MARCH 27, 2019

ADDENDUM NO. 01

1.1 PROJECT INFORMATION

A. Project Name: Depke Juvenile Justice Complex - Fire Alarm and Controls Retrofit

B. Owner: County of Lake. 18 N County St., 9th Floor. Waukegan, Il 60085

C. Architect: DLR Group 333 W. Wacker Drive Chicago Il. 60606

D. Architect Project Number: 22-17132-00

E. Date of Addendum: March 27, 2019

1.2 NOTICE TO BIDDERS

A. This Addendum is issued to all registered plan holders pursuant to the Instructions to Bidders and Conditions of the Contract. This Addendum serves to clarify, revise, and supersede information in the Project Manual, Drawings, and previously issued Addenda. Portions of the Addendum affecting the Contract Documents will be incorporated into the Contract by enumeration of the Addendum in the Owner/Contractor Agreement.

B. The Bidder shall acknowledge receipt of this Addendum in the appropriate space on the Bid Form.

C. The date for receipt of bids is unchanged by this Addendum, at same time and location.

1. Bid Date: April 2, 2019.

1.3 PRE-BID CLARIFICATIONS

A. Preconstruction status reports on all ESC components must be filled out and submitted to AIR prior to beginning the work. The preconstruction status report is a report that documents the functionality of all existing security field devices. Refer to Specification 280500 Section 1.2B.

B. The integrator will program the integration of cameras with the PLC for camera call up. Lake County will provide camera licenses and will program the new cameras into the existing Genetic Video System. This will be a coordinated effort between Lake County and the integrator.

C. Bidder Question: “Where are the 6 doors associated with this additive alternate shown? 4 are shown as part of note #16 on sheet SE1.1, but I can’t find any other notes or items in the scheduled for 2 additional doorways.”

Response: The door count should be four. Those four doors are shown on SE1.1 are 01110.1, 01119, 01ST02, 01110.2.

D. Bidder Question: "Drawing SE0.0 detail 3 shows a New PLC Riser Diagram. There is a PLC and Harding Intercom System Exchange shown in Server Room 301F. There are no drawings to show how many devices this PLC/Exchange serves. The Control Matrix does not have devices scheduled for Area D or E. The Exhibit B Existing PLC On-Line drawings do not show this cabinet. This information is required to size the PLC I/O and Harding DCC/DCE's

Response: Areas D and E do not contain devices that need to be added or retrofitted as part of this project. Only the new main SEC Room 301F is located in Area D. SE devices are shown on SE plans and indicated in the Control Matrix. "Exhibit B Existing PLC One-Line drawings" are not in the SE plans.

1.4 DESCRIPTION OF CHANGES

A. Sheet E0.0, ELECTRICAL SYMBOLS AND ABBREVIATIONS
1. Added code compliance statement.

B. Sheet EF1.0, FIRE ALARM ORIENTATION PLAN
1. Revised Keynote #1 – "Provide 1" conduit with single mode fiber cable between FACP for communications loop. Verify requirements with fire alarm vendor."

C. Sheet EF1.2B, FIRE ALARM PLAN - AREA C-B
1. Clarified smoke detectors in residence units.

D. Sheet EF1.3, FIRE ALARM PLAN - AREA D
1. Added smoke detectors in corridor with sleeping units.
2. Clarified smoke detectors in patient rooms.

E. Sheet EF1.4, FIRE ALARM PLAN - AREA E
1. Added smoke detectors above rooms east of the Gymnasium.

F. Sheet SE0.0, SEC. ELEC. LEGEND AND GENERAL NOTES
1. Note 29 was revised to state four doors instead of six doors.

G. Sheet SE2.1 SEC. ELEC., LARGE SCALE PLANS
1. Note 27 was revised to state, "Division 26 shall ensure 4 UPS EM circuits are furnished and installed at central control and 4 UPS EM circuits are furnished and installed in Security Room 202A."
2. Note 29 was revised to state, "ESC shall furnish and install all BACnet interface devices including all raceways, conduit, and terminations. Test and commission the BACnet interface device following the provisions of 25 20 28.46.19.

H. Section 27 15 00 – COMMUNICATIONS HORIZONTAL CABLING:
1. Removed Section 1.1A. Section 271500 of the specifications is part of the contractor's responsibility.

I. Section 27 51 23 – INTERCOM PAGING SYSTEM:
   1. Revised Section 1.1D to state, "connect four doors currently controlled" in lieu of approximately six doors.

J. Section 28 31 11 – DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM:
   1. Added Section 1.2.14.
   2. Removed Section 2.3.F.
   3. Added Section 2.14.

K. Section 28 05 00 – COMMON WORK RESULTS:
   1. Revised Section 1.1H to state, "connect four doors currently controlled" in lieu of approximately six doors.

L. Section 28 46 19 – PLC ELECTRONIC MONITORING:
   1. Revised Section 1.1N to state, "connect four doors currently controlled" in lieu of approximately six doors.

1.5 ATTACHMENTS

A. This Addendum includes the following attached Sheets:
   1. E0.0, ELECTRICAL SYMBOLS AND ABBREVIATIONS (reissued)
   2. EF1.0, FIRE ALARM ORIENTATION PLAN (reissued)
   3. EF1.2B, FIRE ALARM PLAN - AREA C-B (reissued)
   4. EF1.3, FIRE ALARM PLAN - AREA D (reissued)
   5. EF1.4, FIRE ALARM PLAN - AREA E (reissued)
   6. SE0.0, SEC. ELEC. LEGEND AND GENERAL NOTES (reissued)
   7. SE2.1 SEC. ELEC., LARGE SCALE PLANS (reissued)

B. This Addendum includes the following attached Specification Sections:
   1. 27 15 00 – COMMUNICATIONS HORIZONTAL CABLING (reissued)
   2. 27 51 23 – INTERCOM PAGING SYSTEM (reissued)
   3. 28 31 11 – DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM (reissued)
   4. 28 05 00 – COMMON WORK RESULTS (reissued)
   5. 28 46 19 – PLC ELECTRONIC MONITORING (reissued)

