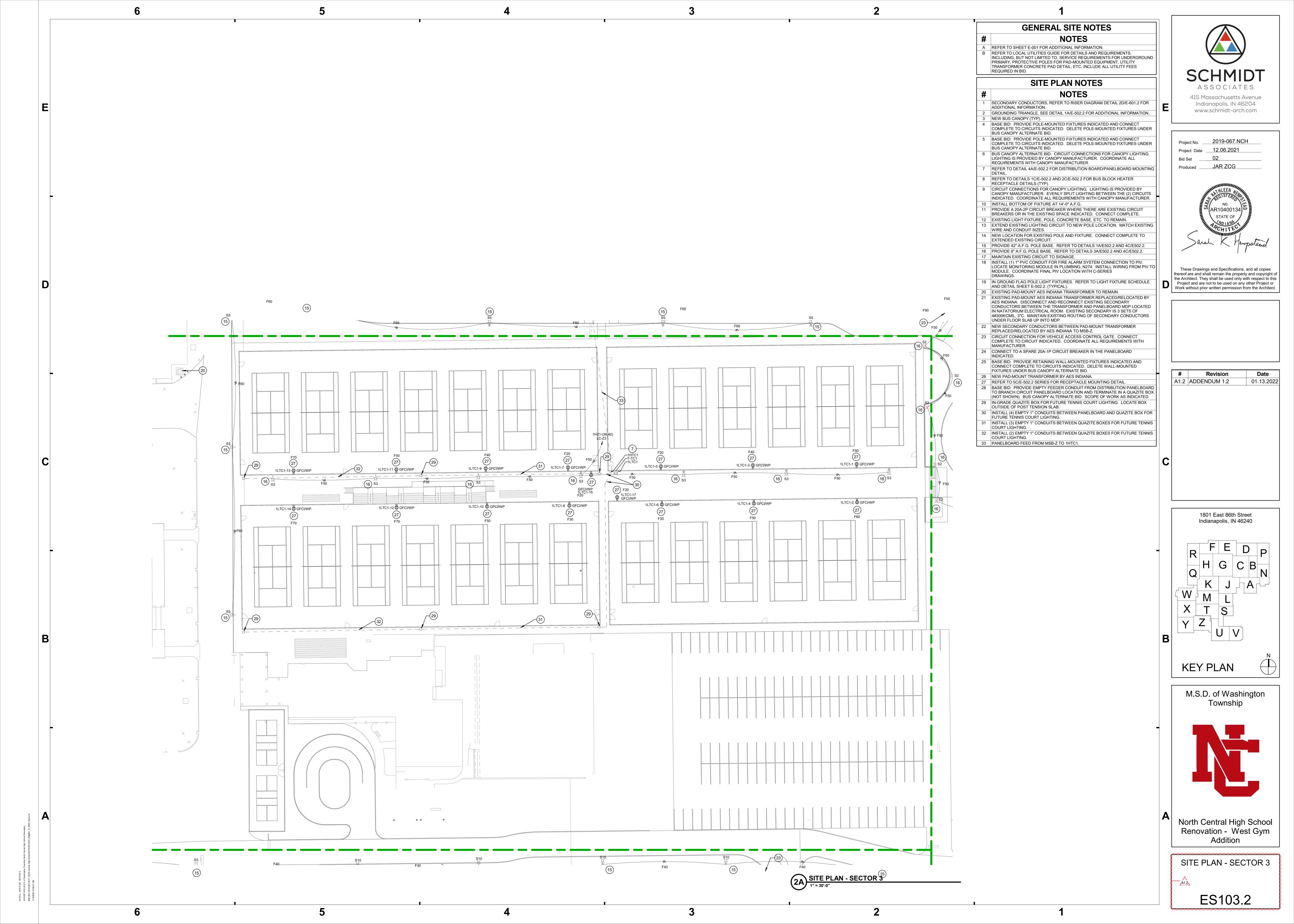


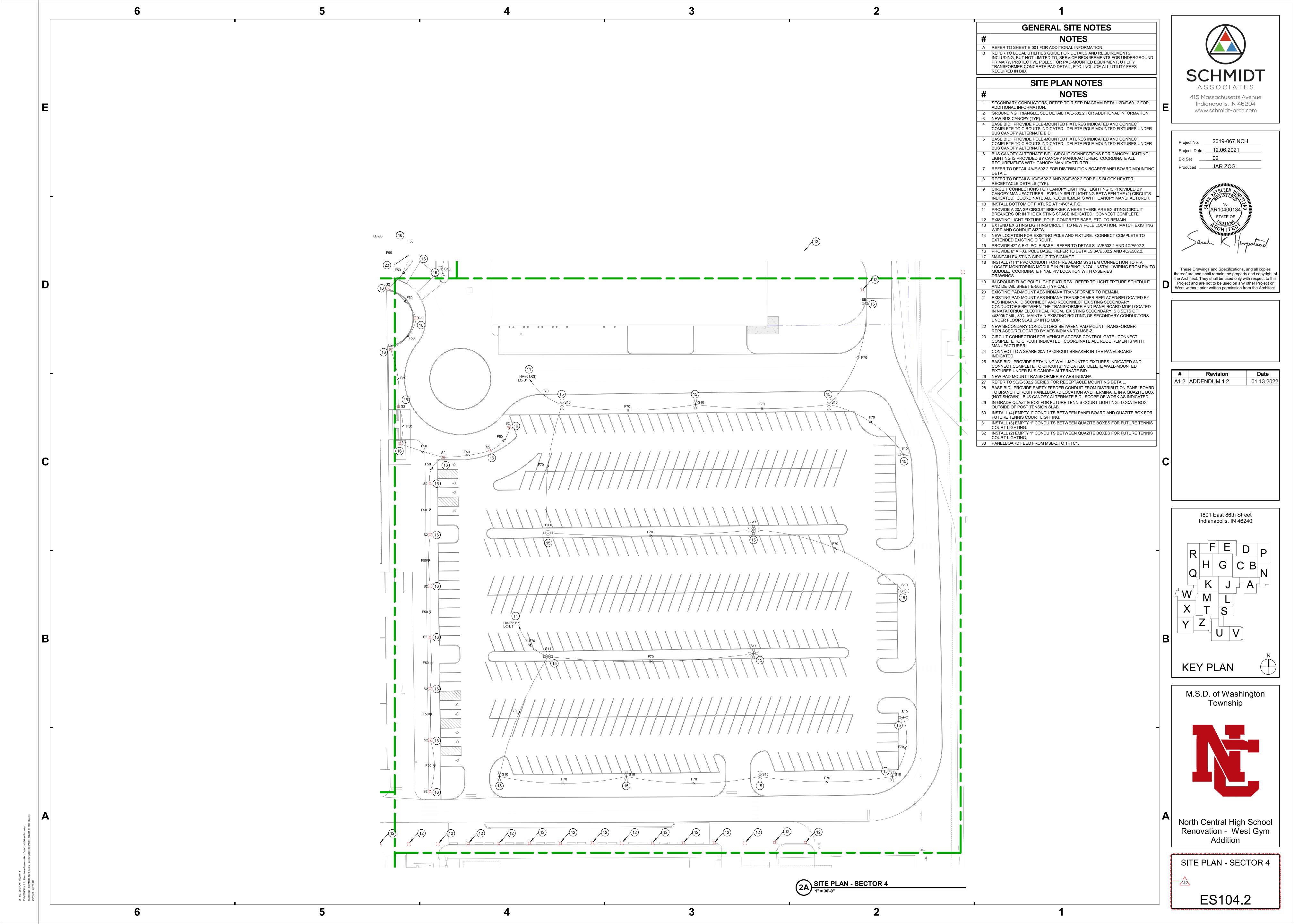


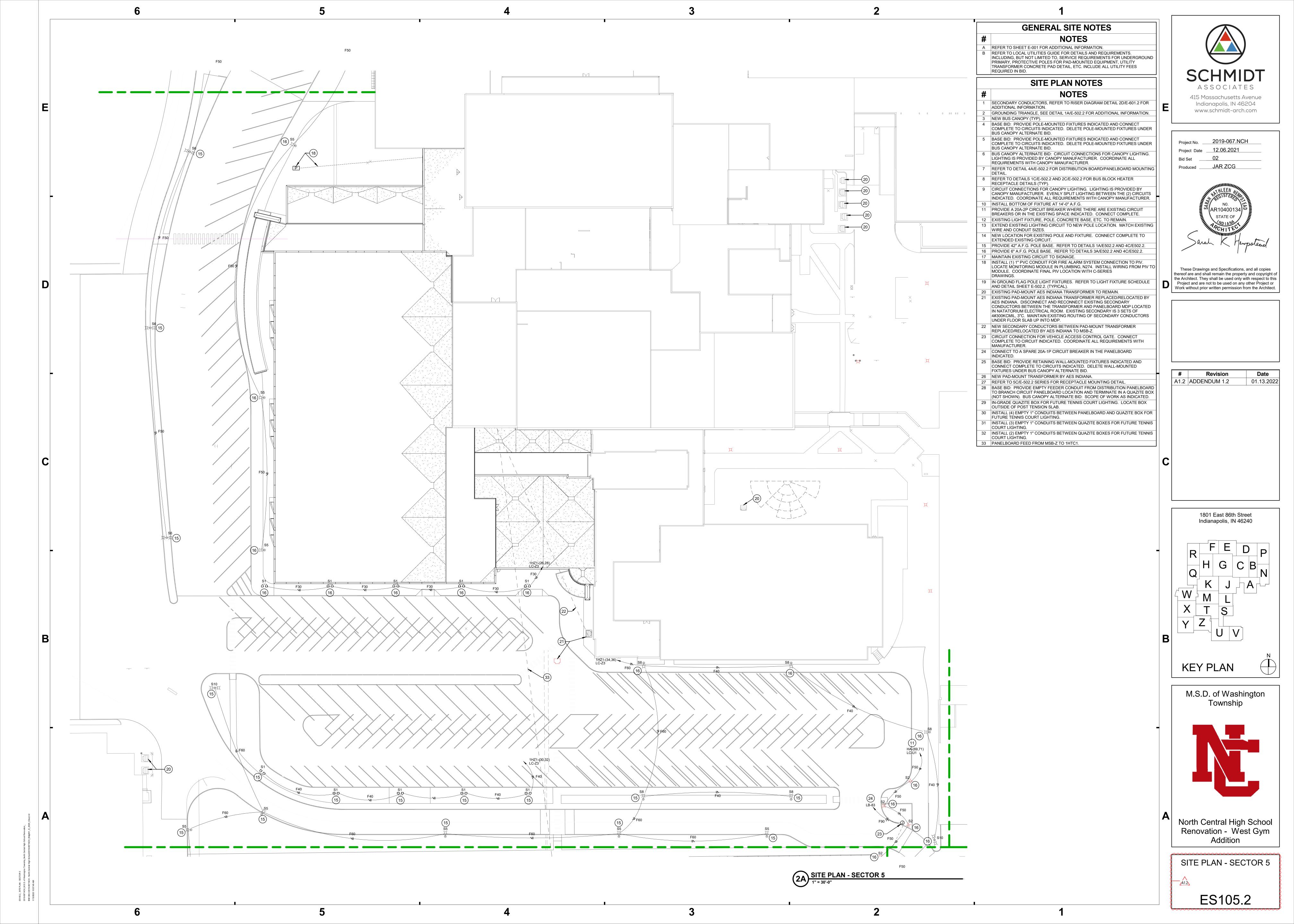


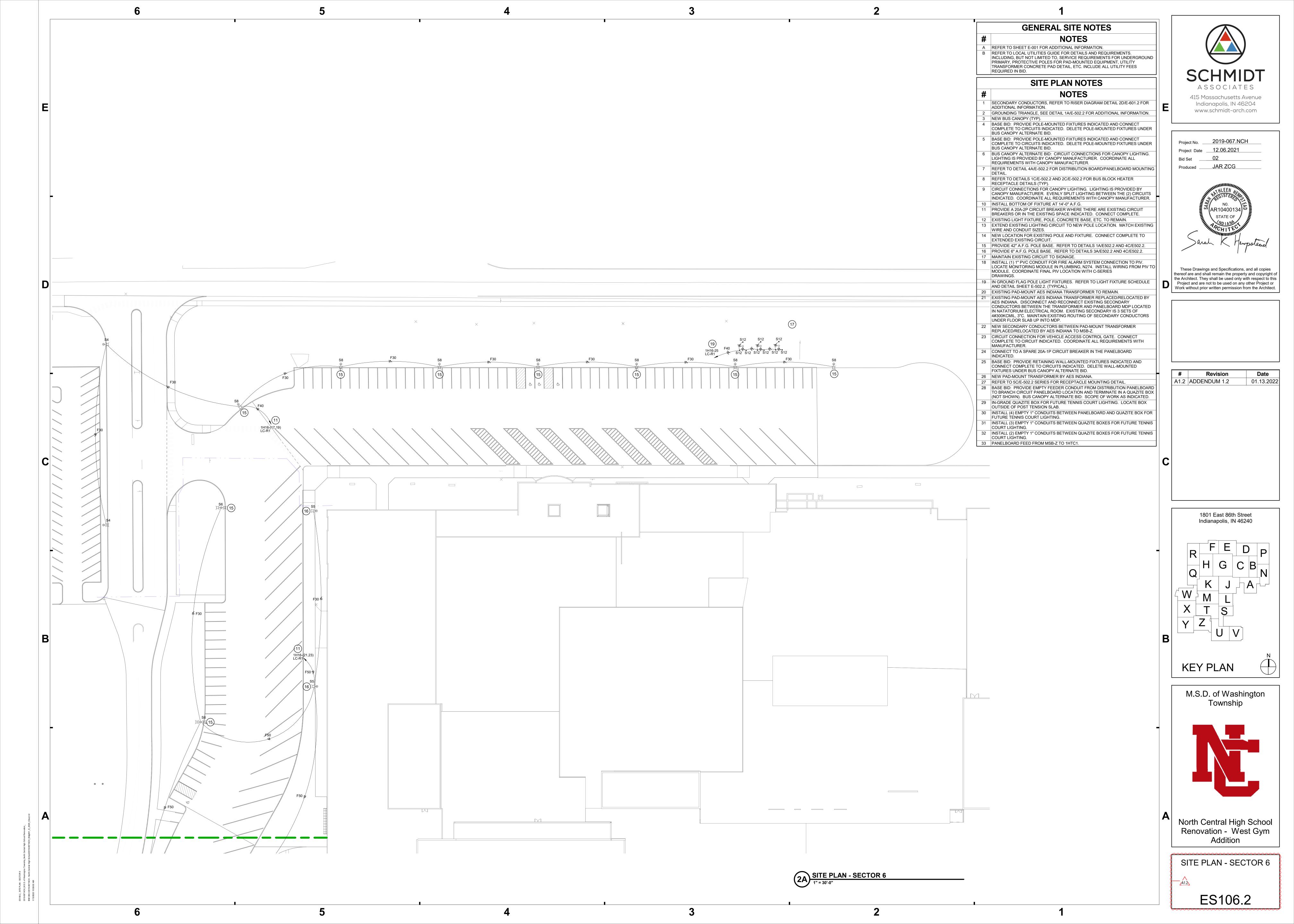


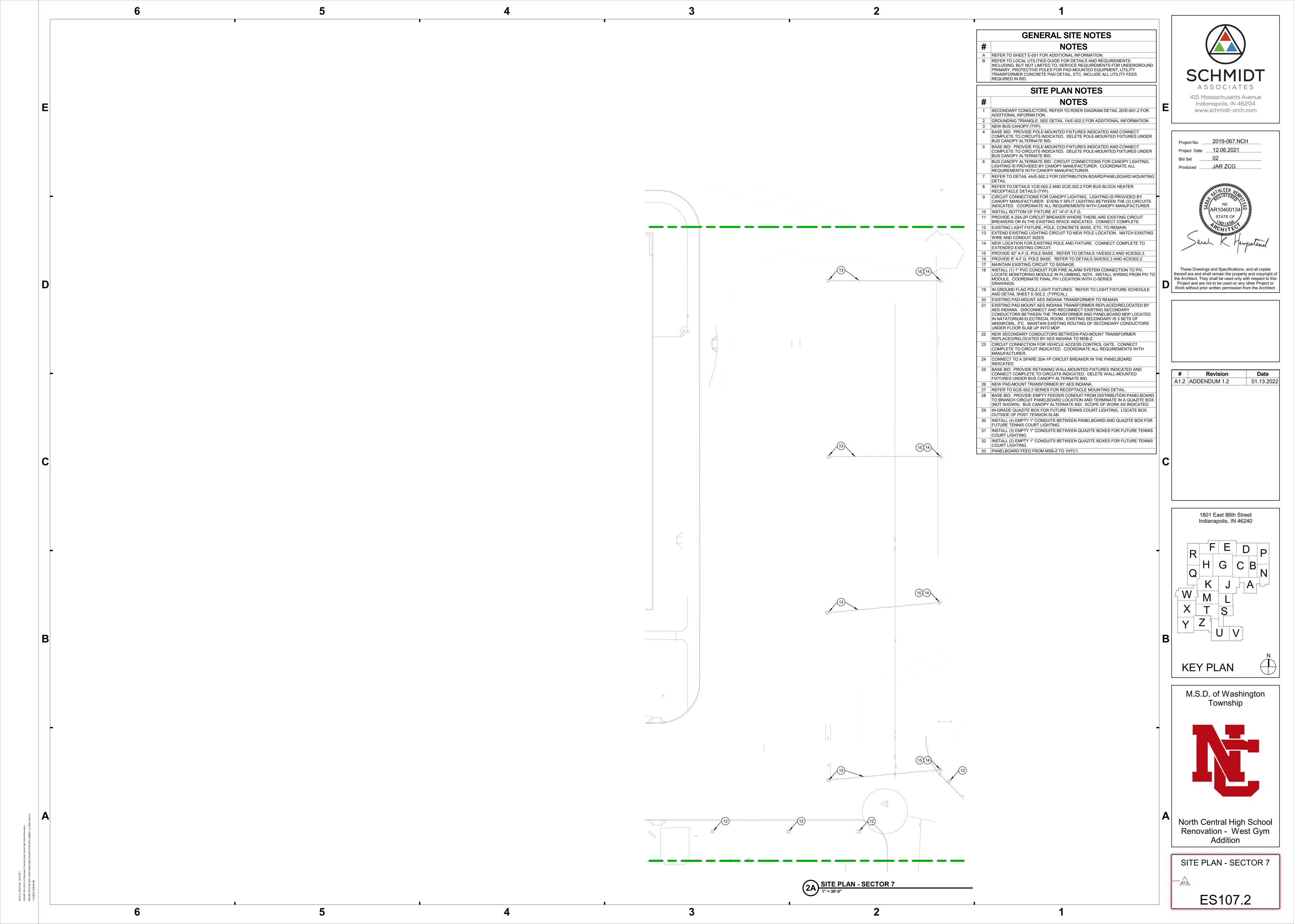


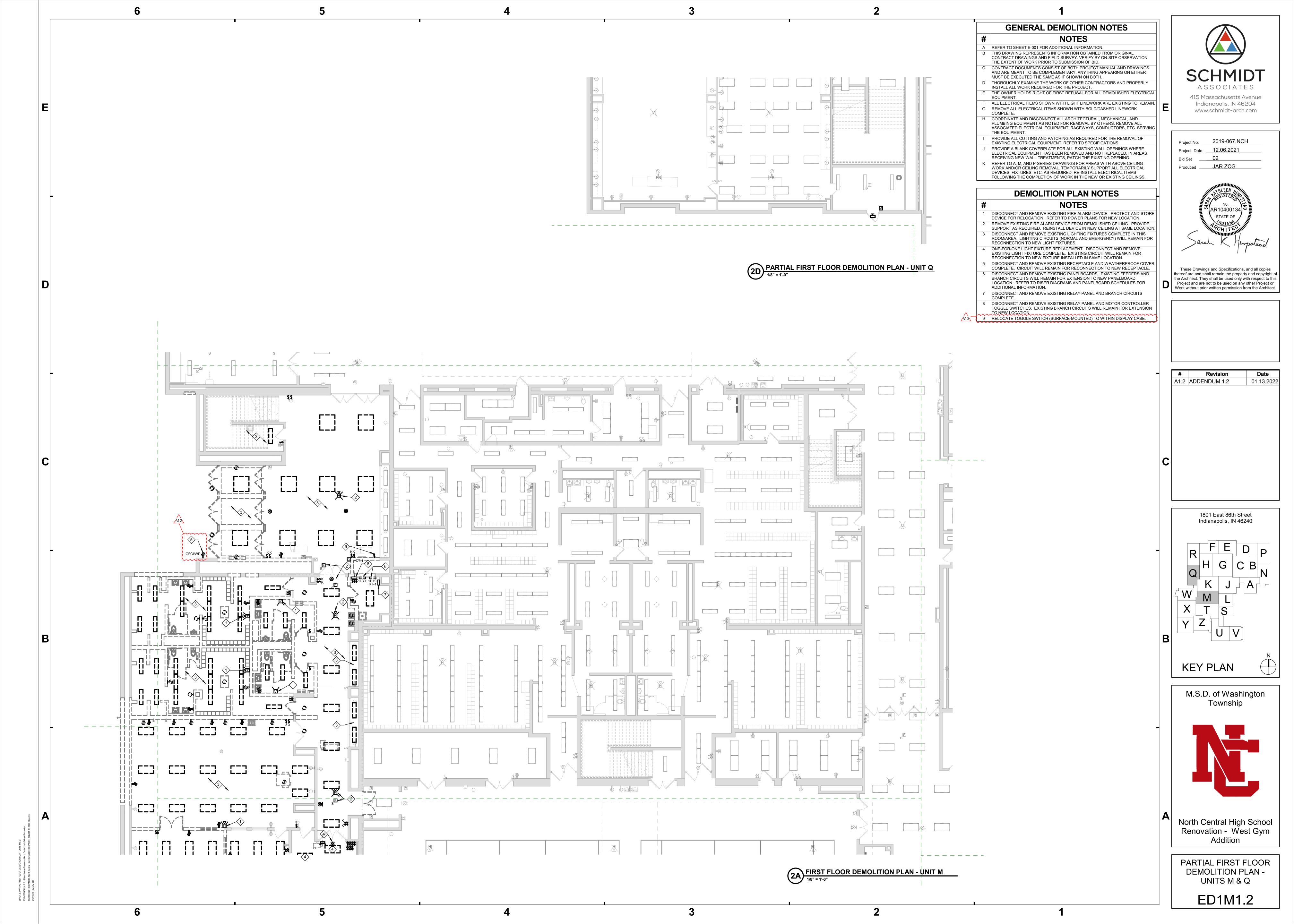


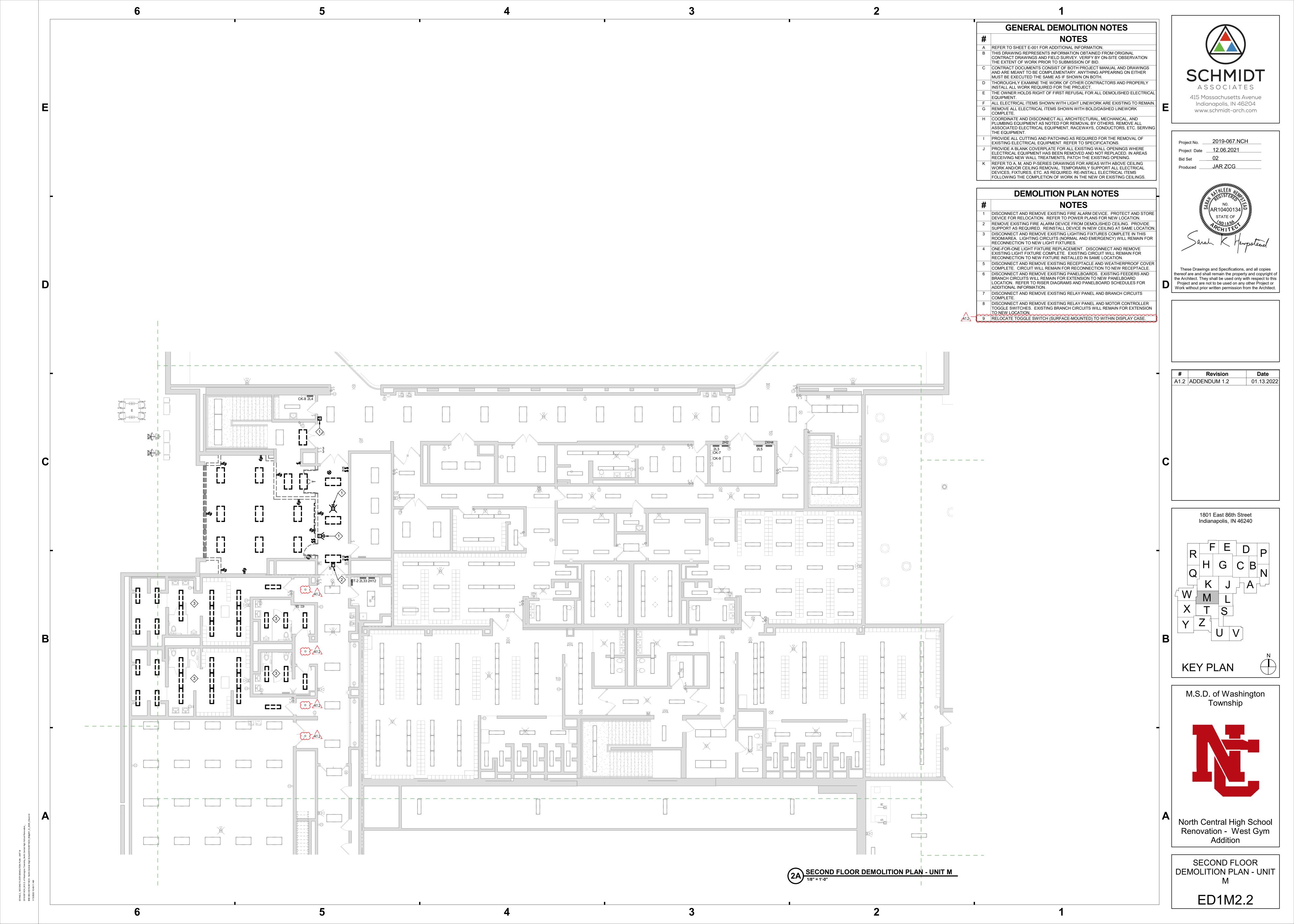


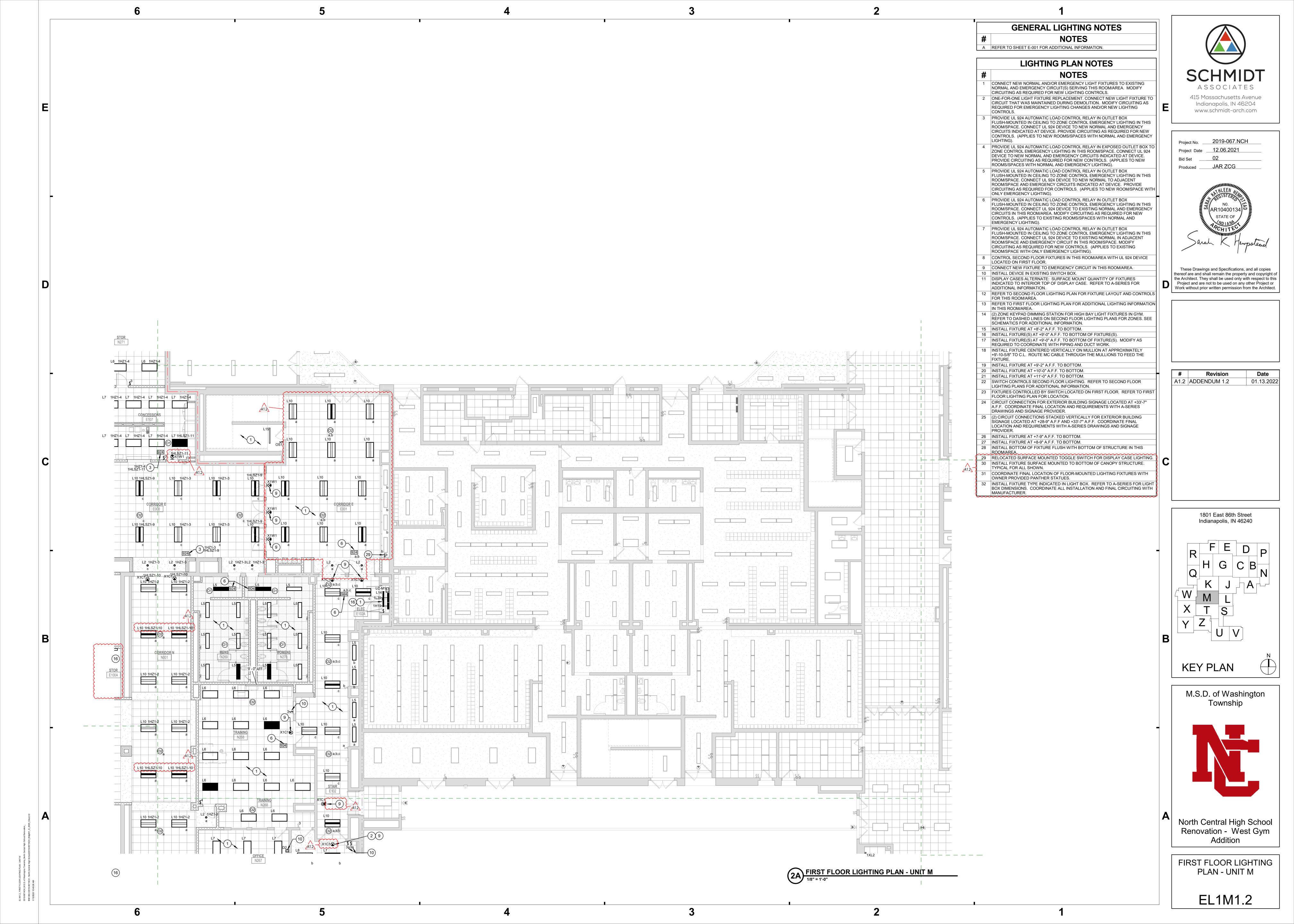


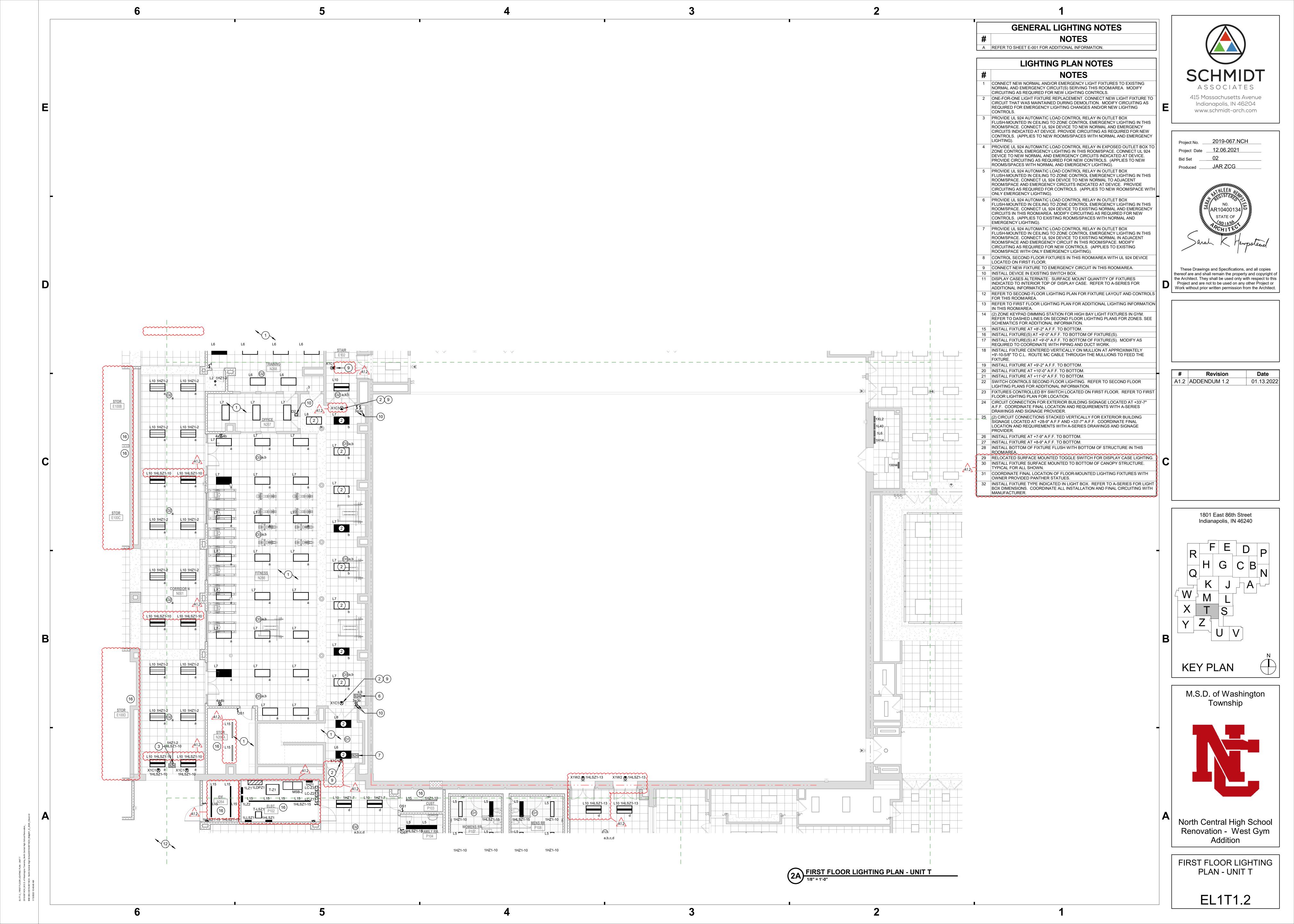