END OF ADDENDUM NO. 01

ABBREVIATIONS

A/C	AIR CONDITIONING(ER)
A AMP	AMPERE
A	COMPRESSED AIR
AAV	AUTOMATIC AIR VENT
AB	ANCHOR BOLT
ABC	AGGREGATE BASE COURSE
ABS	ACRYLONITRILE-BUTADIENE-STYRENE
AC	ALTERNATING CURRENT
ACC	AIR COOLED CONDENSER
ACCU	AIR COOLED CONDENSING UNIT
ACM	ALUMINUM COMPOSITE MATERIAL
ACMU	SOUND ABSORBING MASONRY UNITS
ACST	ACOUSTIC
AD	ACCESS DOOR
AD	AREA DRAIN
ADDN	ADDITION OR ADDITIONAL
ADJ	ADJUSTABLE
ADJT	ADJACENT
ADMIN	ADMINISTRATION
AF	AIR FILTER
AF	AMP FRAME
AFF	ABOVE FINISH FLOOR
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
AI	AREA INLET
ALT	ALTERNATE
ALUM	ALUMINUM
AMB	AMBIENT
ANCH	ANCHOR
AP	ACCESS PANEL
APC	ACOUSTICAL PANEL CEILING
APPROX	APPROXIMATE
AR	ACID RESISTING
ARCH	ARCHITECTURAL
ASB	ASBESTOS
ATC	ACOUSTICAL TILE CEILING
AUTO	AUTOMATIC
AV	ACID VENT
AV	AIR VENT
AV	AVERAGE
AW	ACID WASTE
AWG	AMERICAN WIRE GAUGE
AWP	ACOUSTICAL WALL PANEL
B to B	BACK TO BACK
BBD	BULLETIN BOARD
BBO	BOILER BLOW OFF
BC	BALANCING COCK
BD	BOARD
BD	BACK DRAFT DAMPER
BET	BETWEEN
BFP	BACKFLOW PREVENTOR
BFR	BELOW FLOOR
BF	BOILER FEED
BFV	BUTTERFLY VALVE
BHP	BREAK HORSE POWER
BKR	BREAKER
BL	BUILDING LINE
BLDG	BUILDING
BLK	BLOCK
BLKG	BLOCKING
BLKHD	BULKHEAD
BM	BEAM
BM	BENCH MARK
BMS	BUILDING MANAGEMENT SYSTEM
BOD	BOTTOM OF DECK
BOD	BOTTOM OF DUCT
BOF	BOTTOM OF FIXTURE
BOF	BOTTOM OF FOOTING
BOL	BOTTOM OF LINTEL
BOS	BOTTOM OF STEEL
BOTT	BOTTOM
BLP	BASE PLATE
BRDG	BRIDGING
BRG	BEARING
BRKT	BRACKET
BS	BEARING SHOE
BSMT	BASEMENT
BT	BATH TUB
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
BUR	BUILT UP ROOFING
BV	BALL VALVE
C	CONDENSER WATER
C	CONDUIT
CA	COMBUSTION AIR
CAB	CABINET
CANT	CANTILEVER
CAP	CAPACITY
CAS	CASING
CB	CERAMIC BASE
CB	CIRCUIT BREAKER
CBD	CHALKBOARD
CD	CONDENSATE DRAIN
CCTV	CLOSED CIRCUIT TELEVISION
CE	COVER ELEVATION
CEM	CEMENT
CFMF	COLD-FORMED METAL FRAMING
CFS	CUBIC FEET PER SECOND
CENT	CENTRIFUGAL
CER	CERAMIC
CF	CUBIC FEET
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CG	CORNER GUARD
CH	CHANNEL
CI	CURB INLET
CIPC	CAST IN PLACE CONCRETE
CIP	CAST IRON PIPE
CIR	CIRCLE
CIRC	CIRCULATING
CJ	CONTROL JOINT
CJA	CONTROL JOINT ABOVE
CJB	CONTROL JOINT BELOW
CKT	CIRCUIT
CKT BK	CIRCUIT BREAKER
CL	CENTERLINE
CLG	CEILING
CLOS	CLOSET
CLR	CLEAR
CM	CEILING MOUNTED
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
CO	CONDUIT ONLY
CO2	CARBON DIOXIDE
COL	COLUMN
COM	COMMON
COMB	COMBINATION
COMM	COMMUNICATIONS
COMP	COMPOSITE
COMP	COMPRESSOR UNIT
COMPR	COMPRESSIBLE
CONC	CONCRETE
CONF	CONFERENCE
CONFIG	CONFIGURATION
CONN	CONNECT
CONN	CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR OR CONTRACT
CONV	CONVECTOR
CORR	CORRIDOR
CP	COMPLETE PENETRATION WELD
CP	CONDENSER PUMP
CP	COVER PLATE
CPT	CARPET (SHEET OR TILE)
CR	CONDENSER WATER RETURN
CR	CORROSION RESISTANT
CS	COUNTERSINK
CS	COMBINATION SEWER
CS	CONDENSER WATER SUPPLY
CSK	COUNTERSUNK
CSMU	CAST STONE MASONRY UNITS
CSMU	CALCIUM SILICATE MASONRY UNIT
CSP	COMBINATION STANDPIPE
CSTJ	CONSTRUCTION JOINT
CSWK	CASEWORK
CT	COOLING TOWER
CT	CURRENT TRANSFORMER
CT	CERAMIC TILE
CTB	CERAMIC TILE BASE
CTW	CERAMIC TILE WALL
CTF	CERAMIC TILE FLOOR
CTR	CENTER
CU	COPPER
CU	CONDENSING UNIT
CU	CUBIC
CUH	CABINET UNIT HEATER
CW	COLD WATER
CWR	CHILLED WATER RETURN
CWS	CHILLED WATER SUPPLY
CY	CUBIC YARD
CYL	CYLINDER
D	DEPTH
D	DEAD LOAD
D	DATA
DB	DRY BULB
DB	DECIBEL
DBA	DECIBEL A SCALE
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DC	DIRECT CURRENT
DC	DUST COLLECTOR
DCJ	DUMMY CONTROL JOINT
d	PENNY (AS NAIL 10D)
DDC	DIRECT DIGITAL CONTROL
DE	DEIONIZED WATER
DEG	DEGREE
DEPR	DEPRESS(ION)(ED)
DEPT	DEPARTMENT
DET	DETENTION
DF	DRINKING FOUNTAIN
DFEC	DETENTION FIRE EXTINGUISHER CABINET
DFR	DIESEL FUEL RETURN
DFS	DIESEL FUEL SUPPLY
DFV	DIESEL FUEL VENT
DG	DOOR GRILLE
DH	DUCT HEATER
DI	DISTILLED WATER
DI	DUCTILE IRON
DIA	DIAMETER
DIAG	DIAGONAL
DIFF	DIFFUSER
DIM	DIMENSION
DISC SW	DISCONNECT SWITCH
DISC	DISCONNECT
DISCH	DISCHARGE
DISTR	DISTRIBUTION
DL	DEAD LOAD
DM	DAMPER MOTOR
DMPR	DAMPER
DN	DOWN
DN	DOWNSPOUT NOZZLE
DO OR "	DITTO
DP	DEDICATION PLAQUE
DPFG	DAMPPROOFING
DPS	DIFFERENTIAL PRESSURE SWITCH
DR	DOOR
DR	DRAIN
DS	DOWNSPOUT
DS	DISTILLED WATER
DSP	DRY STANDPIPE
DT	PRECAST DOUBLE TEE
DTL	DETAIL
DTR	DUCT THRU ROOF
DW	DISHWASHER
DWG	DRAWING
DWL	DOWEL
DWR	DRAWER
DXS	DOUBLE EXTRA STRONG
E	EAST
E	SEISMIC LOAD
EA	EACH
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EB	EXPANSION BOLT
EC	ELECTRICAL CONTRACTOR
EDH	ELECTRIC DUCT HEATER
EE	EACH END
EER	ENERGY EFFICIENCY RATIO
EEW	EMERGENCY EYEWASH
EEWS	EMERGENCY EYEWASH/SHOWER
EF	EACH FACE
EF	EXHAUST FAN
EFF	EFFICIENCY
EH	ELECTRICAL HEATER
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EJ	EXPANSION JOINT
EJC	EXPANSION JOINT COVER
EJF	EXPANSION JOINT FILLER
EL	ELEVATION
ELAS	ELASTOMERIC
ELEC	ELECTRIC(AL)
ELEV	ELEVATOR
EMBED	EMBEDMENT
EMER	EMERGENCY
EMD	ESTIMATED MAXIMUM DEMAND
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRICAL METALLIC TUBING
EMV	EMERGENCY MIXING VALVE
ENCL	ENCLOSURE
ENTR	ENTRANCE
EOMD	END OF MAIN DRIP
EP	ELECTRO-PNEUMATIC
EP	EXPLOSION PROOF
EPO	EMERGENCY POWER OFF
ERF	EPOXY RESIN FLOORING
EQ	EQUAL
EQUIP	EQUIPMENT
ER	EXHAUST REGISTER
ES	EMERGENCY SHOWER
ES	EXTRA STRONG
ESP	EXTERNAL STATIC PRESSURE
EST	ESTIMATE
ET	EXPANSION TANK
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EWT	ENTERING WATER TEMPERATURE
EXC	EXCAVATE
EXE	EXTENDED END
EXH	EXHAUST
EXIST	EXISTING
EXP	EXPANSION
EXP	EXPOSED
EXPL	EXPLOSION
EXT	EXTERIOR
F	FAHRENHEIT
F	FIRE LINE
F	FURNACE
FA	FIRE ALARM
FA	FRESH AIR
FAB	FABRICATED
FAMAB	FLUID-APPLIED MEMBRANE AIR BARRIERS
FB	FACE BRICK
FBC	FIRE BLANKET CABINET
FC	FOOT CANDLE
FCMU	FLUTED CONCRETE MASONRY UNIT
FCO	FLOOR CLEAN OUT
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDN	FOUNDATION
FDR	FEEDER
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FEFBC	FIRE EXTINGUISHER FIRE BLANKET CABINET
FF	FINISH FLOOR
FH	FILTER HOUSING
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FIG	FIGURE
FIN	FINISH
FIX	FIXTURE
FL	FLOOR
FLASH	FLASHING
FLEX	FLEXIBLE
FLUOR	FLUORESCENT
FLG	FLOORING
FM	FACTORY MUTUAL
FM	FIRE MAIN
FMC	FLEXIBLE METALLIC CONDUIT
FME	FLOW MEASURING EQUIPMENT
FO	FACE OF
FO	FINISH OPENING
FOC	FACE OF CONCRETE
FOF	FACE OF FINISH
FOF	FUEL OIL FILL
FOM	FACE OF MASONRY
FOR	FUEL OIL RETURN
FOS	FACE OF STUD
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FOW	FACE OF WALL
FP	FIREPROOFING
FPD	FIRE PUMP DISCHARGE
FPM	FEET PER MINUTE
FR	FIRE RESISTIVE
FR	FRAME
FS	FLOOR SINK
FS	FLOW SWITCH
FSD	FIRE/SMOKE DAMPER
FT	FEET (FOOT)
FT	FIN TUBE
FT	FLOW TRANSMITTER
FTG	FOOTING
FUT	FUTURE
FVC	FIRE VALVE CABINET
FWC	FABRIC WALL COVERING
G	GROUND
G	NATURAL GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GRADE BEAM
GC	GENERAL CONTRACTOR
GCO	GRADE CLEAN OUT
GD	GARBAGE DISPOSAL
GEN	GENERAL
GEN	GENERATOR
GFA	GROSS FLOOR AREA
GFCMU	GROUND FACE (BURNISHED) CONC. MASONRY UNITIC
GFI	GROUND FAULT INTERRUPTER
GFRC	GLASS FIBER REINFORCED CONCRETE
GFRP	GLASS FIBER REINFORCED PLASTER
GHR	GLYCOL-WATER HEATING RETURN
GHS	GLYCOL-WATER HEATING SUPPLY
GI	GALVANIZED IRON
GL	GLUE LAMINATED
GL	GLASS/GLAZING
GLB	GLUE LAMINATED BEAM
GMU	GLASS MASONRY UNIT
GND	GROUND
GOVT	GOVERNMENT
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GUARD RAIL
GR	GRADE
GR	GRILLE
GS	GASOLINE
GV	GATE VALVE
GW	GREASE WASTE
GWB	GYPSUM WALL BOARD
GYP	GYPSUM
H	HEIGHT
H 1E	HOOK ONE END
HB	HOSE BIB
HC	HANDICAP
HC	HOLLOW CORE
HCB	HANDICAP BENCH
HCB	HOLLOW CORE BEARING
HCR	HOT / CHILLED WATER RETURN
HCS	HOT / CHILLED WATER SUPPLY
HDBD	HARDBOARD
HDR	HEADER
HDWD	HARDWOOD
HDWR	HARDWARE
HEV	HOSE END VALVE
HID	HIGH INTENSITY DISCHARGE
HM	HOLLOW METAL
HOA	HAND OFF AUTOMATIC
HORIZ	HORIZONTAL
HP	HEAT PUMP
HP	HIGH PRESSURE
HP	HORSEPOWER
HPC	HIGH PERFORMANCE COATING
HPR	HIGH PRESSURE STEAM RETURN
HPS	HIGH PRESSURE SODIUM
HPS	HIGH PRESSURE STEAM SUPPLY
HR	HANDRAIL
HR	HOUR
HS	HEADSTUD
HSS	HOLLOW STRUCTURAL SECTION
HSTR	HIGH STRENGTH
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HTWR	HIGH TEMP HOT WATER RETURN
HTWS	HIGH TEMP HOT WATER SUPPLY
HUM	HUMIDIFIER
HV	HEATING VENTILATING UNIT
HVAC	HEATING VENTILATING AND AIR CONDITIONING
HW	DOMESTIC HOT WATER
HWC	DOMESTIC HOT WATER RECIRCULATING
HWR	LOW TEMP HOT WATER RETURN
HWS	LOW TEMP HOT WATER SUPPLY
HX	HEAT EXCHANGER
HZ	HERTZ
IAQ	INDOOR AIR QUALITY
IAW	IN ACCORDANCE WITH
IB	INFRARED BURNER
IBC	INTERNATIONAL BUILDING CODE
IC	INTERCOM
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IES	ILLUMINATING ENGINEERING SOCIETY
IF	INSIDE FACE
IG	ISOLATED GROUND
IH	INTAKE HOOD
IJ	ISOLATION JOINT
IJS	IN JOIST SPACE
IMC	INTERMEDIATE METAL CONDUIT
IN	INCH
INC	INCLUDE (ING)
INSUL	INSULATION
INT	INTERIOR
IP	IRON PIPE
IW	INDIRECT WASTE
JAN	JANITOR
JB	JOIST BEARING ELEVATION
JB	JUNCTION BOX
JCT	JUNCTION
JST	JOIST
JFB	JOINT FILLER BOARD
JT	JOINT
K	KIP (1000 LB)
KCJ	KEYED CONSTRUCTION JOINT
KCMIL	THOUSAND CIRCULAR MILS
KCP	KEENE'S CEMENT PLASTER
KD	KNOCKDOWN
KH	KITCHEN HOOD
KHE	KITCHEN HOOD EXHAUST FAN
KHS	KITCHEN HOOD SUPPLY FAN
KIT	KITCHEN
KO	KNOCKOUT
KS	KITCHEN SINK
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KVAR	KILOVOLT AMPERES REACTIVE
KW	KILOWATT
KWH	KILOWATT HOUR
L	ANGLE
L	LIVE LOAD
LA	LABORATORY COMPRESSED AIR
LAB	LABORATORY
LAM	LAMINATE(D)
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LB	POUND
LBR	LUMBER
LBS	POUNDS
LDG	LOADING
LF	LINEAR FOOT (FEET)
LFMC	LIQUID TIGHT FLEXIBLE METALLIC CONDUIT
LG	LENGTH (LONG)
LIN	LINEAR
LINO	LINOLEUM
LKR	LOCKER
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LOC	LOCATION
LONG	LONGITUDINAL
LOX	LIQUID OXYGEN
LPG	LIQUEFIED PETROLEUM GAS
LPR	LOW PRESSURE STEAM RETURN
LPS	LOW PRESSURE STEAM SUPPLY
LR	LIVING ROOM
LSC	LIFE SAFETY CODE
LT	LIGHT
LT	LINOLEUM TILE
LTG	LIGHTING
LV	LOUVER
LV	LABORATORY VACUUM
LVL	LAMINATED VENEER LUMBER
LW	LONG WAY
LWT	LEAVING WATER TEMPERATURE
M	THOUSAND
MA	MIXED AIR
MA	MEDICAL COMPRESSED AIR
MAC	MACHINE
MAG	MAGNETIC
MAINT	MAINTENANCE
MAN	MANUAL
MAS	MASONRY
MATL	MATERIAL
MAU	MAKEUP AIR UNIT
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MB	MACHINE BOLT
MB	MOP BASIN
MBD	MARKER BOARD
MBH	THOUSAND BTU PER HOUR
MBTUH	THOUSAND BTU PER HOUR
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPS
MCB	MAIN CIRCUIT BREAKER
MD	MANUAL VOLUME DAMPER
MDO	MEDIUM DENSITY OVERLAY
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MFRG	MANUFACTURING
MG	MOTOR GENERATOR
MH	MANHOLE
MH	METAL HALIDE
MIF	MULTICOLOR INTERIOR FINISH
MIN	MINIMUM
MISC	MISCELLANEOUS
ML	MOTORIZED LOUVER
MLDG	MOLDING
MLO	MAIN LUGS ONLY
MLWK	MILLWORK
MO	MASONRY OPENING
MPG	MEDIUM PRESSURE GAS
MPR	MEDIUM PRESSURE STEAM RETURN
MPS	MEDIUM PRESSURE STEAM SUPPLY
MTD	MOUNTED
MTG	MOUNTING
MTWR	MEDIUM TEMP HOT WATER RETURN
MTWS	MEDIUM TEMP HOT WATER SUPPLY
MUL	MULLION
MV	MEDIUM VOLTAGE
MV	MERCURY VAPOR
MV	MEDICAL VACUUM
MWP	MANUFACTURED WALL PANEL
MRP	MANUFACTURED ROOF PANEL
N	NITROGEN
N	NORTH
N2O	NITROUS OXIDE
N/A	NOT APPLICABLE
NC	NOISE CRITERIA
NC	NORMALLY CLOSED
NC	NURSE CALL
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSN.
NEUT	NEUTRAL
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO	NUMBER
NO	NITROUS OXIDE
NOM	NOMINAL
NS	NEUTRAL SENSOR
NTS	NOT TO SCALE
O&M	OPERATION AND MAINTENANCE
O to O	OUT TO OUT
OA	OVERALL
OA	OUTSIDE AIR
OBSC	OBSCURE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OD	OVERFLOW DRAIN
OF	OUTSIDE FACE
OVFL	OVERFLOW
OFC	OWNER FURNISHED CONTRACTOR INSTALLED
OFF	OFFICE
OFOI	OWNER FURNISHED OWNER INSTALLED
OHP	OVERHEAD POWER
OHT	OVERHEAD TELEPHONE
OPG	OPENING
OPP	OPPOSITE
OSB	ORIENTED STRAND BOARD
OSD	OVERFLOW STORM DRAIN
OS&Y	OUTSIDE SCREW AND YOKE
OTCS	OPEN TO CEILING SPACE
OVHD	OVERHEAD
OWWJ	OPEN WEB WOOD JOIST
OX	OXYGEN
P	PAINT
P	POLE
P/T	PRESSURE/TEMPERATURE TEST PORT
P	PUMP
PA	PUBLIC ADDRESS
PAF	POWDER ACTUATED FASTENER
PAN B	PANIC BOLT
PAR	PARALLEL
PB	PARTICLE BOARD
PB	PULL BOX
PB	PUSH BUTTON
PBS	PUSH BUTTON STATION
PC	PRECAST
PC	PUMPED CONDENSATE
PCF	POUNDS PER CUBIC FOOT
PCT	PORCELAIN CERAMIC TILE
PD	PRESSURE DROP
PD	PUMP DISCHARGE
PDI	PLUMBING & DRAINAGE INSTITUTE
PENT	PENTHOUSE
PERF	PERFORATED
PERP	PERPENDICULAR
PF	POWER FACTOR
PFCMU	PRE-FACED CONCRETE MASONRY UNIT
PG	PRESSURE GAGE
PH	PHASE
PI	POINT OF INTERSECTION
PI	PRESSURE INDICATOR
PIC	PORTABLE INSTRUMENT CONNECTION
PIV	POST INDICATOR VALVE
PL	PLACE(S)
PL	PLATE
PL	PLASTIC LAMINATE
PLF	POUNDS PER LINEAL FOOT
PLAS	PLASTER
PLBG	PLUMBING
PLYWD	PLYWOOD
PNEU	PNEUMATIC
PNL	PANEL
POC	POINT OF CONNECTION
PORC	PORCELAIN
PP	PARTIAL PENETRATION WELD
PPM	PARTS PER MILLION
PR	PAIR
PREFAB	PREFABRICATED
PROJ	PROJECTION
PRV	PRESSURE REDUCING VALVE
PS	PIPE SUPPORT
PS	PROJECTION SCREEN
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSV	PRESSURE SAFETY VALVE
PT	PLASTER TRAP
PT	POINT
PT	POTENTIAL TRANSFORMER
PTN	PARTITION
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVT	POINT OF VERTICAL TANGENCY
PWR	POWER
QT	QUARRY TILE
QTR RND	QUARTER ROUND
QVCT	QUARTZ VINYL COMPOSITION TILE
R	RISER
RA	RETURN AIR
RAD	RADIATOR
RAD or R	RADIUS
RAF	RESILIENT ATHLETIC FLOORING
RAM	RUBBER ACCESSORY MOLDING
RB	RUBBER BASE
RC	REMOVE CONTROL
RCP	REFLECTED CEILING PLAN
RCP	REINFORCED CONCRETE PIPE
RCU	RECIPROCATING CHILLER JOINT
RD	ROOF DRAIN
RD	REFRIGERANT DISCHARGE
RECP	RECEPTACLE
REF	REFERENCE
REFL	REFLECTED
REFR	REFRIGERANT
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCEMENT
REM	REMOVABLE
REQ(D)	REQUIRE(D)
RESIL	RESILIENT
RET	RETAINING (WALL)
REV	REVISIONS
RF	RETURN FAN
RF	RUBBER FLOOR
RFCMU	ROCK-FACED CONCRETE MASONRY UNITS
RFM	RECESSED FLOOR MAT
RH	RELATIVE HUMIDITY
RH	RELIEF HOOD
RHC	REHEAT COIL
RHG	REFRIGERANT HOT GAS
RI&C	ROUGH IN AND CONNECT
RIJS	RISE IN JOIST SPACE
RL	REFRIGERANT LIQUID
RM	ROOM
RMC	RIGID METALLIC CONDUIT
RNC	RIGID NONMETALLIC CONDUIT
RND	ROUND
RO	ROUGH OPENING
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE BACKFLOW PREVENTER
RS	REFRIGERANT SUCTION
RSF	RESILIENT SHEET FLOORING
RT	RUBBER TILE
RTF	RESILIET TILE FLOORING
RWL	RAIN WATER LEADERS SENSOR
S	STAIN
S	SINK
S	SANITARY SEWER
S	SOUTH
S	SPRINKLER LINE
SA	SHOCK ABSORBER
SA	SUPPLY AIR
SAN	SANITARY WASTE
SB	STONE BASE
SC	SOLID CORE
SCFT	STRUCTURAL CLAY FACING TILE
SCHED	SCHEDULE
SCONC	SEALED CONCRETE
SCR	SHOWER CURTAIN ROD
SCUT	SCUTTLE
SCW	SOFT COLD WATER
SD	SMOKE DAMPER
SD	SMOKE DETECTOR
SD	STORM DRAIN
SE	STEAM EXHAUST VENT
SEC	SECONDARY
SEC	SECURITY
SECT	SECTION
SECY	SECRETARY
SENS	SENSIBLE
SF	SQUARE FOOT
SF	SUPPLY FAN
SFCMU	SPLIT-FACED CONCRETE MASONRY UNIT
SGL	SINGLE
SFGT	STRUCTURAL GLAZED FACING TILE
SH	SHOWER
SHEATH	SHEATHING
SHM	SECURITY HOLLOW METAL
SHT	SHEET
SHW	SOFT HOT WATER
SIM	SIMILAR
SL	SHORT LEG
SLNT	SEALANT
SM	SHEET METAL
SM	SPRINKLER MAIN
SNT	STONE TILE
SOG	SLAB ON GRADE
SP	STATIC PRESSURE (H2O)
SP	STAND PIPE
SP	STATIC PRESSURE
SPA	SPACE
SPEC	SPECIFICATIONS
SPK	SPRINKLER
SPL	SOUND PRESSURE LEVEL
SPL	SPECIAL
SPL BLK	SPLASH BLOCK
SQ	SQUARE
SRCMU	SPLIT-RIBBED CONCRETE MASONRY UNITY
SS	STAINLESS STEEL
SSA	STORM SHELTER AREA
SS	SERVICE SINK
SS	SOLID SURFACE
ST	STAIN
ST	STAIR
ST	STORM SEWER
STAG'D	STAGGERED
STC	SOUND TRANSMISSION CLASS
STC	STAINED CONCRETE
STD	STANDARD
STE	SINGLE TAPERED END
STGR	STRINGER
STL	STEEL
STOR	STORAGE
STR	STRUCTURAL - STRUCTURE
SUB	SUBSTATION
SUBFL	SUBFLOOR
SURF	SURFACE
SUSP	SUSPENDED
SV	SHEET VINYL
SV	SOLENOID VALVE
SW	SHORT WAY
SW	SWITCH
SWBD	SWITCH BOARD
SWP	STEAM WORKING PRESSURE
SYM	SYMMETRICAL
T	TEMPERED
T	THERMOSTAT
T & B	TOP & BOTTOM
T & G	TONGUE & GROOVE
T	TREAD
TA	TRANSFER AIR
TAB	TEST AND BALANCE
TAN	TANGENT
TB	TERMINAL BOX
TB	TOWEL BAR
TBD	TACK BOARD
TC	TEMPERATURE CONTROL
TC	TIME CLOCK
TD	TRANSFER DUCT
TD	TRENCH DRAIN
TDH	TOTAL DYNAMIC HEAD
TEL	TELEPHONE
TEMP	TEMPERED
TEMP	TEMPERATURE
TEMP	TEMPORARY
TERR	TERRAZZO
TEXT	TEXTURED
TGL	TOGGLE
TH	THRESHOLD
THK	THICK(NESS)
TMV	THERMOSTATIC MIXING VALVE
TOB	TOP OF BEAM
TOC	TOP OF CONCRETE
TOF	TOP OF FOOTING
TOIL	TOILET
TOS	TOP OF STEEL
TOW	TOP OF WALL
TPV	TRAP PRIMER
TR	TRIP
TRANS	TRANSVERSE
TRD	TREAD
TS	TACK STRIP
TS	TALL STORAGE
TS	TEMPERATURE SENSOR
TSP	TOTAL STATIC PRESSURE
TT	TEMPERATURE TRANSMITTER
TT	TERRAZZO TILE
TV	TELEVISION
TW	TACK WALL
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
UC	UNIT COOLER
UG	UNDERGROUND
UGC	UNDERGROUND COMMUNICATION
UGE	UNDERGROUND ELECTRICAL
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES
UNEX	UNEXCAVATED
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UR	URINAL
URD	UNDERGROUND RESIDENTIAL DISTRIBUTION
US	**UTILITY SHELF**
UT	UTILITY TRANSFORMER
UTIL	UTILITY
UV	UNIT VENTILATOR
V	VENT
V	VOLT
V	VACUUM
VA	VALVE
VAC	VACUUM
VAM	VINYL ACCESSORY MOLDING
VAV	VARIABLE AIR VOLUME
VB	VAPOR BARRIER
VB	VINYL BASE
VBF	VENT BELOW FLOOR
VCB	VENTED COVE BASE
VCJ	VENEER CONTROL JOINT
VCP	VITRIFIED CLAY PIPE
VCT	VINYL COMPOSITION TILE
VD	VOLUME DAMPER - MANUAL
VEL	VELOCITY
VENT	VENTILATION
VENT	VENTILATOR
VERT	VERTICAL
VEST	VESTIBULE
VF	VINYL FLOOR
VFD	VARIABLE FREQUENCY DRIVE
VM	VOLTMETER
VMES	VERTICAL MASONRY EDGE STIFFENER
VMWR	VERTICAL MASONRY WALL REINFORCING
VOL	VOLUME
VP	VENEER PLASTER
VPLAS	VENETIAN PLASTER
VP	VACUUM PUMP
VR	VAPOR RETARDER
VTR	VENT THROUGH ROOF
VWC	VINYL WALLCOVERING
W	WATER SERVICE
W	WIDE; WIDTH
W	WASTE (PLUG)
W	WATT
W	WEST
W	WIDE FLANGE
W	WIND LOAD
W	WIRE
W/	WITH
W/O	WITHOUT
WAF	WOOD ATHLETIC FLOORING
WB	WET BULB
WC	WALL COVERING
WC	WATER COLUMN
WC	WATER CLOSET
WCC	WATER COOLED CONDENSER
WCL	WATER CLOSET/LAVATORY COMBINATION
WCO	WALL CLEAN OUT
WD	WOOD
WDB	WOOD BASE
WDW	WINDOW
WF	WASH FOUNTAIN
WG	WIRE GUARD
WH	WALL HYDRANT
WFMD	WATER FLOW MEASURING DEVICE
WH	WATER HEATER
WHM	WATT HOUR METER
WI	WROUGHT IRON
WIJ	WOOD I-JOIST
WLR	WATER LOOP RETURN
WLS	WATER LOOP SUPPLY
WMG	WATER MOTOR GONG
WNSCT	WAINSCOT
WP	WEATHERPROOF
WP	WORKING POINT
WPB	WHIRLPOOL BATH
WPF	WATERPROOF
WPFG	WATERPROOFING
WR	WATER RESISTANT
WR	WASTE RECEPTACLE
WSP	WET STANDPIPE
WT	WEIGHT
WW	WARM WHITE
WWF	WELDED WIRE FABRIC
WWR	WELDED WIRE REINFORCING
XFMR	TRANSFORMER
XMTR	TRANSMITTER
YD	YARD
YH	YARD HYDRANT
Z	IMPEDANCE
ZCV	ZONE CONTROL VALVE
ZVB	ZONE VALVE BOX
&	AND
@	AT
i.e.	THAT IS
#	NUMBER