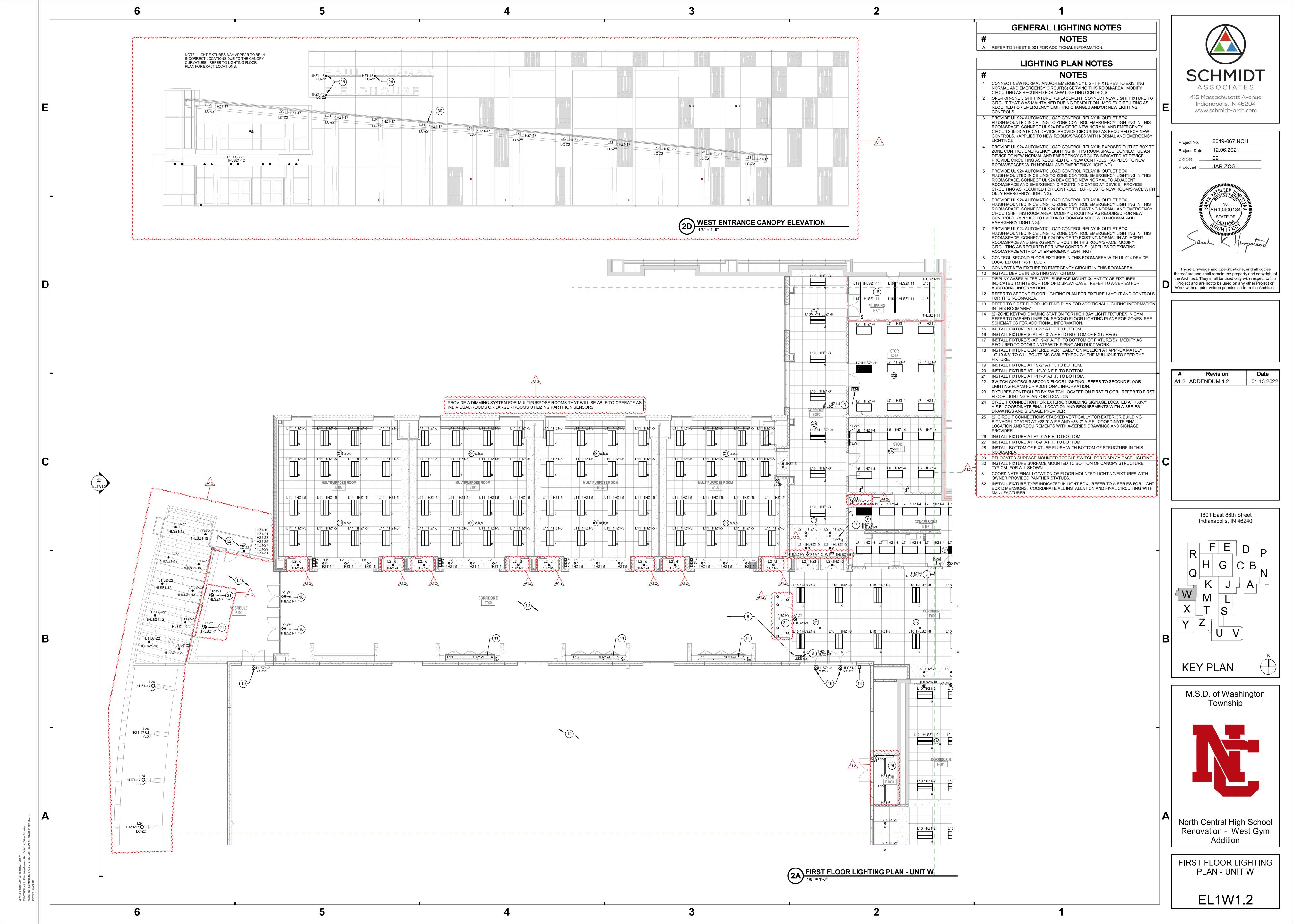


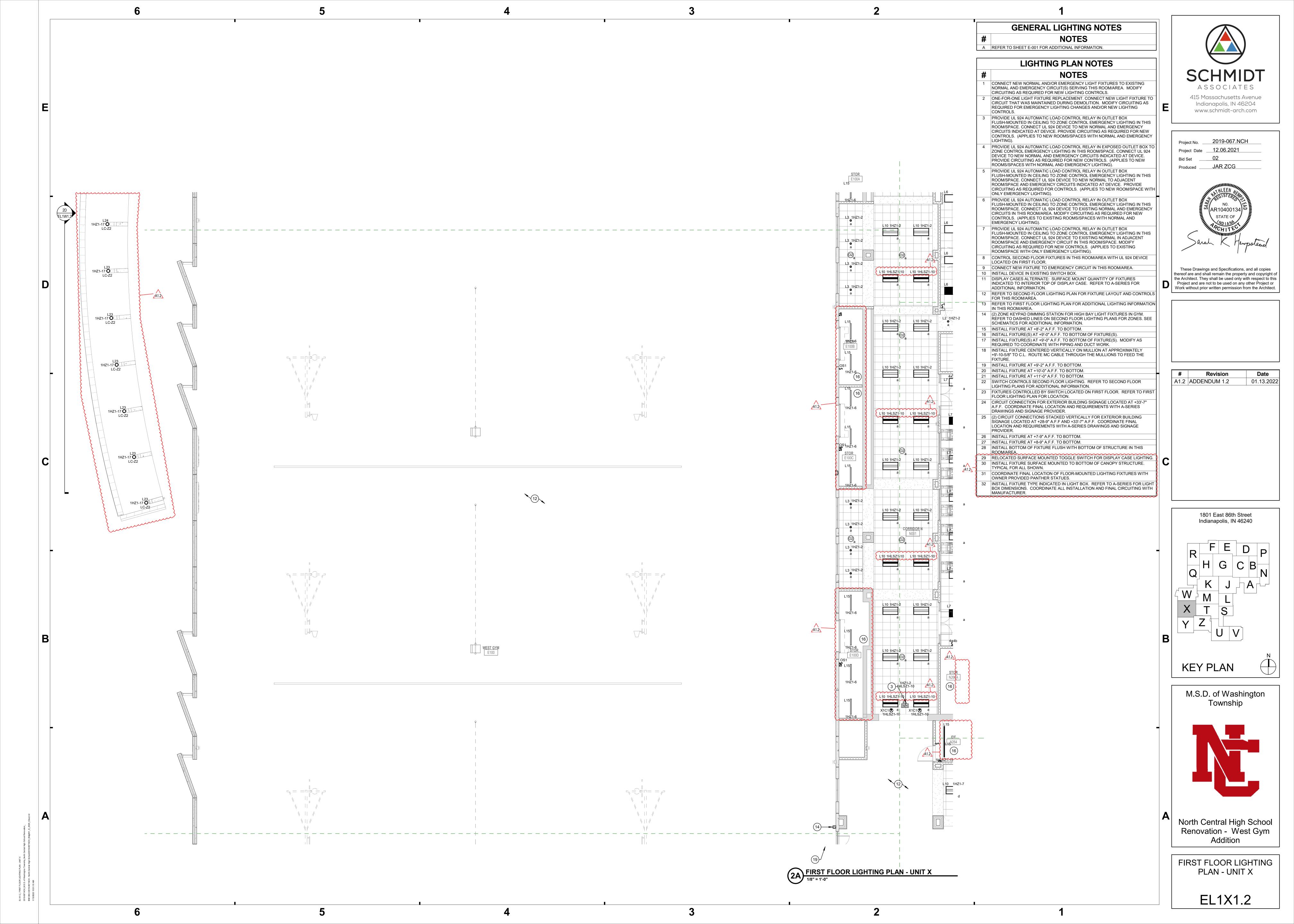


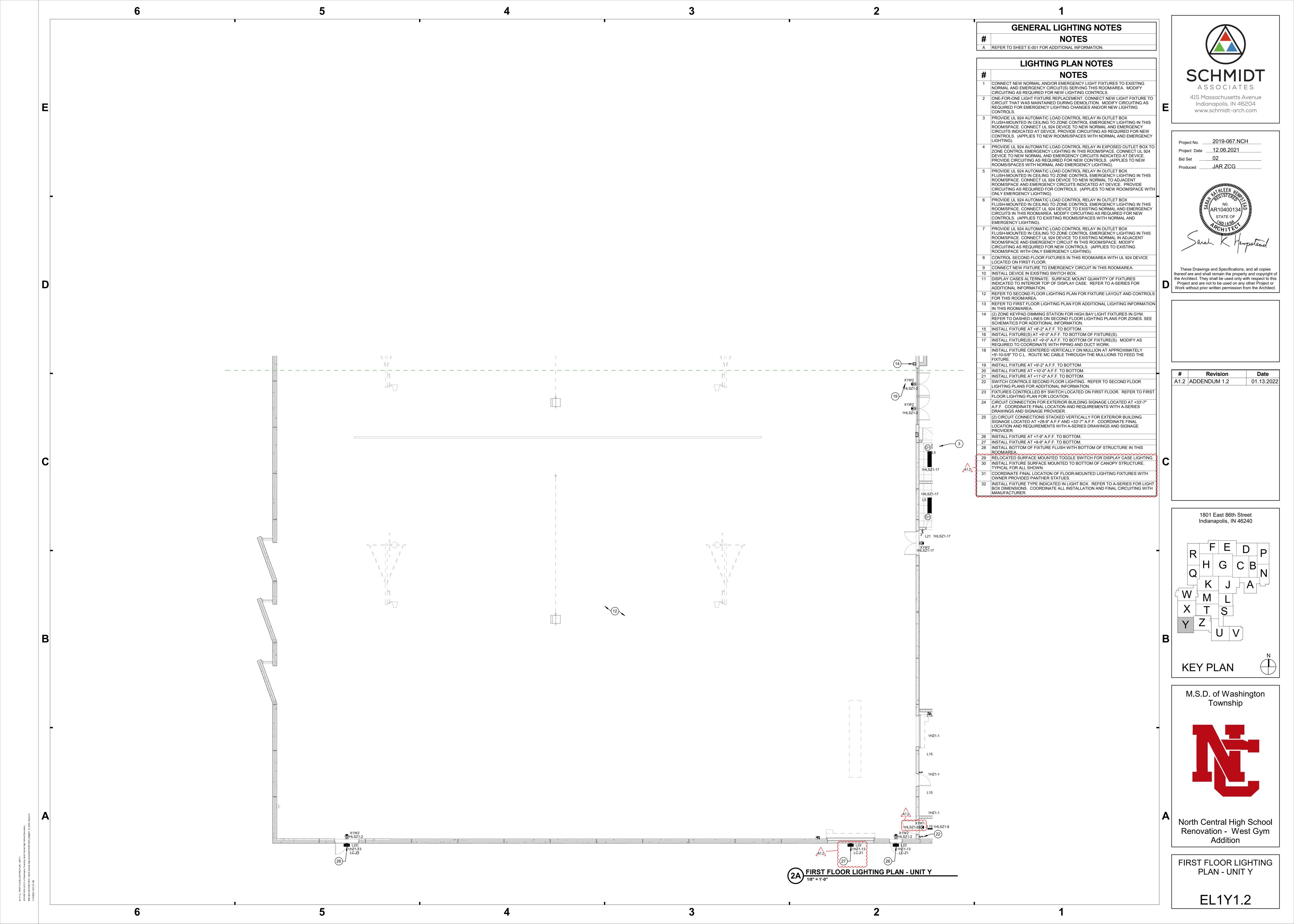


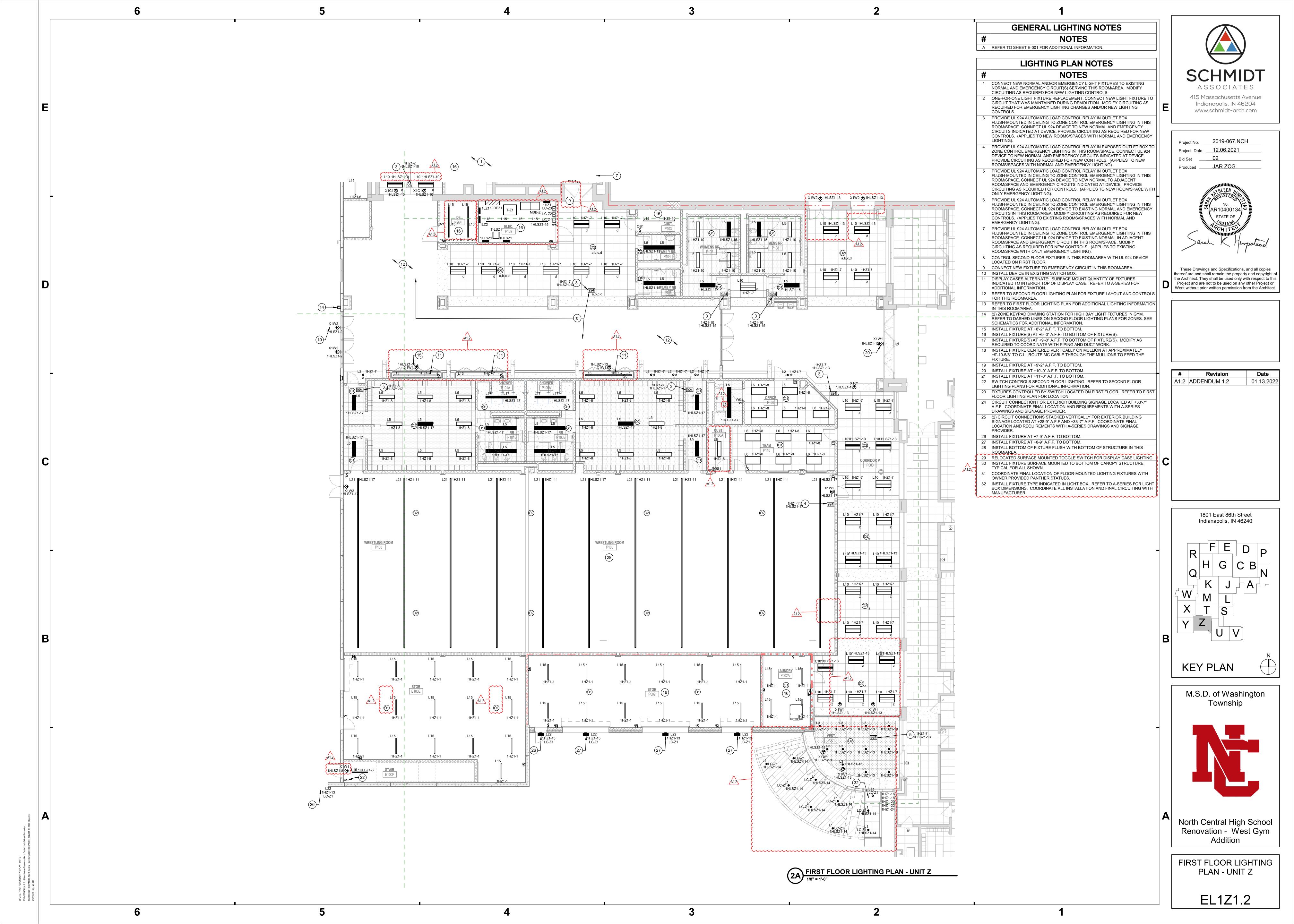