THE FOLLOWING ABBREVIATIONS ARE USED WITH GLAZING:

CG	CLEAR FLOAT GLASS
CIG	CLEAR INSULATING GLASS
CTG	CLEAR TEMPERED FLOAT GLASS
CTIG	CLEAR TEMPERED INSULATING GLASS
LG	LAMINATED GLASS
LSG	LAMINATED SECURITY GLAZING
SG	SPANDREL GLASS
ISG	INSULATED SPANDREL GLASS
TG	TINTED FLOAT GLASS
TIG	TINTED INSULATING GLASS
TTG	TINTED TEMPERED FLOAT GLASS
TTIG	TINTED TEMPERED INSULATING GLASS
WG	POLISHED WIRE GLASS

MOUNTING HEIGHT SCHEDULE

	DEVICE	CENTERLINE OF BOX ABOVE FINISHED FLOOR U.N.O.
1.	SWITCH	42 INCHES
2.	RECEPTACLE	18 INCHES
3.	DOOR PUSHBUTTON	42 INCHES
4.	DISCONNECT SWITCH	54 INCHES
5.	MOTOR STARTER	54 INCHES
6.	PANELBOARD	72 INCHES TO TOP
7.	PULL STATION	42 INCHES
8.	FIRE HORN WITH VISUAL WARNING*	90 INCHES
9.	VISUAL WARNING LIGHT*	90 INCHES
10.	FIRE SPEAKER WITH VISUAL WARNING*	90 INCHES
11.	FIRE SPEAKER HORN (WALL MOUNT)	144 INCHES
12.	FIRE ALARM CONTROL PANEL	72 INCHES TO TOP
13.	FIRE ALARM ANNUNCIATOR PANEL	60 INCHES TO TOP
14.	DOOR HOLDER	74 INCHES

1. * MOUNT AT HEIGHTS INDICATED OR 6 INCHES BELOW CEILING WHICHEVER IS LOWER.

ADD-1

CODES AND ORDINANCES
*COMPLY WITH ALL APPLICABLE LOCAL AND NATIONAL CODES INCLUDING THE FOLLOWING CODES WITH AMENDMENTS:
2018 INTERNATIONAL BUILDING CODE (IBC)
2016 NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) 72
2017 NATIONAL ELECTRICAL CODE (NEC)

ELECTRICAL SYMBOLS

POWER

	CIRCUIT HOME RUN
	CONDUIT TURNING UP
	CONDUIT TURNING DOWN
	CONDUIT STUB-UP
	CONDUIT SLEEVE
	CONDUIT SEAL
	CONDUIT CONCEALED IN CEILING OR WALLS, POWER
*	CONDUIT CONCEALED IN CEILING OR WALLS, OTHER (* = SEE ABBREVIATIONS)
	CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, POWER
*	CONDUIT CONCEALED IN FLOOR OR UNDERGROUND, OTHER (* = SEE ABBREVIATIONS)
	EXPOSED CONDUIT, POWER
*	EXPOSED CONDUIT, OTHER (* = SEE ABBREVIATIONS)
T	TRANSFORMER
XXX	BRANCH CIRCUIT PANEL BOARD
XXX	DISTRIBUTION PANEL BOARD
	EQUIPMENT CABINET, AS NOTED
XXX	SWITCHBOARD
CT	CURRENT TRANSFORMER ENCLOSURE
M	METER
GEN	GENERATOR
[ATS]	AUTOMATIC TRANSFER SWITCH
	SYSTEM GROUND ELECTRODE
(T)	THERMOSTAT
	MUSHROOM
MH	ELECTRICAL MANHOLE
HH	ELECTRICAL HAND HOLE
(M)	MOTOR CONNECTION, HORSEPOWER AS INDICATED
S_F	MANUAL SWITCH, WITH FUSE
S_T	MANUAL SWITCH, WITH THERMAL OVERLOAD
S_M	MOTOR RATED TOGGLE SWITCH
☒	MAGNETIC MOTOR STARTER
	DISCONNECT SWITCH, WITH FUSE
NF	DISCONNECT SWITCH, WITHOUT FUSE
☒	COMBINATION MOTOR STARTER
[R]	RELAY
PC	PHOTOELECTRIC CELL
	SWITCH, PUSH BUTTON, SINGLE
	SWITCH, PUSH BUTTON, DOUBLE
	SWITCH, PUSH BUTTON, TRIPLE
[LC]	LIGHTING CONTACTOR
[OS]	OCCUPANCY SENSOR
	SINGLE RECEPTACLE
	DUPLEX RECEPTACLE
	FOURPLEX RECEPTACLE
	DUPLEX RECEPTACLE, CEILING MOUNTED
TV	DUPLEX RECEPTACLE TO SERVE TELEVISION
	DUPLEX RECEPTACLE, HORIZONTALLY MOUNTED
	DUPLEX RECEPTACLE, EMERGENCY
	FOURPLEX RECEPTACLE, EMERGENCY
	DUPLEX RECEPTACLE, LOWER SWITCH
	DUPLEX RECEPTACLE, SWITCHED
	RANGE RECEPTACLE
A	SPECIAL RECEPTACLE (MARK INDICATES OUTLET IN SCHEDULE)
	FLUSH FLOOR OUTLET BOX
	FLUSH FLOOR BOX WITH DUPLEX RECEPTACLE
	FLUSH FLOOR BOX WITH FOURPLEX RECEPTACLE
	MULTIDEVICE FLOOR BOX WITH DUPLEX AND DATA OUTLETS, DIVIDED 2 GANG BOX WITH SINGLE GANG PLASTER RING
	MULTI-RECEPTACLE STRIP, SPACING AS INDICATED
	DIVIDED RACEWAY
(J)	FLUSH JUNCTION BOX, CEILING MOUNTED
	JUNCTION BOX ABOVE SUSPENDED CEILING WITH FLEX CONNECTION
(J)	FLUSH JUNCTION BOX, WALL MOUNTED
[J]	SURFACE JUNCTION BOX, CEILING MOUNTED
[J]	SURFACE JUNCTION BOX, WALL MOUNTED
PB	PULL BOX
	EQUIPMENT CONNECTION
	EQUIPMENT CONNECTION
AC	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
GFI	GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE
AC/GFI	GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
WP/GFI	WEATHER PROOF GROUND FAULT CIRCUIT INTERRUPTER DUPLEX RECEPTACLE

FIRE ALARM

FACP	FILE ALARM CONTROL PANEL (SEE FIRE ALARM DEVICE SCHEDULE)
FAA	FILE ALARM ANNUNCIATOR PANEL (SEE FIRE ALARM DEVICE SCHEDULE)
NAC	NOTIFICATION APPLIANCE CONTROL PANEL (SEE FIRE ALARM DEVICE SCHEDULE)
NEP	N.A.C. EXTENDER PANEL
[F]	MANUAL FIRE ALARM PULL STATION (SEE FIRE ALARM DEVICE SCHEDULE)
	FIRE ALARM BELL
[F]	FIRE ALARM HORN
(F)	FIRE ALARM VISUAL WARNING SIGNAL (SEE FIRE ALARM DEVICE SCHEDULE)
(F)	FIRE ALARM BELL WITH VISUAL WARNING SIGNAL
(F)	FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
(F)	MINI FIRE ALARM HORN WITH VISUAL WARNING SIGNAL
(F)	FIRE ALARM SPEAKER WITH VISUAL WARNING SIGNAL
⟨I⟩ D	SMOKE DETECTOR - IONIZATION TYPE (D = DUCT)
⟨P⟩ D	SMOKE DETECTOR - PHOTOELECTRIC TYPE (D = DUCT)
⟨I⟩	SMOKE DETECTOR - IONIZATION TYPE
⟨P⟩	SMOKE DETECTOR - PHOTOELECTRIC TYPE (SEE FIRE ALARM DEVICE SCHEDULE)
⬡	HEAT DETECTOR RATE-OF-RISE AND FIXED TEMPERATURE, 135 F
	HEAT DETECTOR, RATE-OF-RISE AND FIXED TEMPERATURE, 200 F
	HEAT DETECTOR, FIXED TEMPERATURE ONLY, 135 F
	HEAT DETECTOR, FIXED TEMPERATURE ONLY, 200 F
S F	VOICE EVACUATION SPEAKER (SEE FIRE ALARM DEVICE SCHEDULE)
S F	VOICE EVACUATION SPEAKER/STROBE, CEILING (SEE FIRE ALARM DEVICE SCHEDULE)
[D]	FIRE ALARM MAGNETIC DOOR HOLDER
[L]	REMOTE INDICATOR LAMP
OSY	OS&Y VALVE
FS	WATER FLOW ALARM SWITCH
TS	TAMPER SWITCH
MM	MONITOR MODULE
PIV	POST INDICATOR VALVE SWITCH
⟨T⟩	BEAM TRANSMITTER
⟨R⟩	BEAM RECEIVER
FF	FIRE FIGHTERS TELEPHONE
DAS	DISTRIBUTED ANTENNA (CEILING)

Fire Alarm Device Schedule

Description	Manufacturer	Model	Type Comments	Type Image
FIRE ALARM HEAT DETECTOR	SYSTEM SENSOR	5604		
FIRE ALARM BELL	SIMPLEX	A-BELL-IN-06-4		
DUCT SMOKE DETECTOR	SIMPLEX	4098-9756 (2098-9806 REMOTE TEST)	4098-9792 BASE	(P) D
FIRE ALARM ANNUNCIATOR	SIMPLEX	4603-9101	6 GANG BOX 3 1/2" DEEP	FAA
FIRE ALARM CONTROL PANEL - 8 SPDT	SIMPLEX	4100-9311	4100ES MASTER CONTROLLER ASSEMBLY	FACP
FIRE ALARM PULL STATION	SIMPLEX	4099-9006	SINGLE GANG BOX 2 1/2" DEEP	F
NOTIFICATION APPLIANCE CIRCUIT	SIMPLEX	505SDA		F
				NAC
PHOTOELECTRIC SMOKE DETECTOR	SIMPLEX	4098-9714 (4098-9792 BASE)	ADDRESSABLE PHOTOELECTRIC SMOKE DETECTOR.	(P)
FIRE ALARM SPEAKER/STROBE	SIMPLEX	49EPBB-AVVOWR	WHITE HOUSING, RED LETTERING, "ALERT" INSTEAD OF "FIRE" PROVIDE WEATHERPROOF WHERE REQUIRED.	S F
FIRE ALARM SPEAKER	SIMPLEX	49SOC-WWALT	WHITE HOUSING, RED LETTERING, "ALERT" INSTEAD OF "FIRE"	S F

ELECTRICAL SHEET INDEX

Sheet Number	Sheet Name
E0.0	ELECTRICAL SYMBOLS AND ABBREVIATIONS
ED1.0	ELECTRICAL DEMOLITION PLAN - ORIENTATION
ED1.1	ELECTRICAL DEMOLITION PLAN - AREA B
ED1.2A	ELECTRICAL DEMOLITION PLAN - AREA C-A
ED1.2B	ELECTRICAL DEMOLITION PLAN - AREA C-B
ED1.3	ELECTRICAL DEMOLITION PLAN - AREA D
ED1.4	ELECTRICAL DEMOLITION PLAN - AREA E
ED1.5	ELECTRICAL DEMOLITION PLAN - BASEMENT
EF1.0	FIRE ALARM ORIENTATION PLAN
EF1.1	FIRE ALARM PLAN - AREA B
EF1.2A	FIRE ALARM PLAN - AREA C-A
EF1.2B	FIRE ALARM PLAN - AREA C-B
EF1.3	FIRE ALARM PLAN - AREA D
EF1.4	FIRE ALARM PLAN - AREA E
EF1.5	FIRE ALARM PLAN - AREA D - BSMT
EF2.0	FIRE ALARM PLAN - DETAILS & SCHEDULES
EP1.1	POWER PLAN
EP2.0	ELECTRICAL DETAILS AND SCHEDULES
ET1.1	DATA CONNECTION PLAN

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062-066432

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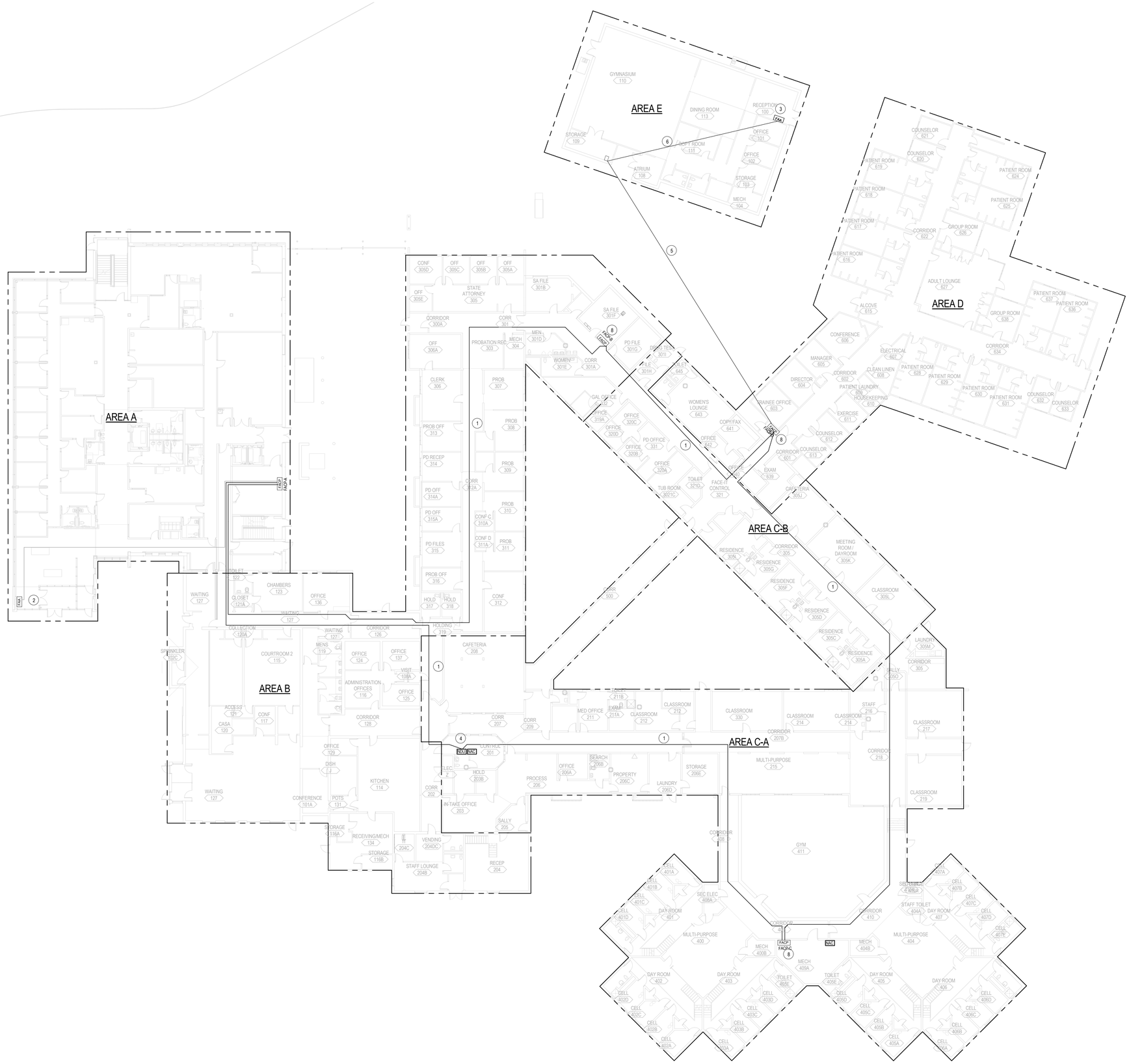
ELECTRICAL SYMBOLS AND ABBREVIATIONS
DEPKE JUVENILE JUSTICE COMPLEX - FIRE ALARM AND DOOR CONTROL REPLACEMENT

E0.0
22-17132-00
02/25/2019
Revisions
ADD-1 03/27/19



FIRE ALARM ORIENTATION PLAN

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

LEGEND NOTES

LEGEND NOTES ARE COMMON TO ALL
SOME NOTES MAY NOT APPLY TO THIS SHEET

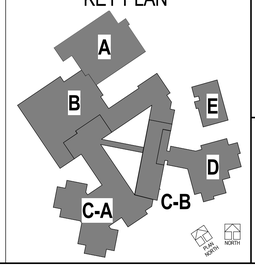
ADD-1

1. PROVIDE 1" CONDUIT WITH SINGLE MODE FIBER CABLE BETWEEN FACP FOR COMMUNICATIONS LOOP. VERIFY REQUIREMENTS WITH FIRE ALARM VENDOR.
2. CONNECT FAA TO FIRE ALARM PANEL IN BUILDING A.
3. CONNECT FAA TO FIRE ALARM PANEL IN BUILDING D.
4. CONNECT NDU TO FIRE ALARM PANEL IN BUILDING D. NDU SHALL BE ABLE TO ADDRESS MASS NOTIFICATION, HAVE A NETWORK DISPLAY UNIT (NDU), AND HAVE A NETWORK VOICE COMMAND CENTER (NVCC) IN ONE CABINET.
5. ROUTE NEW UNDERGROUND LINE FROM PANEL IN BUILDING E TO FACP-D.
6. ROUTE OVERHEAD LINE FROM FAA TO CONNECTION POINT.
7. PROVIDE MASS NOTIFICATION DEVICE MOUNTED ON POLE ABOVE DURESS STATION IN PARKING LOT. USE EXISTING DATA CONDUIT TO ROUTE CABLE TO BUILDING.
8. CONNECT ALL FIRE ALARM DEVICES IN EACH ZONE TO FIRE ALARM PANEL SERVING THAT ZONE.