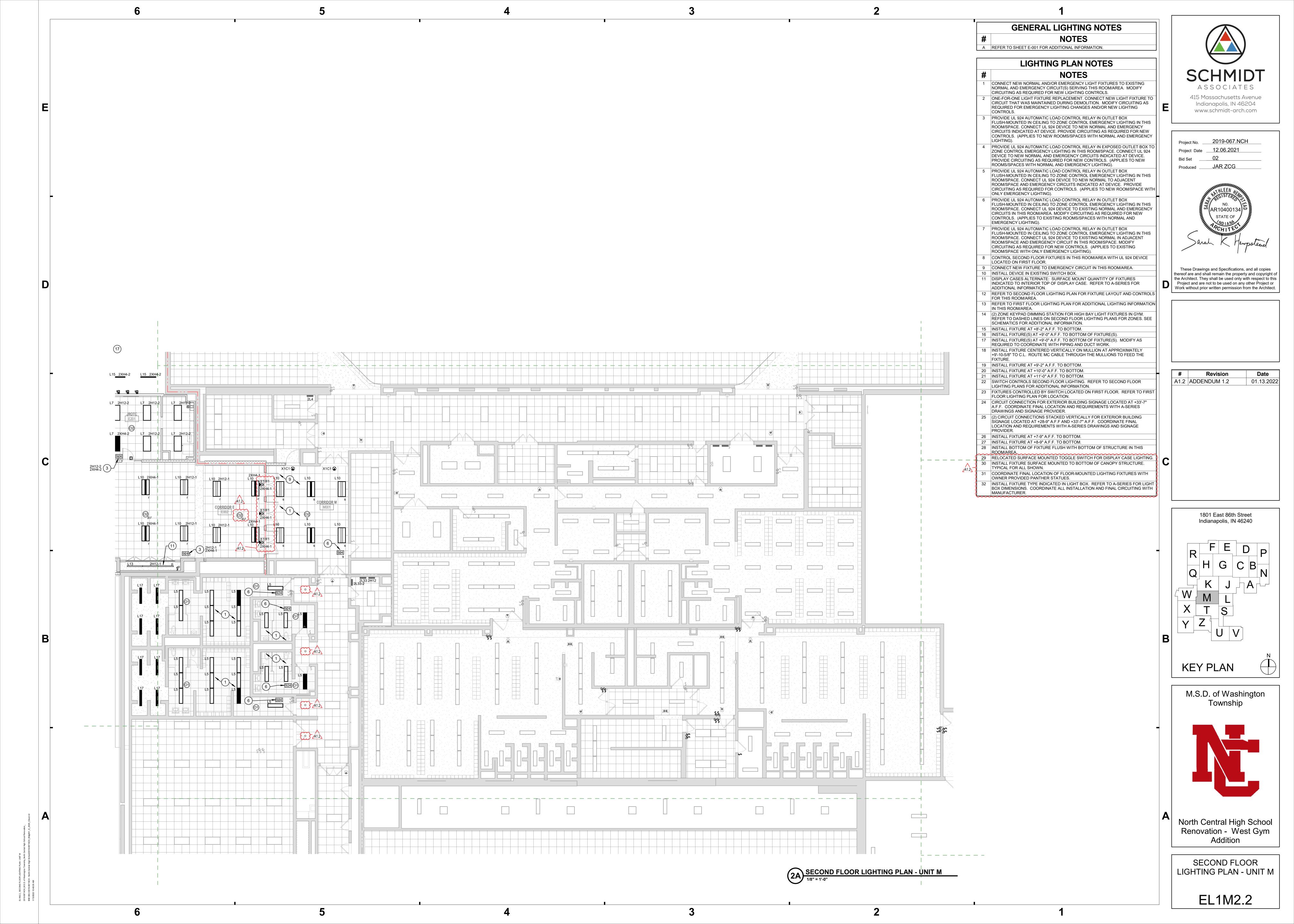


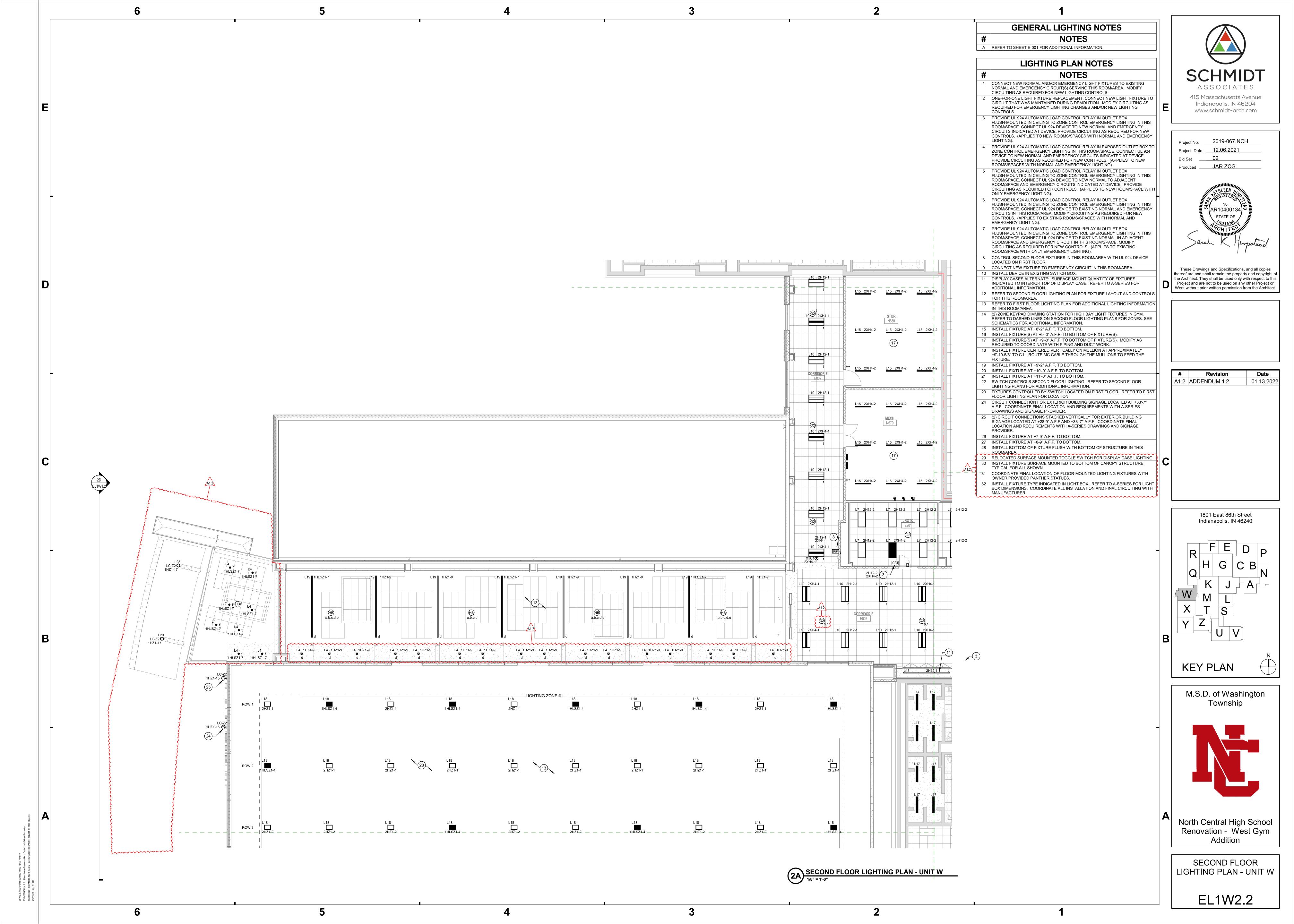


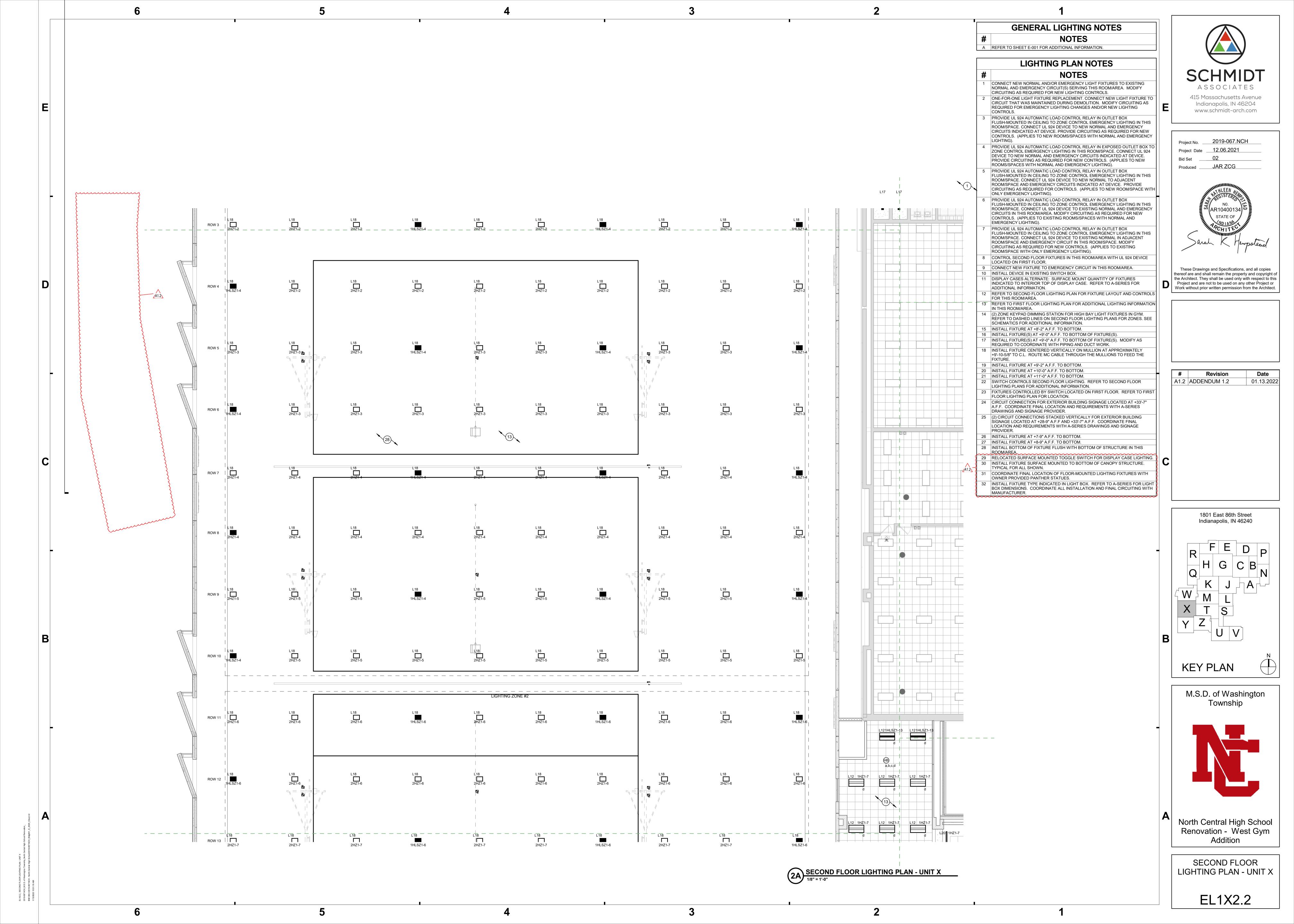


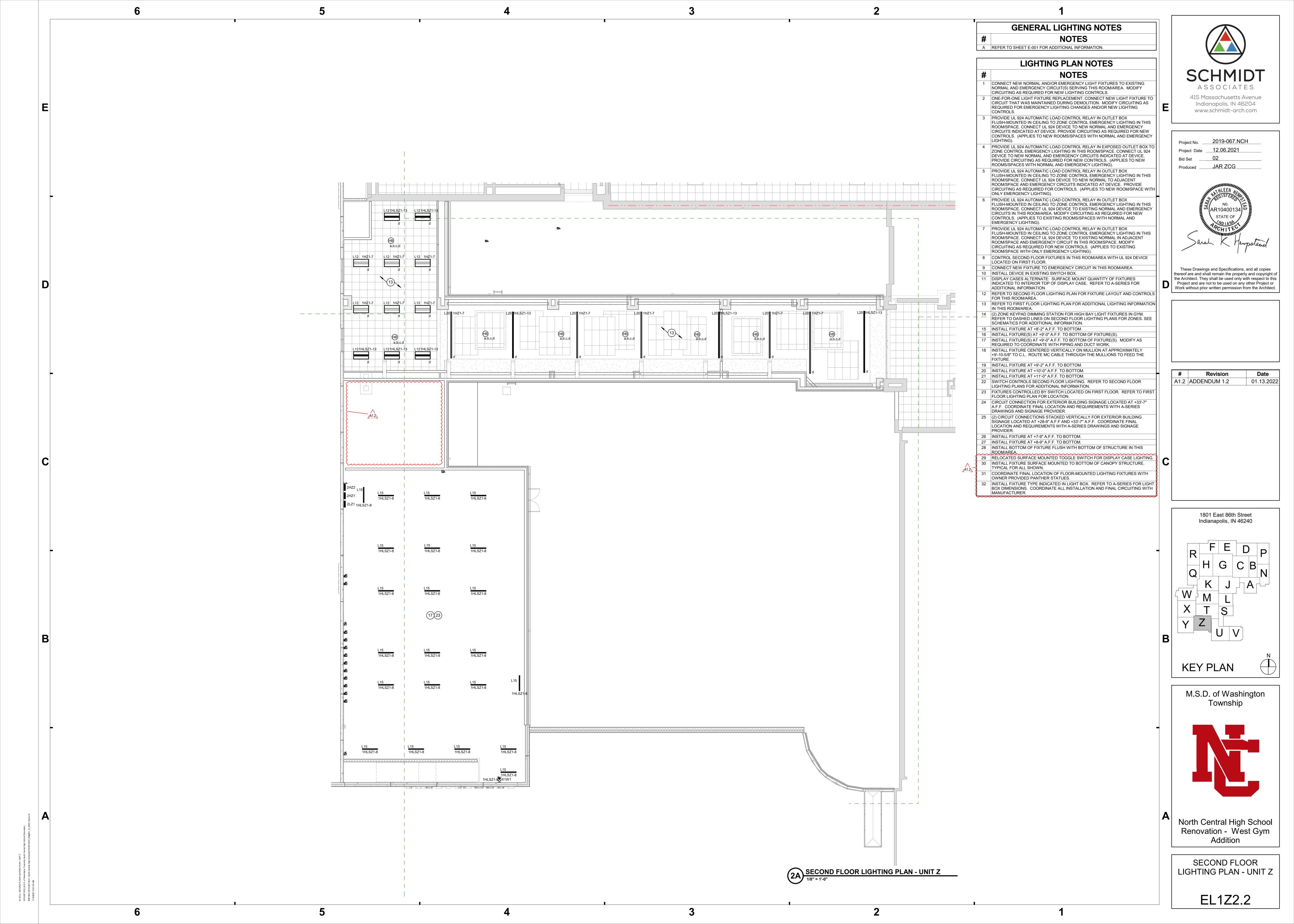


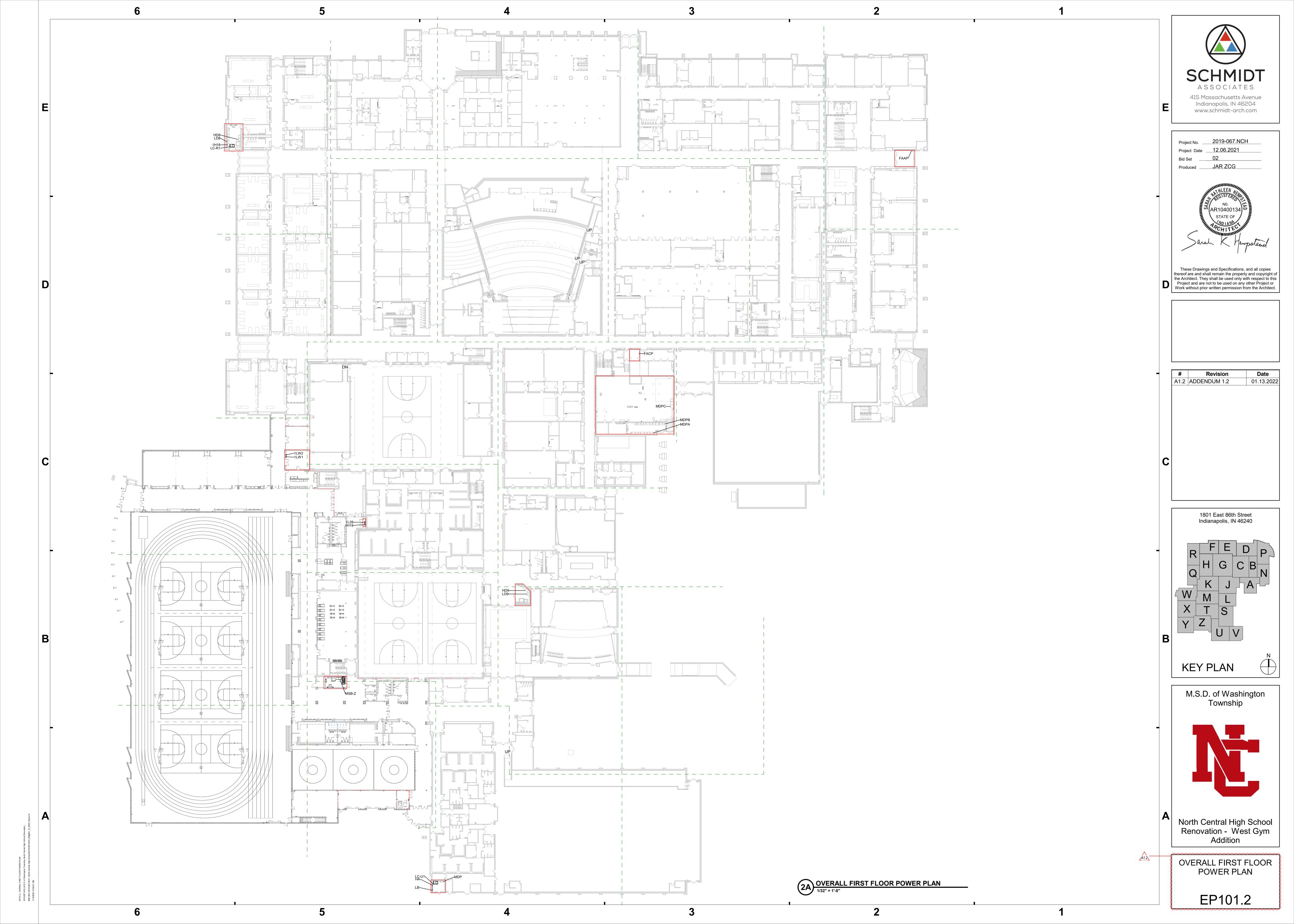


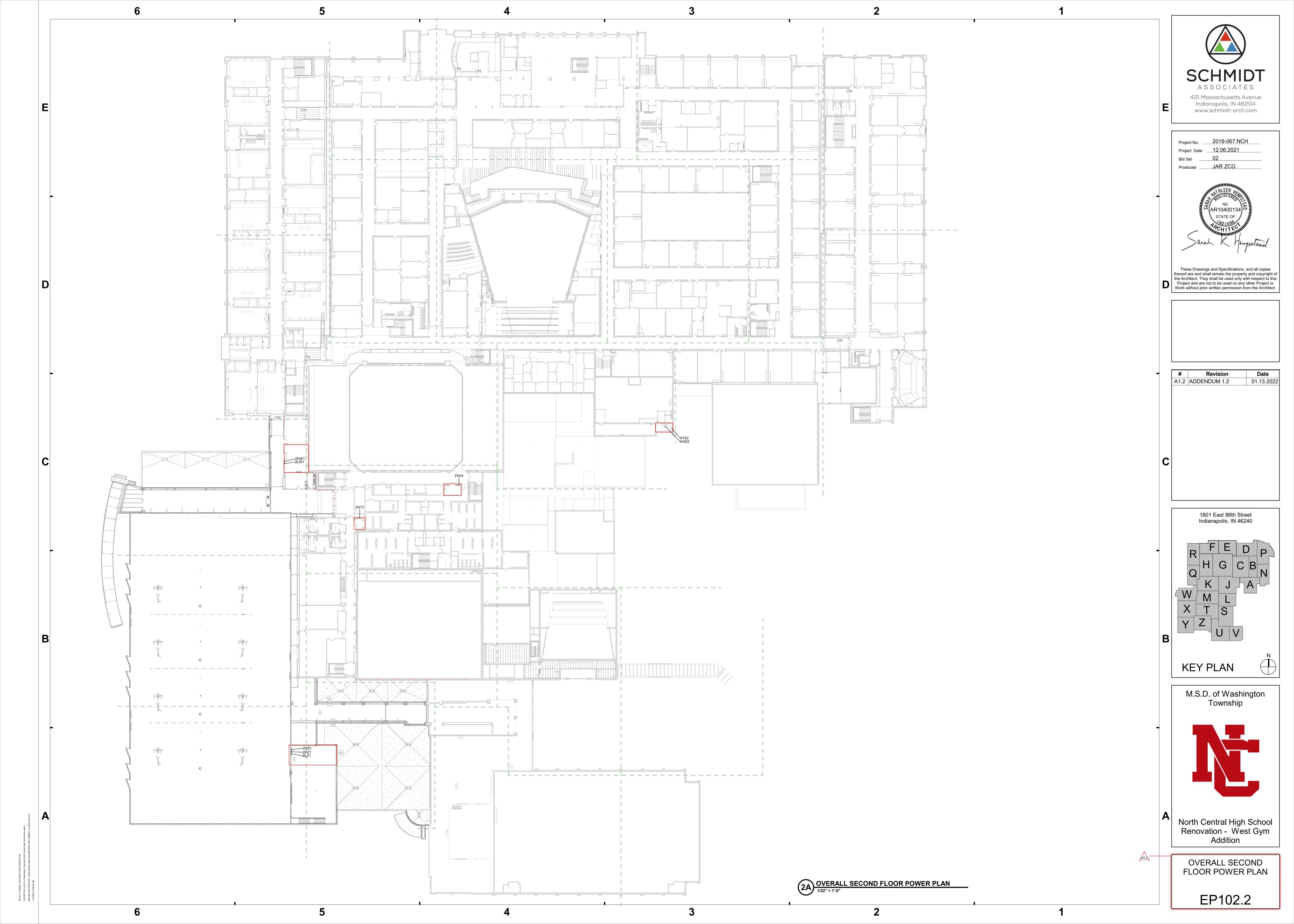


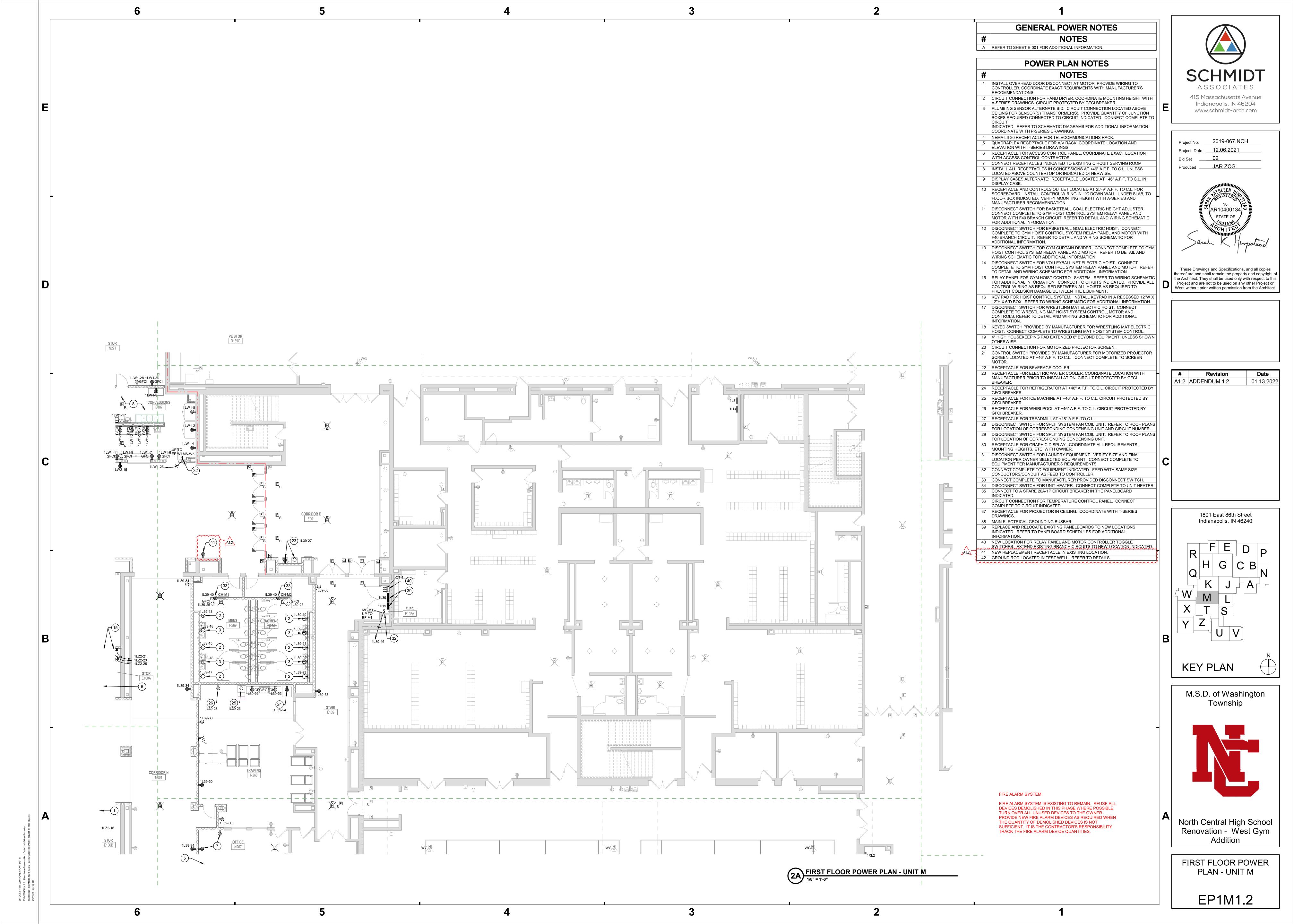


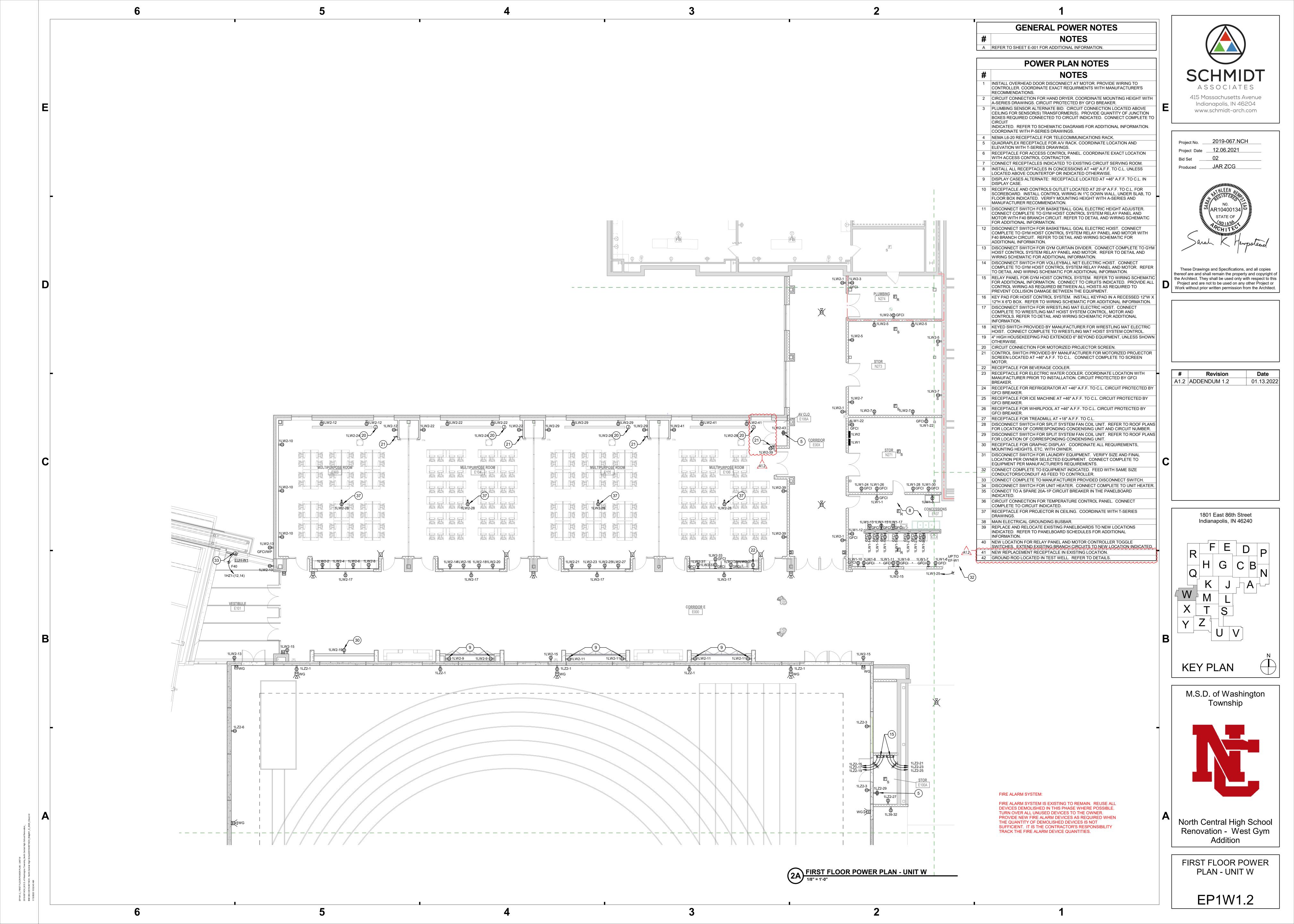


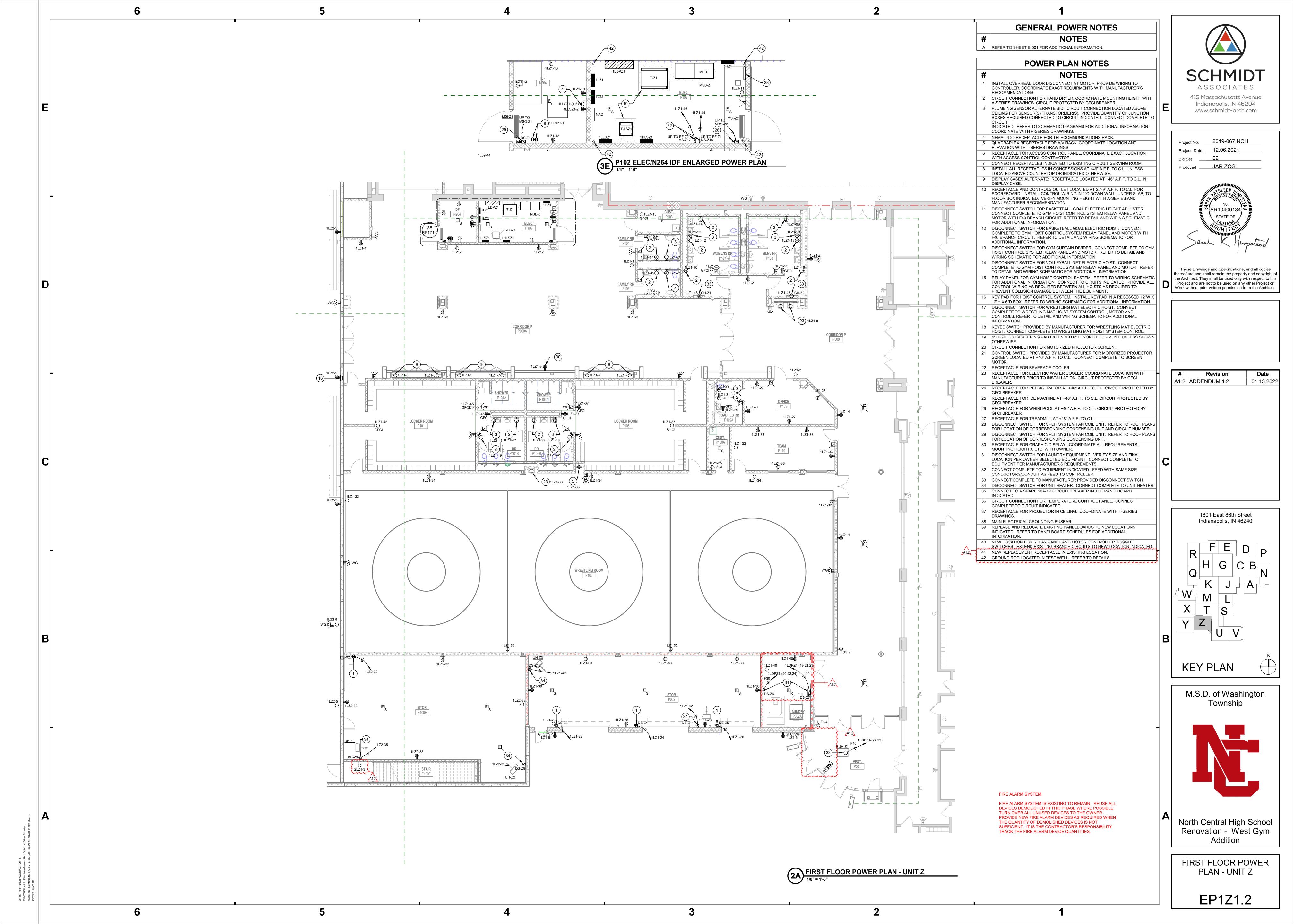