GENERAL NOTES

A. ALL FIRE ALARM DEVICES SHOWN ARE ONLY TO INDICATE DESIGN INTENT AND APPROXIMATE LOCATIONS AND QUANTITY OF DEVICES FOR BIDDING PURPOSES. A COMPLETE FIRE ALARM SYSTEM DESIGN SHALL BE DELEGATED TO A LICENSED AND CERTIFIED FIRE ALARM CONTRACTOR WHO SHALL BE RESPONSIBLE FOR COMPLETE DESIGN IN COMPLIANCE WITH ALL GOVERNING CODES AND AUTHORITIES HAVING JURISDICTION (AHJ). THE INTENT OF THE SYSTEM IS TO PROVIDE A VOICE NOTIFICATION SYSTEM EXCEPT FOR DETENTION AREAS. REQUIREMENTS, INCLUDING FINAL PLACEMENT AND QUANTITIES OF DEVICES AT NO ADDITIONAL COST TO THE PROJECT. CONTRACTOR SHALL PROVIDE COMPLETE SHOP DRAWINGS AS A DEFERRED SUBMITTAL TO AHJ FOR APPROVAL PRIOR TO SUBMITTING THEM TO THE ARCHITECT. PROVIDE A BACNET/IP FIELDSERVER GATEWAY FOR EACH FIRE ALARM PANEL IN THE WORK. PROVIDE IP DROP FROM FIRE ALARM PANEL TO THE DESIGNATED IDF ROOM SWITCH. ALL IP CABLING SHALL BE IN ORANGE CONDUIT AND LABELED TO LAKE COUNTY STANDARD.
B. PHASE WORK SO THAT EXISTING FIRE ALARM DEVICES ARE FUNCTIONING UNTIL NEW DEVICES ARE READY FOR SERVICE. IF ANY OUTAGES ARE REQUIRED THEY ARE TO BE MINIMIZED AND WORK IS TO BE COORDINATED WITH THE OWNER. COORDINATE ALL PHASING WITH OWNER, SECURITY, AND CONTROLS CONTRACTORS.
C. FIRE ALARM: PROVIDE INSULATED BUSHINGS ON ALL CONDUIT STUB-UPS, INCLUDING UNUSED STUB-UPS OR STUB-UPS INDICATED FOR FUTURE USE.
D. ALL FIRE ALARM CABLING TO BE NEW AND IN CONDUIT UNLESS NOTED OTHERWISE. ALL FIRE ALARM CABLING SHALL BE IN RED CONDUIT.
E. PROVIDE SURFACE MOUNT SPEAKER ENCLOSURES FOR ALL CEILING MOUNTED FIRE SPEAKERS IN LOCATIONS WITH NO CEILINGS (EXPOSED STRUCTURE). EACH SPEAKER/VISUAL SHALL BE A NETWORKABLE DEVICE. NON-NETWORKED SPEAKER/VISUALS ARE NOT ALLOWED IN THE WORK. ALL DEVICES SHALL BE LABELED WITH ALERT, NOT FIRE.
F. DO NOT ATTACH EQUIPMENT SUPPORTS TO METAL ROOF DECKING.
G. DO NOT INSTALL FIRE ALARM CONDUIT ABOVE STRUCTURAL MEMBERS IN ROOF DECK SPACES.
H. FIRE ALARM CONDUIT PENETRATING WALLS SHALL BE FIRESTOPPED AND SMOKE STOPPED THROUGH FIRE/SMOKE-RATED WALLS PER MFRS RECOMMENDATIONS AND MATERIALS SPECIFIED IN DIVISION 7. USE REMOVABLE PILLOWS OR NON-HARDENING PUTTY.
I. PROVIDE NEW CABLING AND NEW SMOKE DAMPERS. CONNECT TO NEW FIRE ALARM PANEL. REUSE RACEWAY WHERE POSSIBLE. PROVIDE FA RELAY AND DUCT DETECTOR WITH REMOTE INDICATOR LAMP AND TEST SWITCH FOR ACTUATION OF DAMPER. CORRIDOR DETECTION MAY BE UTILIZED IN LIEU OF DUCT DETECTOR IF APPLICABLE. DETECTION AND ACTUATION SHALL BE COMPLIANT WITH IBC 2009 SECTION 716.3.3.2 TYPICAL FOR EACH DAMPER SHOWN. PROVIDE A SIMPLEX 4090-9118 RELAY IAM (INDIVIDUAL ADDRESSABLE MODULE) WITH T-SENSE INPUT (OR APPROVED EQUAL) NETWORKED MODULE TO PICK UP THE SMOKE DAMPER OUTPUT AND OPEN/CLOSED STATUSES. MAP THESE POINTS TO THE BACNET/IP FIELDSERVER DEVICE.
J. ALL DEVICES SHALL BE PROVIDED WITH TAMPER PROOF FASTENERS. DEVICES IN DETENTION AREAS SHALL BE RATED FOR CORRECTIONAL FACILITIES.
K. FIRE ALARM SYSTEM SHALL BE TIED IN TO PHASE 1 BUILDING. EXTEND OR ADD NEW MASS NOTIFICATION MODULE(S) IN ALL NEW FIRE ALARM PANELS. SEE SPECIFICATION FOR MASS NOTIFICATION SYSTEM WORK REQUIREMENTS.
L. ALL EXISTING FREE AIR AND IN CONDUIT FIRE ALARM CABLE MUST BE REMOVED.
M. EXTEND OR ADD NEW MASS NOTIFICATION MODULE(S) IN ALL NEW FIRE ALARM PANELS. SEE SPECIFICATION FOR MASS NOTIFICATION SYSTEM WORK REQUIREMENTS.
N. ALL FIRE ALARM PANELS SHALL HAVE BAS INTERFACE. PROVIDE DATA DROP AT EACH FIRE ALARM PANEL LOCATION.

KEY PLAN



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FIRE ALARM ORIENTATION PLAN
DEPKE JUVENILE JUSTICE COMPLEX - FIRE ALARM AND DOOR CONTROL REPLACEMENT

EF1.0
22-17132-00
02/25/2019
Revisions
ADD-1 10/27/19

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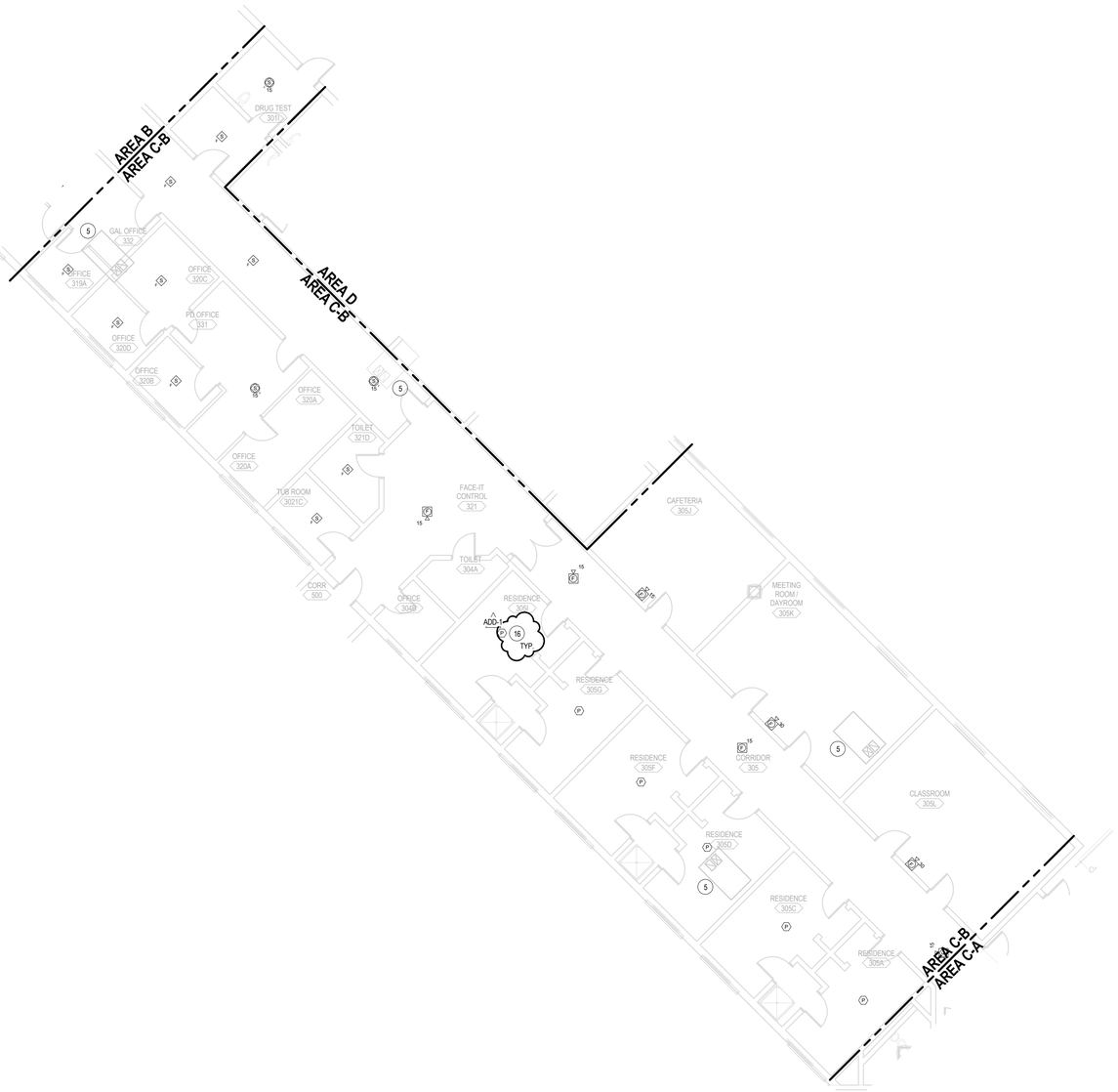


1 EF1.2B FIRE ALARM PLAN - AREA C-B
SCALE: 1/8" = 1'-0"

LEGEND NOTES

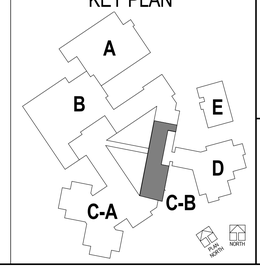
LEGEND NOTES ARE COMMON TO ALL
SOME NOTES MAY NOT APPLY TO THIS SHEET

1 PROVIDE 1" CONDUIT WITH FIBER CABLE BETWEEN FACP IN BUILDING D AND A. COORDINATE WITH VENDOR.
2 NETWORK DISPLAY UNIT/NETWORK VOICE COMMAND CENTER
3 NEW FIRE ALARM CONTROL PANEL FOR BUILDINGS B, C, D & E.
4
5 PROVIDE FOR SHUT DOWN OF ALL AIR HANDLING UNITS IN THE EVENT OF A FIRE.
6
7 REPLACE EXISTING FIRE ALARM CONNECTION TO SMOKE FAN LOUVERS.
8 NEW FIRE ALARM NOTIFICATION DEVICE TO REPLACE EXISTING. FIELD VERIFY EXACT LOCATIONS AND QUANTITIES OF EXISTING DEVICES.
9 PROVIDE 1" CONDUIT WITH FIBER CABLE BETWEEN FACP IN BUILDING D AND A. VERIFY REQUIREMENTS WITH FIRE ALARM MANUFACTURER.
10 REPLACE EXISTING FLOW AND TAMPER SWTICHES WITH NEW. CONNECT TO FIRE ALARM PANEL.
11 CONNECT CHEXIT TO FIRE ALARM SYSTEM.
12 CONNECT DEVICES IN THIS CORRIDOR TO FIRE ALARM PANEL IN BUILDING A.
13 PROTECT FIRE ALARM DEVICES IN THIS ROOM WITH WIREGUARDS.
14 CONNECT FACP AND NAC PANEL TO UPS PANEL IN ROOM 301F.
15 PROVIDE A SIMPLEX 4090-9118 RELAY IAM (INDIVIDUAL ADDRESSABLE MODULE) WITH T-SENSE INPUT (OR APPROVED EQUAL) NETWORKED MODULE TO PICK UP SMOKE DAMPER OUTPUT AND OPEN/CLOSED STATUSES. MAP THESE POINTS TO THE BACNET/IP FIELDSERVER DEVICE.
ADD-1
16 SINGLE-STATION SMOKE DETECTOR. TYPICAL OF SMOKE DETECTORS IN SLEEPING UNITS.

GENERAL NOTES

A. ALL FIRE ALARM DEVICES SHOWN ARE ONLY TO INDICATE DESIGN INTENT AND APPROXIMATE LOCATIONS AND QUANTITY OF DEVICES FOR BIDDING PURPOSES. A COMPLETE FIRE ALARM SYSTEM DESIGN SHALL BE DELEGATED TO A LICENSED AND CERTIFIED FIRE ALARM CONTRACTOR WHO SHALL BE RESPONSIBLE FOR COMPLETE DESIGN IN COMPLIANCE WITH ALL GOVERNING CODES AND AUTHORITIES HAVING JURISDICTION (AHJ). THE INTENT OF THE SYSTEM IS TO PROVIDE A VOICE NOTIFICATION SYSTEM EXCEPT FOR DETENTION AREAS. REQUIREMENTS, INCLUDING FINAL PLACEMENT AND QUANTITIES OF DEVICES AT NO ADDITIONAL COST TO THE PROJECT. CONTRACTOR SHALL PROVIDE COMPLETE SHOP DRAWINGS AS A DEFERRED SUBMITTAL TO AHJ FOR APPROVAL PRIOR TO SUBMITTING THEM TO THE ARCHITECT. PROVIDE A BACNET/IP FIELDSERVER GATEWAY FOR EACH FIRE ALARM PANEL IN THE WORK. PROVIDE IP DROP FROM FIRE ALARM PANEL TO THE DESIGNATED IDF ROOM SWITCH. ALL IP CABLING SHALL BE IN ORANGE CONDUIT AND LABELED TO LAKE COUNTY STANDARD.
B. PHASE WORK SO THAT EXISTING FIRE ALARM DEVICES ARE FUNCTIONING UNTIL NEW DEVICES ARE READY FOR SERVICE. IF ANY OUTAGES ARE REQUIRED THEY ARE TO BE MINIMIZED AND WORK IS TO BE COORDINATED WITH THE OWNER. COORDINATE ALL PHASING WITH OWNER, SECURITY, AND CONTROLS CONTRACTORS.
C. FIRE ALARM: PROVIDE INSULATED BUSHINGS ON ALL CONDUIT STUB-UPS, INCLUDING UNUSED STUB-UPS OR STUB-UPS INDICATED FOR FUTURE USE.
D. ALL FIRE ALARM CABLING TO BE NEW AND IN CONDUIT UNLESS NOTED OTHERWISE. ALL FIRE ALARM CABLING SHALL BE IN RED CONDUIT.
E. PROVIDE SURFACE MOUNT SPEAKER ENCLOSURES FOR ALL CEILING MOUNTED FIRE SPEAKERS IN LOCATIONS WITH NO CEILINGS (EXPOSED STRUCTURE). EACH SPEAKER/VISUAL SHALL BE A NETWORKABLE DEVICE. NON-NETWORKED SPEAKER/VISUALS ARE NOT ALLOWED IN THE WORK. ALL DEVICES SHALL BE LABELED WITH ALERT, NOT FIRE.
F. DO NOT ATTACH EQUIPMENT SUPPORTS TO METAL ROOF DECKING.
G. DO NOT INSTALL FIRE ALARM CONDUIT ABOVE STRUCTURAL MEMBERS IN ROOF DECK SPACES.
H. FIRE ALARM CONDUIT PENETRATING WALLS SHALL BE FIRESTOPPED AND SMOKE STOPPED THROUGH FIRE/SMOKE-RATED WALLS PER MFR'S RECOMMENDATIONS AND MATERIALS SPECIFIED IN DIVISION 7. USE REMOVABLE PILLOWS OR NON-HARDENING PUTTY.
I. PROVIDE NEW CABLING AND NEW SMOKE DAMPERS. CONNECT TO NEW FIRE ALARM PANEL. REUSE RACEWAY WHERE POSSIBLE. PROVIDE FA RELAY AND DUCT DETECTOR WITH REMOTE INDICATOR LAMP AND TEST SWITCH FOR ACTUATION OF DAMPER. CORRIDOR DETECTION MAY BE UTILIZED IN LIEU OF DUCT DETECTOR IF APPLICABLE. DETECTION AND ACTUATION SHALL BE COMPLIANT WITH IBC 2009 SECTION 716.3.3.2 TYPICAL FOR EACH DAMPER SHOWN. PROVIDE A SIMPLEX 4090-9118 RELAY IAM (INDIVIDUAL ADDRESSABLE MODULE) WITH T-SENSE INPUT (OR APPROVED EQUAL) NETWORKED MODULE TO PICK UP THE SMOKE DAMPER OUTPUT AND OPEN/CLOSED STATUSES. MAP THESE POINTS TO THE BACNET/IP FIELDSERVER DEVICE.
J. ALL DEVICES SHALL BE PROVIDED WITH TAMPER PROOF FASTENERS. DEVICES IN DETENTION AREAS SHALL BE RATED FOR CORRECTIONAL FACILITIES.
K. FIRE ALARM SYSTEM SHALL BE TIED IN TO PHASE 1 BUILDING. EXTEND OR ADD NEW MASS NOTIFICATION MODULE(S) IN ALL NEW FIRE ALARM PANELS. SEE SPECIFICATION FOR MASS NOTIFICATION SYSTEM WORK REQUIREMENTS.
L. ALL EXISTING FREE AIR AND IN CONDUIT FIRE ALARM CABLE MUST BE REMOVED.
M. EXTEND OR ADD NEW MASS NOTIFICATION MODULE(S) IN ALL NEW FIRE ALARM PANELS. SEE SPECIFICATION FOR MASS NOTIFICATION SYSTEM WORK REQUIREMENTS.
N. ALL FIRE ALARM PANELS SHALL HAVE BAS INTERFACE. PROVIDE DATA DROP AT EACH FIRE ALARM PANEL LOCATION.

KEY PLAN



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DANIEL A. DOYLE
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FIRE ALARM PLAN - AREA C-B
DEPKE JUVENILE JUSTICE COMPLEX - FIRE ALARM AND DOOR CONTROL REPLACEMENT

EF1.2B
22-17132-00
02/25/2019
Revisions
ADD 1 02/27/19

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NORTH FIRE ALARM PLAN - AREA D

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

LEGEND NOTES

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SOME NOTES MAY NOT APPLY TO THIS SHEET

1 PROVIDE 1" CONDUIT WITH FIBER CABLE BETWEEN FACP IN BUILDING D AND A. COORDINATE WITH VENDOR.
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11 CONNECT CHEXIT TO FIRE ALARM SYSTEM.
12 CONNECT DEVICES IN THIS CORRIDOR TO FIRE ALARM PANEL IN BUILDING A.
13 PROTECT FIRE ALARM DEVICES IN THIS ROOM WITH WIREGUARDS.
14 CONNECT FACP AND NAC PANEL TO UPS PANEL IN ROOM 301F.
15 PROVIDE A SIMPLEX 4090-9118 RELAY IAM (INDIVIDUAL ADDRESSABLE MODULE) WITH T-SENSE INPUT (OR APPROVED EQUAL) NETWORKED MODULE TO PICK UP SMOKE DAMPER OUTPUT AND OPEN/CLOSED STATUSES. MAP THESE POINTS TO THE BACNET/IP FIELDSERVER DEVICE.
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D. ALL FIRE ALARM CABLING TO BE NEW AND IN CONDUIT UNLESS NOTED OTHERWISE. ALL FIRE ALARM CABLING SHALL BE IN RED CONDUIT.
E. PROVIDE SURFACE MOUNT SPEAKER ENCLOSURES FOR ALL CEILING MOUNTED FIRE SPEAKERS IN LOCATIONS WITH NO CEILINGS (EXPOSED STRUCTURE). EACH SPEAKER/VISUAL SHALL BE A NETWORKABLE DEVICE. NON-NETWORKED SPEAKER/VISUALS ARE NOT ALLOWED IN THE WORK. ALL DEVICES SHALL BE LABELED WITH ALERT, NOT FIRE.
F. DO NOT ATTACH EQUIPMENT SUPPORTS TO METAL ROOF DECKING.
G. DO NOT INSTALL FIRE ALARM CONDUIT ABOVE STRUCTURAL MEMBERS IN ROOF DECK SPACES.
H. FIRE ALARM CONDUIT PENETRATING WALLS SHALL BE FIRESTOPPED AND SMOKE STOPPED THROUGH FIRE/SMOKE-RATED WALLS PER MFR'S RECOMMENDATIONS AND MATERIALS SPECIFIED IN DIVISION 7. USE REMOVABLE PILLOWS OR NON-HARDENING PUTTY.
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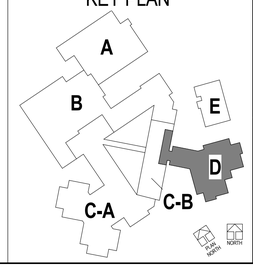

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FIRE ALARM PLAN - AREA D

DEPKE JUVENILE JUSTICE COMPLEX - FIRE ALARM AND DOOR CONTROL REPLACEMENT

EF1.3

22-17132-00
02/25/2019
Revisions
ADD-1 03/07/19

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1 EF1.4 FIRE ALARM PLAN - AREA E
SCALE: 1/8" = 1'-0"

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L. ALL EXISTING FREE AIR AND IN CONDUIT FIRE ALARM CABLE MUST BE REMOVED.
M. EXTEND OR ADD NEW MASS NOTIFICATION MODULE(S) IN ALL NEW FIRE ALARM PANELS. SEE SPECIFICATION FOR MASS NOTIFICATION SYSTEM WORK REQUIREMENTS.
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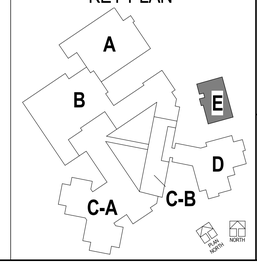
KEY PLAN



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FIRE ALARM PLAN - AREA E
DEPKE JUVENILE JUSTICE COMPLEX - FIRE ALARM AND DOOR CONTROL REPLACEMENT

EF1.4
22-17132-00
02/25/2019
Revisions
ADD-1 03/27/19

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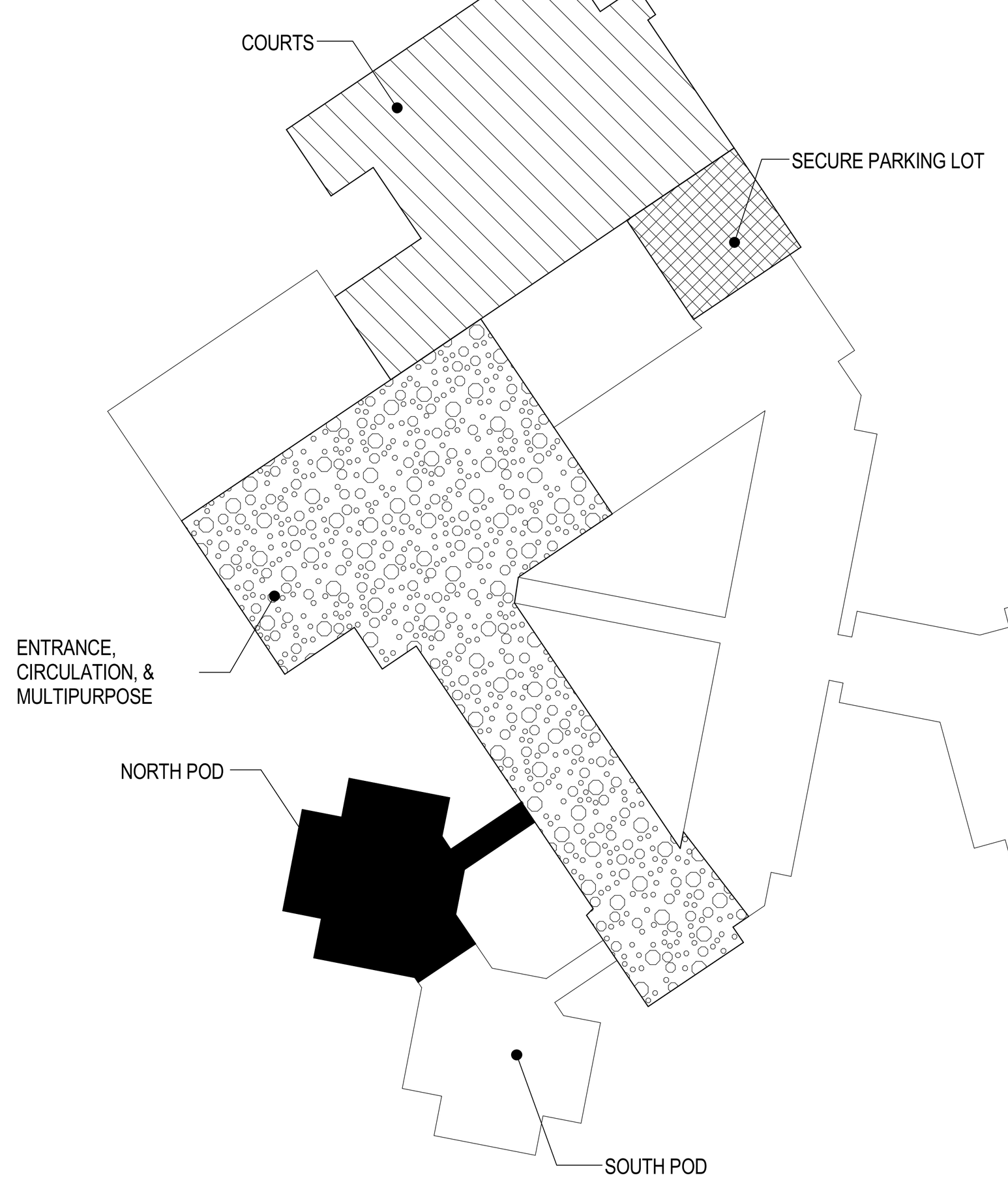


TASK GROUP MAP OF FACILITY

COURTS = CONTROLLED BY OPERATOR WORK STATION B

SECURE PARKING LOT= CONTROLLED BY OPERATOR WORK STATION B

ENTRANCE, CIRCULATION, & MULTIPURPOSE= CONTROLLED BY OPERATOR WORK STATION B

NORTH HOUSING POD = CONTROLLED BY OPERATOR WORK STATION C1. OPERATOR WORK STATION B HAS ROLLOVER AND TAKEOVER CAPABILITIES.

SOUTH HOUSING POD = CONTROLLED BY OPERATOR WORK STATION C2. OPERATOR WORK STATION B HAS ROLLOVER AND TAKEOVER CAPABILITIES.