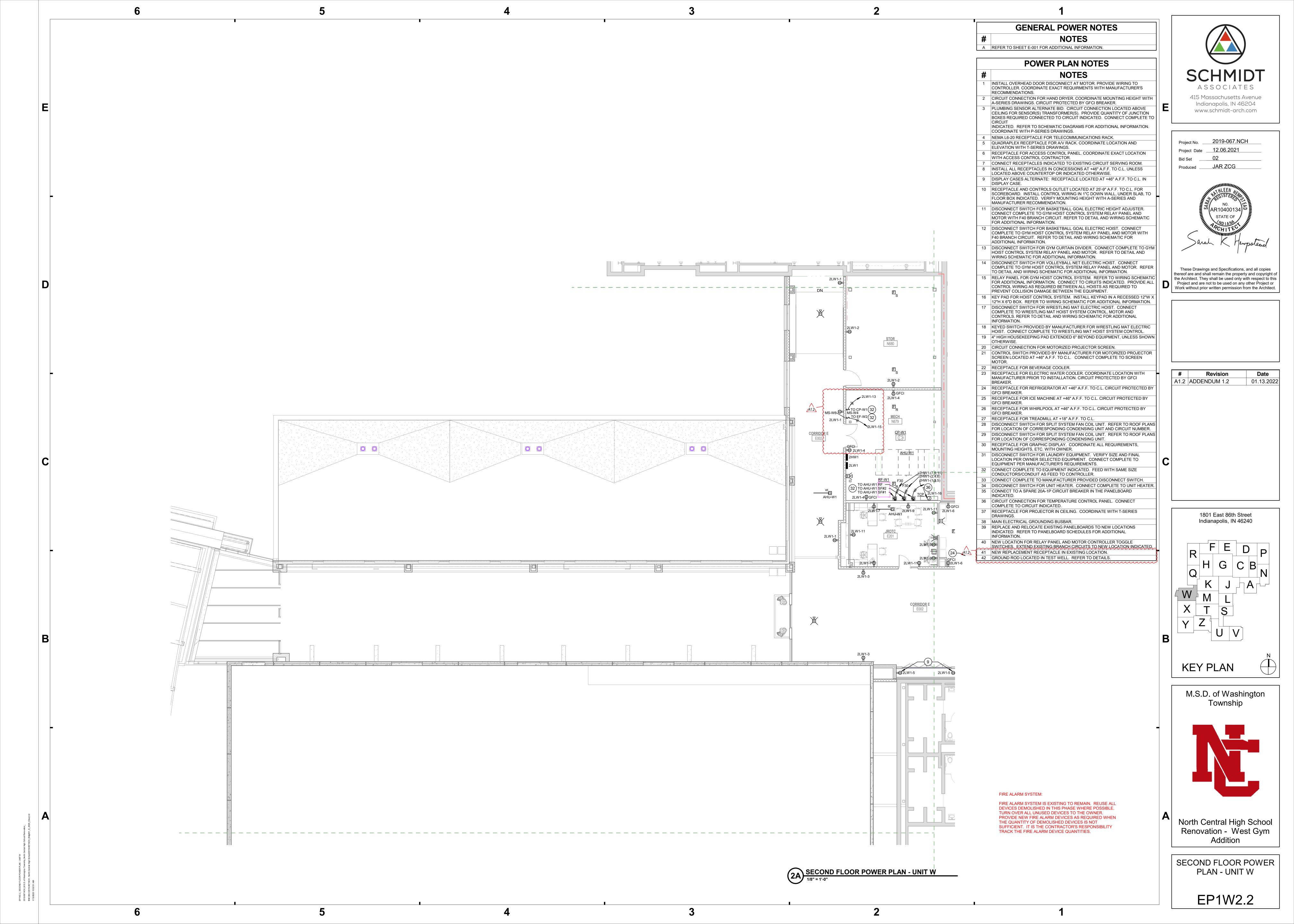


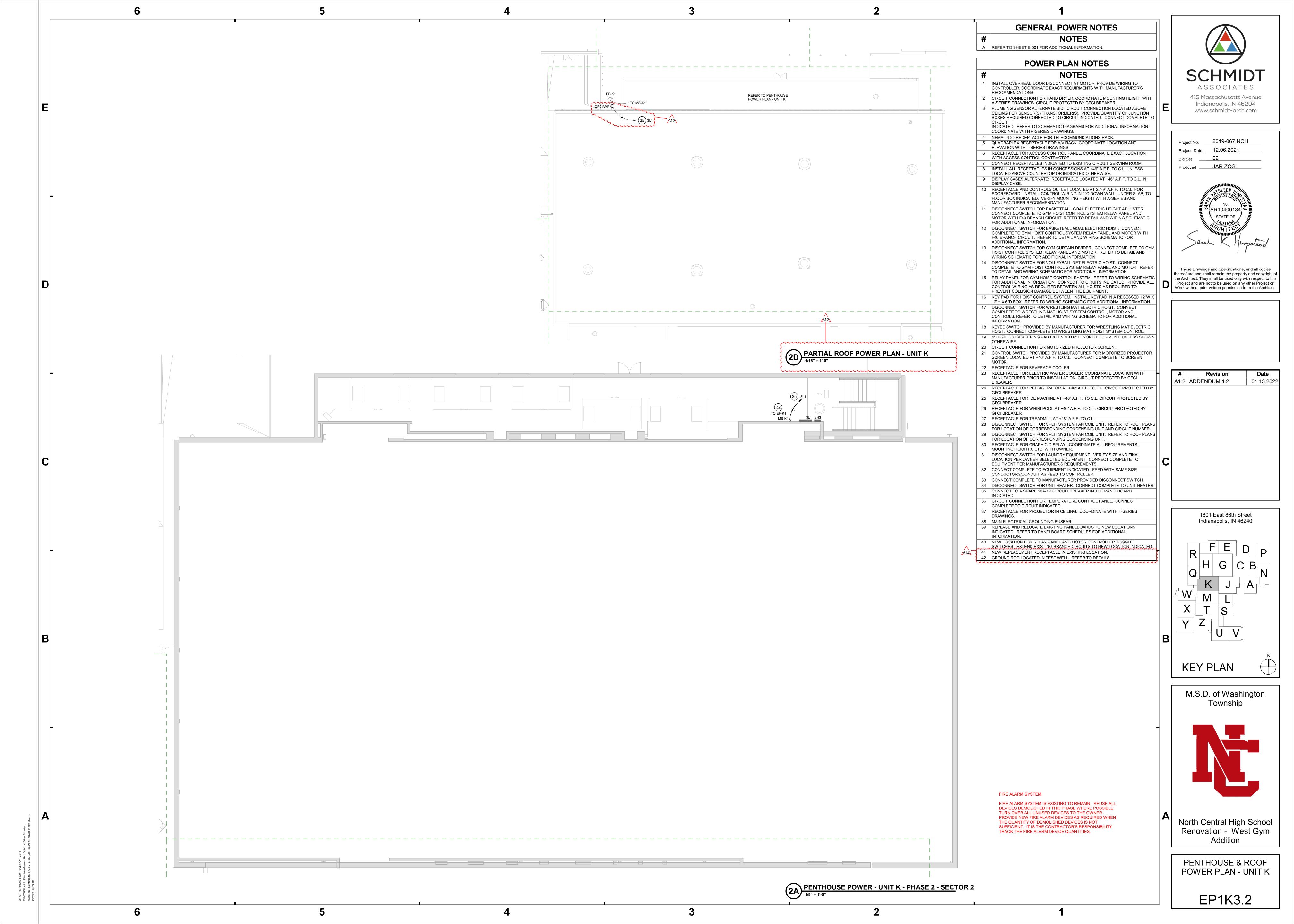




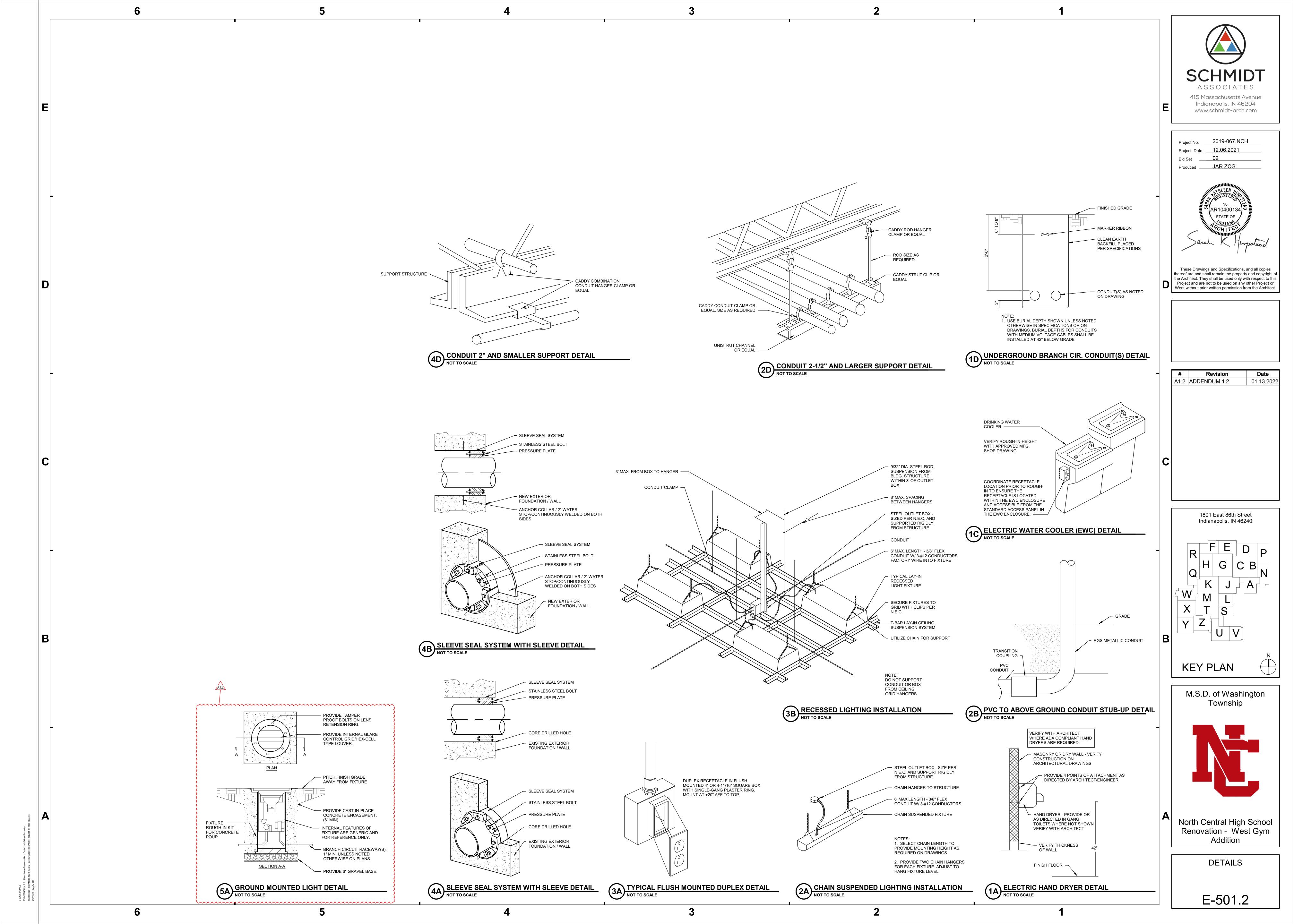


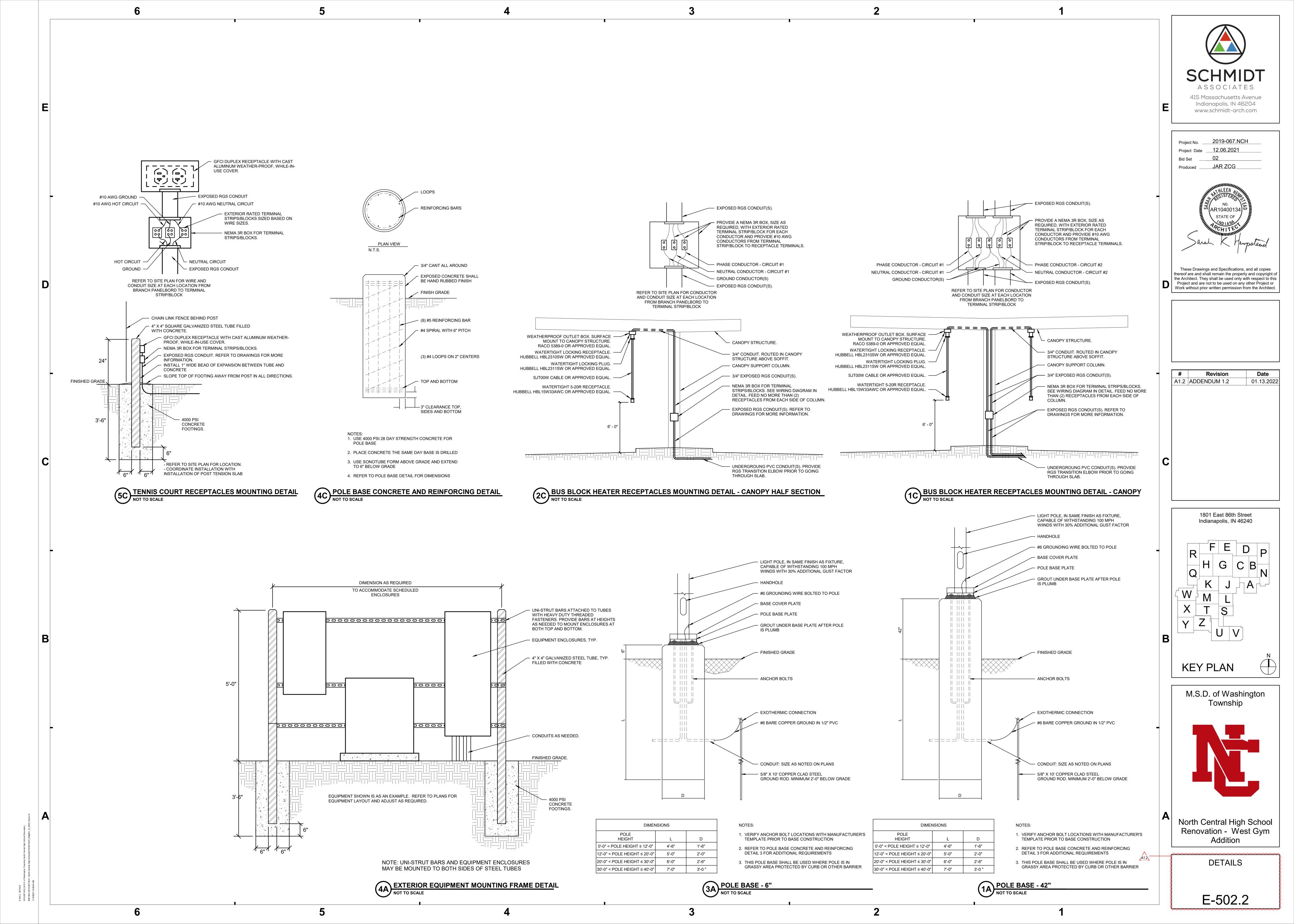