1 SE0.0 FACILITY ZONE/TASK GROUPS
SCALE: NONE

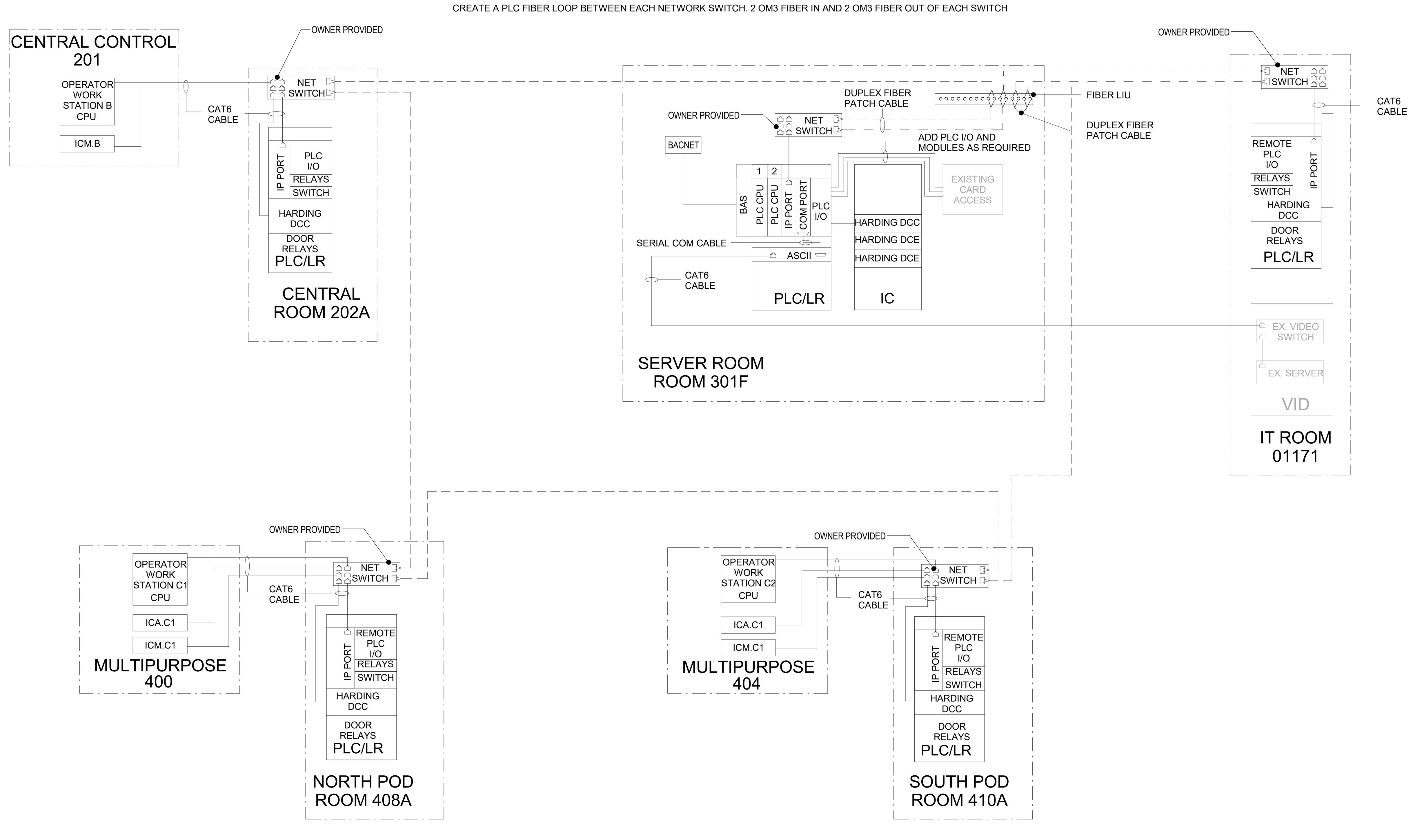
GENERAL NOTICES:

1. DEVICE AND CONDUIT LAYOUT ON FLOOR PLANS IS DIAGRAMMATIC AND IS PROVIDED TO INDICATE HOW SYSTEMS ARE INSTALLED, INTERCONNECTED, AND ROUTED. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND CONFIGURATION.
2. DIVISION 26 TO FURNISH AND INSTALL ALL 120 VAC POWER FOR ANY NEW DIVISION 27/28 EQUIPMENT.
3. DIVISION 26 TO PROVIDE CIRCUIT BREAKERS IN POWER PANELS TO SERVE EQUIPMENT RACKS, CCTV MONITORS, AND OPERATOR WORK STATIONS AS INDICATED ON THE DRAWINGS.
4. THE DIVISION 27/28 EQUIPMENT SHALL BE CONNECTED TO A UNIFIED GROUND SYSTEM PROVIDED BY DIVISION 26. ALL TRANSIENT VOLTAGE SURGE SUPPRESSION GROUND CONNECTIONS MUST BE NO GREATER THAN 1 OHM.
5. ALL DIVISION 27/28 SECURITY ELECTRONICS CONTROL EQUIPMENT IS TO BE POWERED FROM UPS CIRCUITS.
6. THE CONTRACTOR MAY REUSE EXISTING CONDUIT WHERE AVAILABLE. ALL NEW CONDUIT SHALL BE 3/4" UNLESS OTHERWISE NOTED AND CONCEALED INTO THE WALLS.
7. ANY MODIFICATION TO CONDUIT ROUTINGS FROM THAT SHOWN ON THESE PLANS MUST BE SUBMITTED AND APPROVED PRIOR TO INSTALLATION. ALL CONDUIT INSTALLATION SHALL BE SUPERVISED BY A MASTER LICENSED ELECTRICIAN.
8. OTHER THAN IN EQUIPMENT ROOMS ALL CONDUIT SHALL BE CONCEALED IN CEILINGS, WITHING WALLS, OR UNDER SLAB.
9. FULLY COORDINATE THE MOUNTING LOCATIONS OF ALL PULL BOXES AND CONDUIT ROUTING WITH ALL TRADES. ALL DEVICES SHALL BE FIELD LOCATED TO AVOID DAMAGE FROM DOORS OPENING AND CONTACTING WALLS.
10. INSTALL ALL PULL BOXES BEHIND ACCESS PANELS OR IN ACCESSIBLE AREAS.
11. LOW VOLTAGE WIRING SHALL BE INSTALLED IN A SEPARATE RACEWAY FROM ALL 120 VAC CONDUCTORS.
12. CONDUITS ROUTED INTO CONTROL ROOMS AND BEHIND COUNTERS SHALL STUB UP INTO CONSOLE OR WIRE CHASE PROVIDED BEHIND MILLWORK.
13. JUNCTION BOXES SHALL BE SIZED TO ACCEPT THE NUMBER OF TERMINATING CONDUITS.
14. DEVICES AND PANELS ARE NUMBERED BY BUILDING. FOR EXAMPLE A COMPUTER CONTROL STATION IN AREA C IS LABELED "OWS.C". MULTIPLE OCCURRENCES OF THE SAME PANEL ARE DESIGNATED WITH AN ADDITIONAL NUMBER.
15. ALL DIVISION 27 & 28 SYSTEMS COMMUNICATION BETWEEN AREAS SHALL BE OVER OPTIC FIBERS. THE DIVISION 28 CONDUIT SHOWN ON THESE DRAWINGS SHALL BE REVIEWED/APPROVED/COORDINATED BY THE SECURITY ELECTRONICS CONTRACTOR/INTEGRATOR.
16. PROVIDE A BACKBOX SCHEDULE FOR ALL DIVISION 27/28 EQUIPMENT PRIOR TO CONDUIT INSTALLATION. CONDUIT AND BACKBOXES SHALL BE SIZED TO ACCEPT THE NUMBER OF WIRES TO BE INSTALLED. PROVIDE CONDUIT AND WIRING SCHEDULE INDICATING CONDUIT AND FILL RATIO COMPLIES WITH NEC.
17. ALL PLYWOOD UTILIZED FOR MOUNTING DEVICES SHALL BE 3/4" AND FIRE RATED.
18. DIVISION 26 TO FURNISH AND INSTALL CONDUIT AND WIRE FOR POWER DISTRIBUTION AS REQUIRED BY NEC AND LOCAL CODES. DIVISION 26 TO PROVIDE CONDUIT AND WIRE FROM BREAKER PANEL TO TVSS BACKBOARD, FROM TVSS BACKBOARD TO RACK TERMINATION POINTS, AND FROM BREAKER TO CONTROL ROOM RECEPTACLE. FULLY COORDINATE EQUIPMENT INSTALLATION WITH DIVISION 26.
19. FURNISH AND INSTALL CORRECT COLOR CONDUIT FOR EACH SYSTEM. REFER TO COUNTY STANDARDS.
20. ALL DEVICES ON THE DRAWINGS ARE EXISTING UNLESS OTHERWISE NOTED.
21. OWNER TO PROVIDE NETWORK SWITCHES THROUGH OUT FACILITY.
22. COORDINATE THE DEMOLITION AND INSTALLATION OF THE NEW CONTROLS DIRECTLY WITH THE OWNER. WORK WITH THE OWNER TO DEVELOP A SCHEDULE THAT IDENTIFIES SYSTEM DOWN TIME BY AREA. WHERE POSSIBLE TAKE DOWN AND REPLACE THE CONTROLS BY AREA TO AVOID OPERATIONAL STAFFING ISSUES AT THE FACILITY.
23. PLC EQUIPMENT SUPPLIER IS RESPONSIBLE FOR PROVIDING BACNET INTERFACE DEVICE(S), INTERFACE RELAYS, WIRING, AND TERIMATIONS AS REQUIRED TO INPUT ALL SECURITY SYSTEM ALARMS TO THE EXISTING BACNET NETOWKR. ALLOW FOR A MINIMUM OF 300 BACNET POINTS FROM THE PLC NETWORK. ALL POINTS SHALL BE READ ONLY. NO CONTROL VIA BACNET IS ALLOWED. SEE DIVISION 25 FOR FURTHER DETAILS.
24. UNDER THE BASE BID B, COMPLETE THE PLC DOOR CONTROL AND INTERCOM SYSTEM REPLACEMENT WITH ALL LABOR, CONDUIT, NEW CAMERAS, NEW WORKSTATION, AND NEW CABLING AS INDICATED ON THE PLANS OR EQUIRED FOR A COMPLETE AND FUNCTIONING SYSTEM. FURNISH AND INSTALL NEW PAGING WIRING AND EXTEND WIRING FOR INTERCOM DEVICES TO SA FILE ROOM 301F. EXISTING DEVICES WILL BE REUSED. REFER TO BID FORM.
25. UNDER ADD ALTERNATE 1, DEDUCT ALTERNATE IF BASE BIDS A, B, AND C ARE ACCEPTED TOGETHER AND MOBILIZATION AND WORK IS ACCOMPLISHED IN EACH AREA AT THE SAME TIME. REFER TO BID FORM AND SPECIFICATION SECTION 012300 ALTERNATES FOR ADDITIONAL INFORMATION.
26. UNDER ADD ALTERNATE 2, REPLACE ALL LOCK WIRING IN ADDITION TO BASE BID ITEM B SECURITY SYSTEM REPLACEMENT. REFER TO BID FORM AND SPECIFICATION SECTION 012300 ALTERNATES FOR ADDITIONAL INFORMATION.
27. UNDER ADD ALTERNATE 3, REPLACE ALL INTERCOM WIRING IN ADDITION TO BASE BID ITEM B SECURITY SYSTEM REPLACEMENT. REFER TO BID FORM AND SPECIFICATION SECTION 012300 ALTERNATES FOR ADDITIONAL INFORMATION.
28. UNDER ADD ALTERNATE 4, USE EXISTING CAMERA CONDUIT TO PARKING LOT AND EXTEND MASS NOTIFICATION AUDIO PARKING DURESS STATION SPEAKER. FURNISH AND INSTALL ALL CABLING AND CONTROLS. ALSO FURNISH AND INSTALL CABLING AND ELECTRONICS TO CONNECT ALARM CONTACTS ON PARKING DURESS STATIONS TO PLC INPUTS FOR ANNUNCIATION IN CENTRAL CONTROL AND CAMERA CALLUP ON DURESS ACTIVATION. REFER TO BID FORM AND SPECIFICATION SECTION 012300 ALTERNATES FOR ADDITIONAL INFORMATION.
29. UNDER ADD ALTERNATE 5, FURNISH AND INSTALL WIRING AND ELECTRONICS TO CONNECT FOUR DOORS CURRENTLY CONTROLLED BY THE CARD ACCESS SYSTEM TO PLC DOOR CONTROL SYSTEM. FURNISH AND INSTALL WIRING TO INDICATE EACH DOOR POSITION AND TO UNLOCK EACH INDIVIDUAL DOOR. ALSO FURNISH AND INSTALL AN INTERCOM IN EACH OF THE TWO HOLDING CELLS IN THE COURTS BUILDING. REFER TO BID FORM. ADD-1
30. UNDER DEDUCT ALTERNATE 6, OWNER SHALL FURNISH AND INSTALL FIBER LOOP BETWEEN EACH NETWORK SWITCH. REFER TO BID FORM AND SPECIFICATION SECTION 012300 ALTERNATES FOR ADDITIONAL INFORMATION.