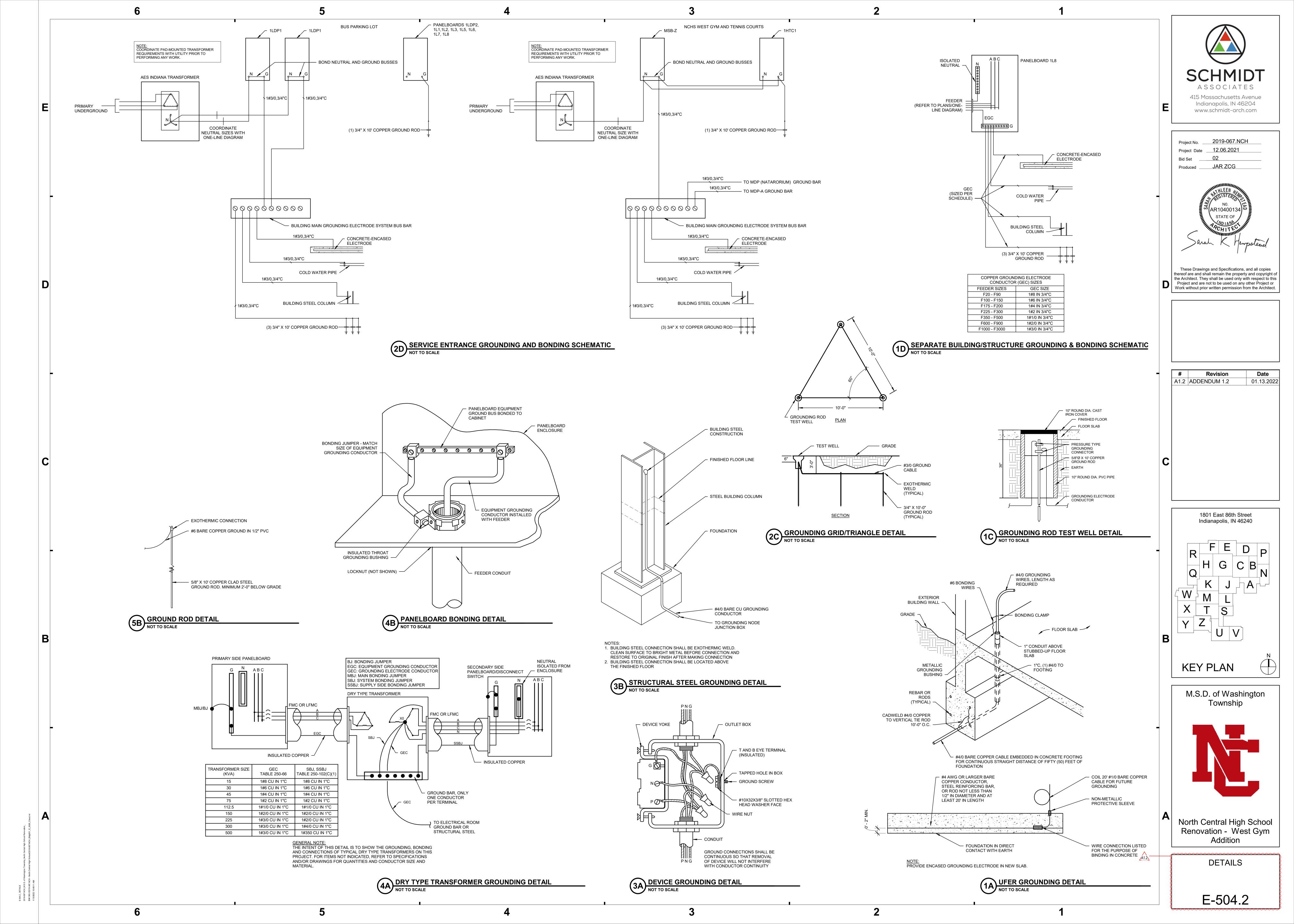




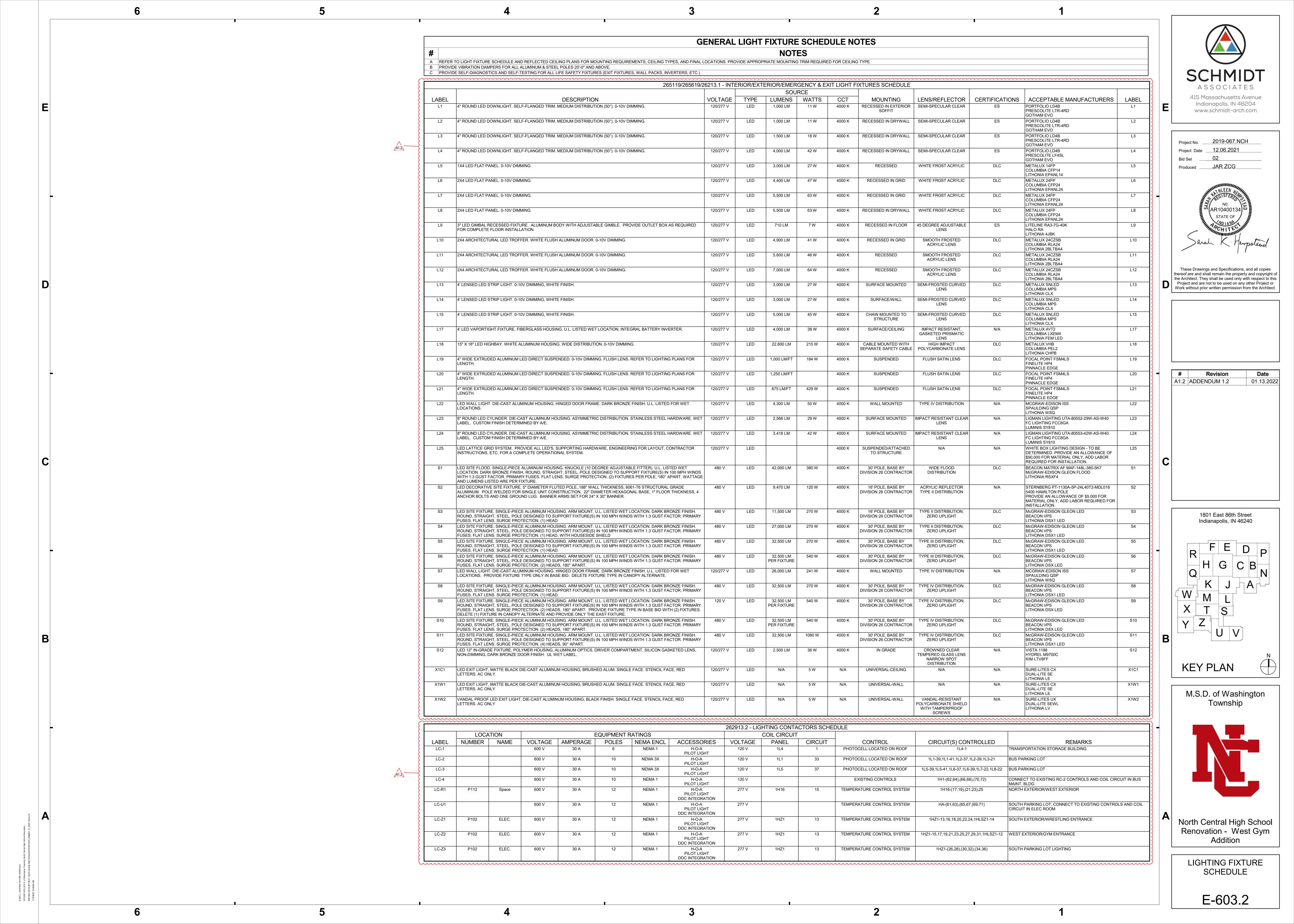


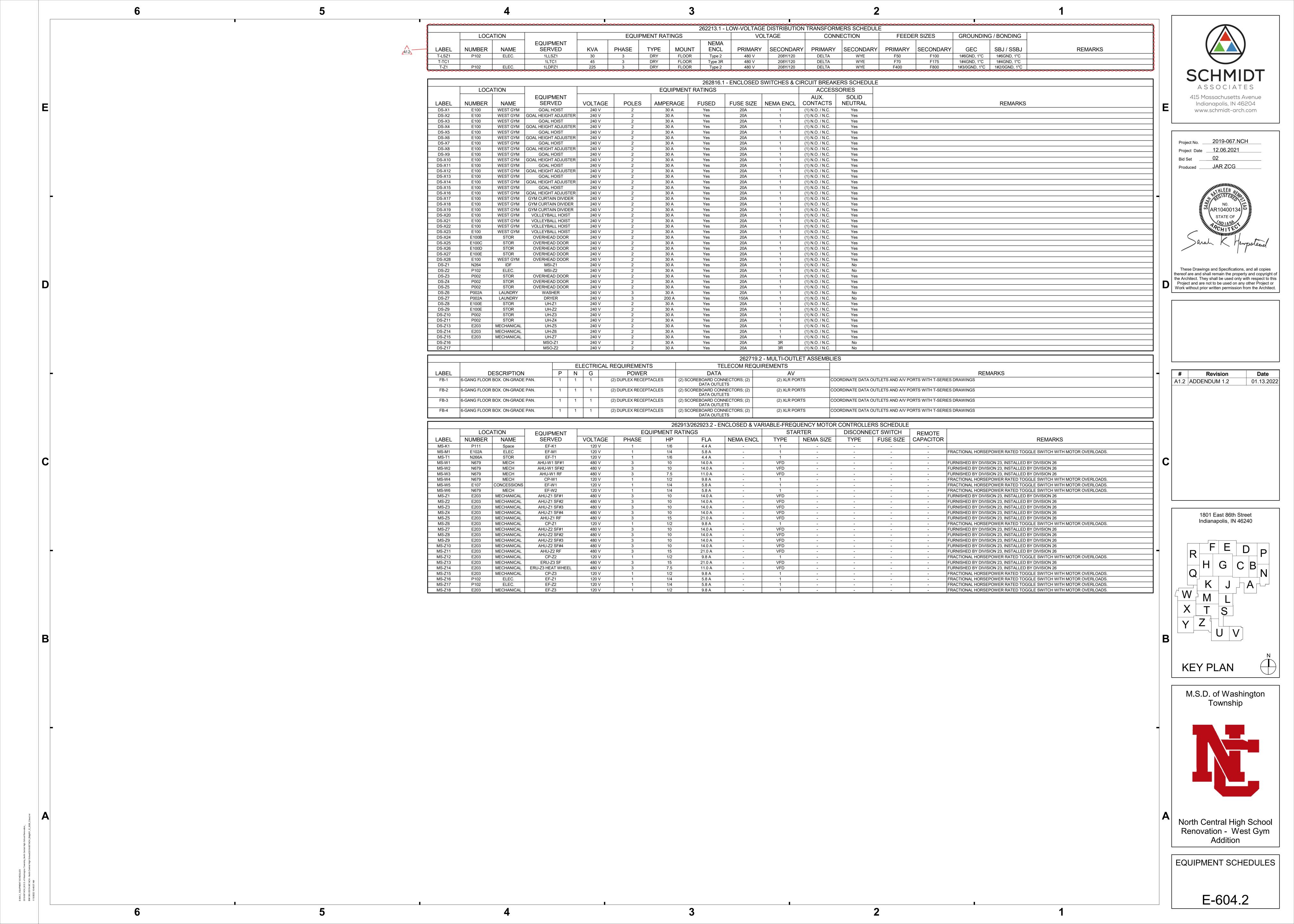


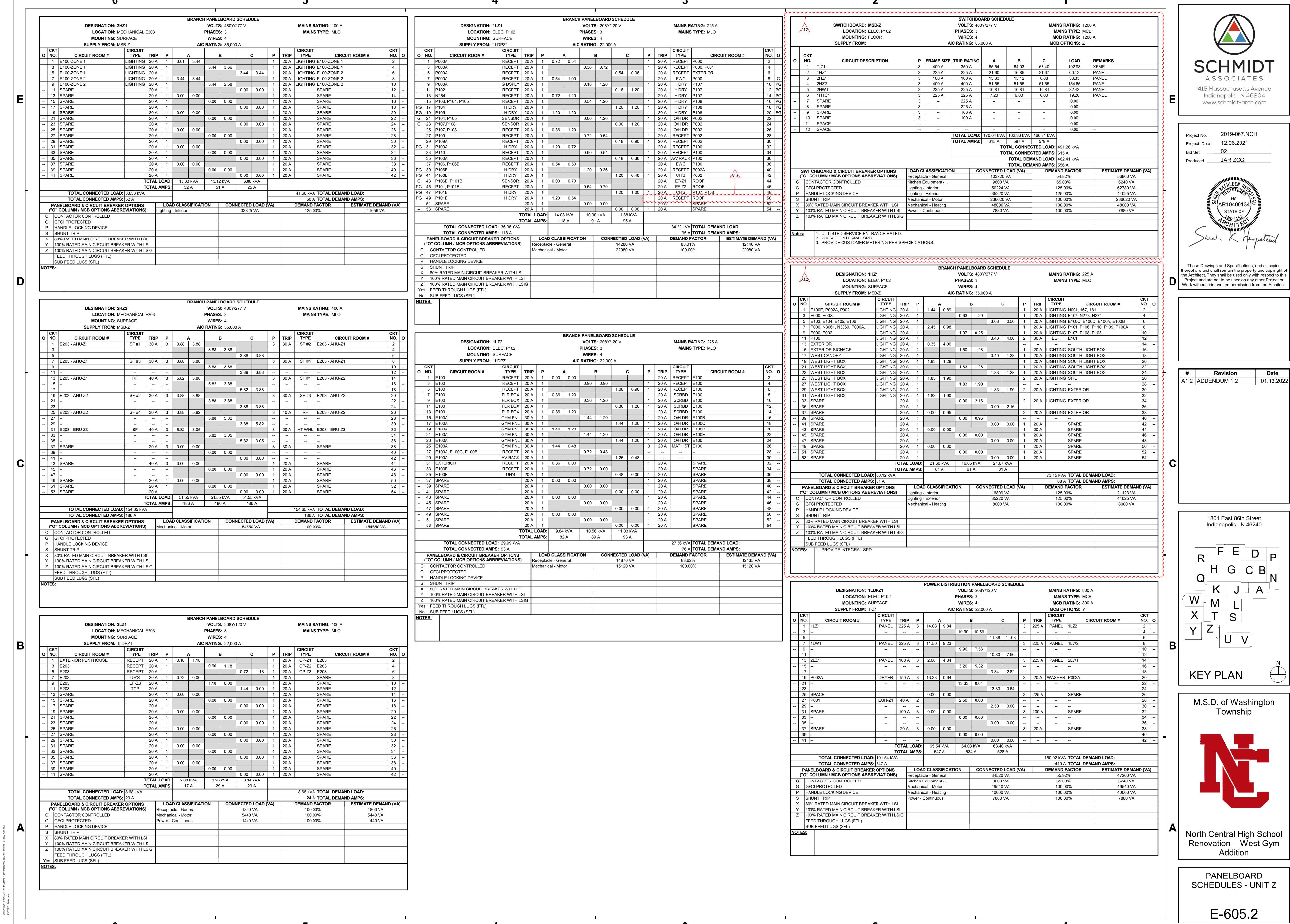


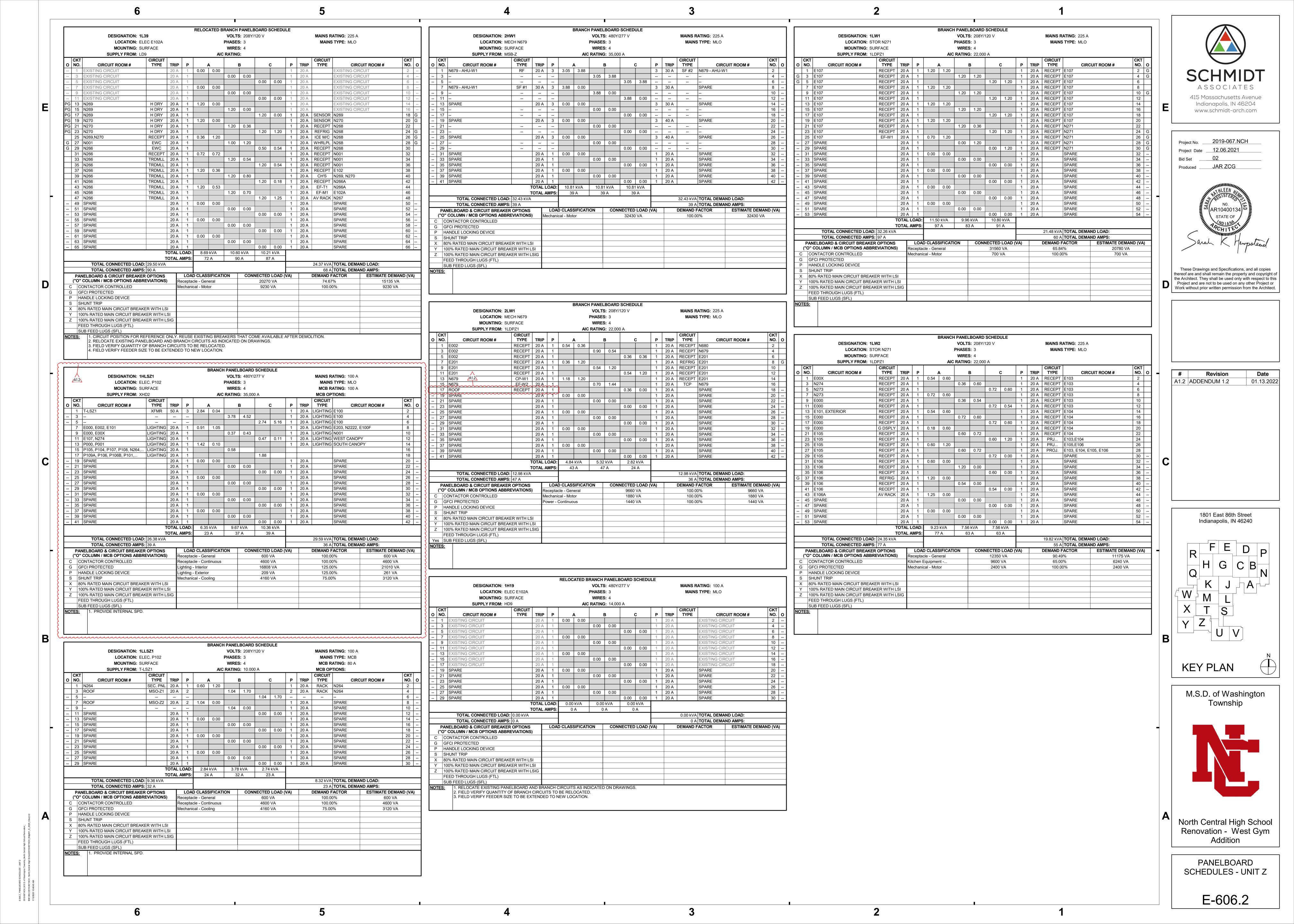


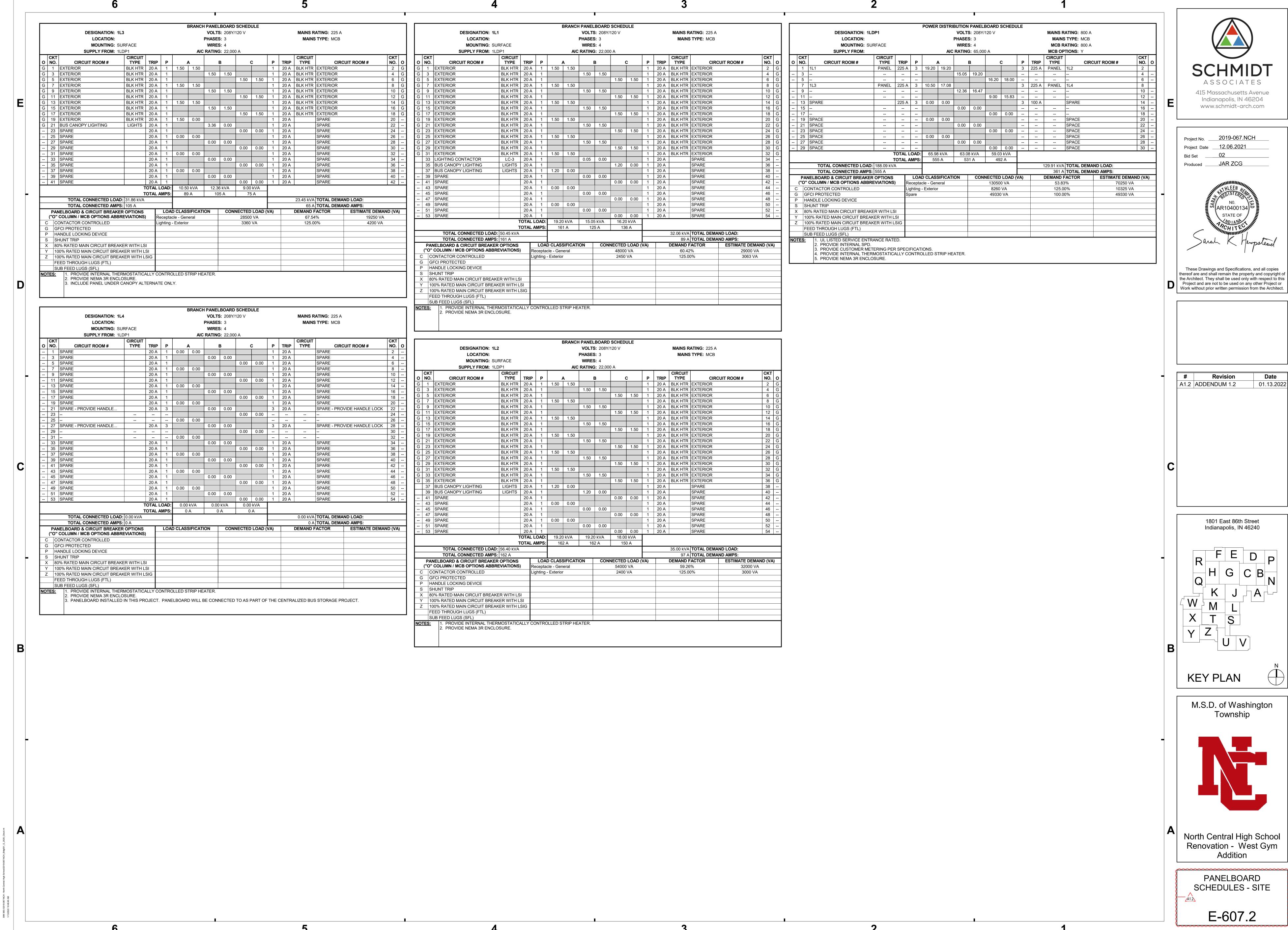












E-607.2\_ PANELBOARD SCHEDULES - SITE 2019-067.NCH\_M.S.D. of Washington Township\_North Central High School Renovation\_