SECURITY ELECTRONICS DEVICE LEGEND

TVSS1, MUX	ARROWS INDICATE A CONDUIT HOME RUN TO THE CABINET OR PULL BOX INDICATED. HOME RUNS THAT ARE SUPPRESSED ARE ROUTED FIRST TO THE APPROPRIATE SURGE SUPPRESSION BOARD AND THEN TO THE TERMINATING EQUIPMENT (I.E. "TVSS1, LR" INDICATES THAT THE RUN IS ROUTED TO THE TVSS1 SUPPRESSION BACKBOARD AND THEN TO THE APPROPRIATE LOCKING RACK.)
○	CONDUIT TURN UP TO UPPER LEVEL. REFER TO LEVEL ABOVE FOR CONTINUATION.
●	CONDUIT TURN DOWN TO LOWER LEVEL. REFER TO LEVEL BELOW FOR CONTINUATION.
ID.#	LOCATIONS OF CONTROL PANELS, RACKS AND SPECIAL PULL BOXES. REFER TO RISERS AND THE SPECIFICATION FOR SPECIFIC EQUIPMENT. "ID" IDENTIFIES THE PANEL AND IS NOT A COUNT OF PANELS. PANELS ARE IDENTIFIED AS FOLLOWS: CA.# = CARD ACCESS TERMINAL CONTROLLER CABINET. CATV = CABLE TELEVISION; FIRE RATED 4' X 8' X 3/4" FIRE-RATED SECTION OF PLYWOOD (UNLESS OTHERWISE NOTED). CP.# = CONTROL PANEL GRAPHIC IN TURRET ON COUNTER. ELEC = ELECTRICAL POWER PANEL. FODP = FIBER OPTIC DISTRIBUTION PANEL. HVAC = HVAC SENSOR AND CONTROL INTERFACE CABINET. IC.# = INTERCOM AND PAGING EQUIPMENT RACK. LR.# = FREE STANDING LOCKING RACK OR PULL CABINET. MON.# = CCTV MONITOR - SEE RISER FOR DESCRIPTION. PLC.# = PLC CONTROL RACK. TVSS = TRANSIENT VOLTAGE SURGE SUPPRESSION CABINET. TELD = TELEPHONE/DATA/CCTV EQUIPMENT RACK. FLOOR OR WALL MOUNTED. PRINT = EVENT RECORDING COMPUTER (ERC) NETWORK PRINTER. TELE = TELEPHONE BACKBOARD FOR PUNCHDOWN BLOCKS. FIRE RATED 4' X 8' X 3/4" FIRE-RATED SECTION OF PLYWOOD (UNLESS OTHERWISE NOTED). UPS = UNINTERRUPTIBLE POWER SUPPLY.
90° ID MOUNT	CCTV CAMERA. 90° DENOTES A PAN-TILT ZOOM CAMERA. OTHER CAMERAS ARE FIXED WITH FIELDS OF VIEW AS INDICATED ON THE PLANS. "ID" IS FOR CAMERA IDENTIFICATION ONLY AND DOES NOT REPRESENT A COUNT. PROVIDE A 4" SQUARE BOX WITH FLEXIBLE CONDUIT TO HOUSING. REFER TO CAMERA SCHEDULE ON SHEET SE#.## FOR CAMERA MOUNTING HEIGHTS. "MOUNT" REFERS TO THE TYPE OF MOUNTING AS FOLLOWS: C = INTERIOR CEILING MOUNTED TO 4" SQUARE 2 1/8" DEEP BOX. P = POLE MOUNTED SEE DETAIL. REFER TO SHEET SE#.# W = INTERIOR WALL MOUNTED TO 4" SQUARE 2 1/8" DEEP BOX. CRNR = INTERIOR CORNER MOUNTED. XCRNR = EXTERIOR CORNER MOUNTED. XC = EXTERIOR CEILING WITH AXIS HOOK MOUNT. XW = EXTERIOR WALL MOUNTED. FP = FENCE POST MOUNTED. REFER TO SHEET SE#.#.
G ID	VEHICLE GATE OPERATOR WITH LOCAL POWER BY DIVISION 26. COORDINATE CONTROLS INTERFACE WITH GATE CONTROLLER SUPPLIER. "ID" IS THE ARCHITECTURAL DOOR NUMBER.
m ID, M ID	MONITORED DOOR. "ID" IS THE ARCHITECTURAL DOOR NUMBER . THE LOWER CASE m INDICATES A SENTROL SWITCH INSTEAD OF A DETENTION DOOR POSITION SWITCH.
E ID	CONTROLLED DOOR WITH SECURITY LOCK AND DOOR POSITION SWITCH. TERMINATE CONDUIT IN DOOR FRAME LOCK POCKET OR DOOR POSITION SWITCH POCKET. "ID" IS THE ARCHITECTURAL DOOR NUMBER.
es ID	COMMERCIAL DOOR ELECTRIC STRIKE. "ID" IS THE ARCHITECTURAL DOOR NUMBER.
D	EXISTING DURESS SYSTEM. NO WORK TO BE DONE.
DB	DOOR BUTTON.
IC	INTERCOM STATION, THREE GANG BOX, WALL MOUNTED 4'-0" AFF AND A MAXIMUM OF 8" FROM DOOR. "FR" FRAME MOUNTED. "TH" IS TACTICAL HANDSET SINGLE GANG STATION. "ID" IS FOR IDENTIFICATION ONLY AND DOES NOT REPRESENT A COUNT.
EC M ID	EMERGENCY CALL STATION PUSH BUTTON, SINGLE GANG BOX, WALL MOUNTED 4'-0" AFF AS DETAILED BY THE ARCHITECT. "ID" IS FOR IDENTIFICATION ONLY AND DOES NOT REPRESENT A COUNT.
IC ID	INTERCOM STATION ON PEDESTAL. FURNISH AND INSTALL INTERCOM, PEDESTAL, AND WEATHER RESISTANT HOUSING. PROVIDE TEMPLATE AND BOLTS TO GENERAL CONTRACTOR FOR INSTALLATION IN BASE. "ID" IS FOR IDENTIFICATION ONLY AND DOES NOT REPRESENT A COUNT.
ICM	LOCAL INTERCOM MASTER STATION IN TURRET MOUNTED ON COUNTER. PROVIDES DIRECT COMMUNICATION TO THE MAIN CONTROL ROOM WITHOUT USING LOCAL TCS STATION MASTER.
PS ID	INTERIOR CEILING PUBLIC SPEAKER. "ID" IDENTIFIES THE PAGING ZONE.
RDR ID	PROXIMITY CARD READER MOUNTED ON A SINGLE GANG BOX 4'-0" AFF. "ID" IS FOR IDENTIFICATION ONLY AND DOES NOT REPRESENT A COUNT.
REX ID	REQUEST TO EXIT BUTTON MOUNTED ON SINGLE GANG BOX, 4'-0" AFF. "ID" IS FOR IDENTIFICATION ONLY AND DOES NOT REPRESENT A COUNT. M = MOTION DETECTOR CENTERED ABOVE DOOR LOCATED IN THE ALUMINUM PANEL ABOVE DOOR FRAME
OWS	OPERATOR WORK STATION.
ESC	ELECTRICAL SECURITY CONTRACTOR

CREATE A PLC FIBER LOOP BETWEEN EACH NETWORK SWITCH. 2 OM3 FIBER IN AND 2 OM3 FIBER OUT OF EACH SWITCH



3 SE0.0 SECURITY ELECTRONICS, NEW PLC RISER DIAGRAM
SCALE: NONE

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3/27/2019 10:55:17 AM

R&N SYSTEMS DESIGN

REGISTERED PROFESSIONAL ENGINEER FRANK A. NIEDZWIEDZ 062-054679 EXPIRES: 11-30-2019

DLR Group
Architecture Engineering Planning Interiors

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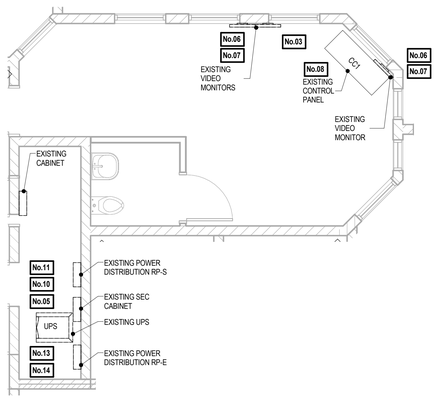
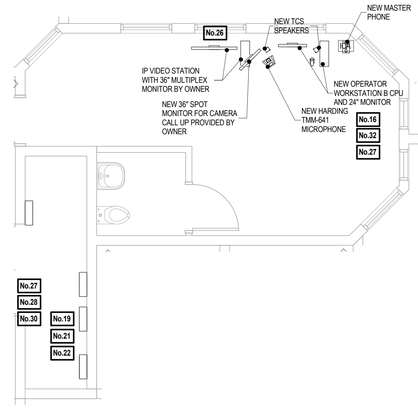
SEC. ELEC. LEGEND AND GENERAL NOTES
DEPKE JUVENILE JUSTICE COMPLEX
FIRE ALARM AND DOOR CONTROL REPLACEMENT

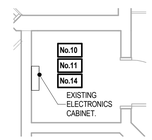
SE0.0
22-17132-00
02/25/2019
Revisions
ADD-1 03-27-2019



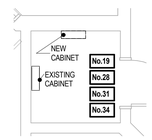
1 SE2.1 EXISTING CONTROL ROOM 201 AND SEC ROOM 202A
SCALE: 1/4" = 1'-0"



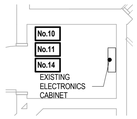
2 SE2.1 NEW CONTROL ROOM 201 AND SEC ROOM 202A
SCALE: 1/4" = 1'-0"



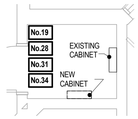
3 SE2.1 EXISTING REMOTE SEC ELEC RM 408A
SCALE: 1/4" = 1'-0"



4 SE2.1 NEW REMOTE SEC ELEC RM 408A
SCALE: 1/4" = 1'-0"



5 SE2.1 EXISTING REMOTE SEC ELEC RM 410A
SCALE: 1/4" = 1'-0"



6 SE2.1 REMOTE SEC ELEC RM 410A
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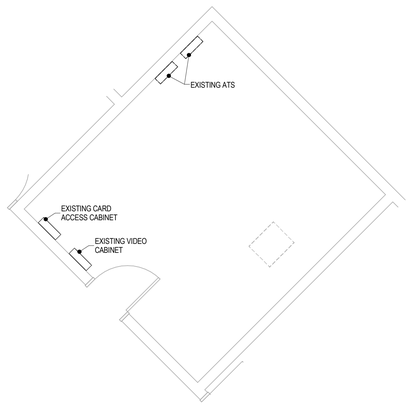
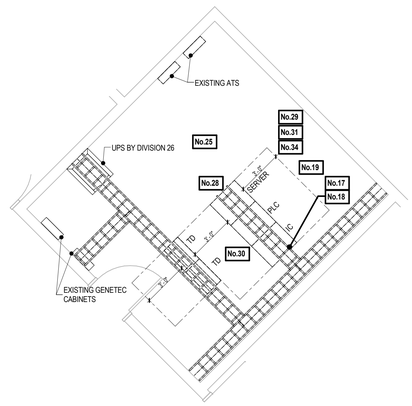
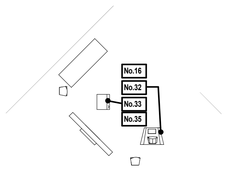


7 SE2.1 EXISTING SEC ROOM SA FILE ROOM 301F
SCALE: 1/4" = 1'-0"



8 SE2.1 NEW SEC ROOM SA FILE ROOM 301F
SCALE: 1/4" = 1'-0"



9 SE2.1 DAYROOM TCS STATION (TYPICAL)
SCALE: NONE

LEGEND NOTES

1. REFER TO GENERAL NOTES ON LEGEND SHEET SE0.00 AND INCORPORATE AS APPLICABLE.

2. EXISTING EQUIPMENT AND CONDITIONS INDICATED HERE WERE GATHERED FROM AS-BUILT DOCUMENTS AND SITE SURVEYS. ALL INFORMATION IS BELIEVED TO BE CORRECT, BUT IS NOT GUARANTEED. THE CONTRACTOR SHALL CONFIRM ALL EXISTING EQUIPMENT LOCATIONS AND CONDITIONS.

3. EXISTING MILLWORK TO REMAIN. AT ALL LOCATIONS WHERE EXISTING CONTROL EQUIPMENT IS REMOVED THE CONTRACTOR SHALL PATCH ANY HOLES IN THE EXISTING COUNTERTOP. MATCH COLOR OF EXISTING COUNTERTOP AS CLOSELY AS POSSIBLE.

4. THE OWNER SHALL HAVE FIRST RIGHT OF SALVAGE FOR ALL REMOVED USED EQUIPMENT. CONTRACTOR SHALL DISPOSE OF ALL EQUIPMENT NOT SALVAGED BY OWNER.

5. AT ALL LOCATIONS WHERE EXISTING CONTROL EQUIPMENT IS REMOVED, THE CONTRACTOR SHALL PATCH ANY HOLES IN EXISTING WALL. FOR BLOCK OR CONCRETE WALLS ONLY, FILL HOLES WITH GROUT. MATCH COLOR OF EXISTING WALLS AS CLOSELY AS POSSIBLE.

6. EXISTING FACILITY COMPUTER/MONITORS, AND/OR PRINTERS TO REMAIN. CONFIRM THE IDENTITY OF THE ITEMS TO BE REMOVED WITH THE FACILITY STAFF PRIOR TO BEGINNING DEMO.

7. EXISTING CAMERA VIDEO MONITORS, CPU, AND ASSOCIATED COMPONENTS TO REMAIN.

8. EXISTING GRAPHICS CONTROL PANEL AND WIRING TO BE REMOVED.

9. EXISTING ACCESS CONTROL DEVICES, WIRING, CABINET, AND ASSOCIATED COMPONENTS TO REMAIN.

10. REMOVE ALL EXISTING LOCKING SYSTEM CONTROLS AND INTERCOM SYSTEM COMPONENTS AT THIS LOCATION.

11. EXISTING IC AND PLC EQUIPMENT RACK AND/OR CABINET COMPONENTS, POWER SUPPLIES, AND RELAYS SHALL BE REMOVED. THE EXISTING EQUIPMENT RACK AND/OR CABINET SHALL REMAIN AND BE UTILIZED TO HOUSE THE NEW SYSTEM COMPONENTS.

12. PROVIDE NEW CONDUITS AND WIRE AS REQUIRED FOR A COMPLETE FUNCTIONAL SYSTEM. ALL WIRE AND CABLE SHALL BE INSTALLED IN CONDUIT.

13. ALL DEVICE CONDUIT RUN DOWN THE WALL BELOW 12' SHALL BE CONCEALED IN THE WALL.

14. CONDUIT ON THE PRECAST CEILING CAN BE SURFACE RUN.

15. CONTRACTOR SHALL PROVIDE FIRE STOPPING AS REQUIRED TO MAINTAIN WALL FIRE RATING AT ALL CONDUIT PENETRATIONS. THE CAULK COLOR AT CONDUIT PENETRATIONS TO REMAIN RED.

16. FURNISH AND INSTALL NEW 24" MONITOR, CPU, AND OPTICAL MOUSE FOR THE OPERATOR WORK STATION. HOUSE THE CPU IN THE SPACE UNDER THE COUNTER IN A NEW LOCKABLE CABINET BY THE CONTRACTOR. IF NECESSARY, PROVIDE 10 FEET EXTENSION CABLES BETWEEN THE WORK STATION COMPONENTS AND THE CPU. REFER TO SECTION 284600 FOR ADDITIONAL INFORMATION.

17. FURNISH AND INSTALL NEW COMPONENTS FOR THE INTERCOM AND PAGING SYSTEMS. PROVIDE A HARDING DCC, THE NECESSARY QUANTITY OF DCE'S, POWER SUPPLIES, AND PLC I/O COMPONENTS IN NEW EQUIPMENT RACKS. PROVIDE PROGRAMMING TO ACCOMPLISH ALL OF THE FEATURES IDENTIFIED IN THE PROJECT DOCUMENTS. RECONNECT THE EXISTING INTERCOM STATION CABLES TO THE NEW INTERCOM SYSTEM COMPONENTS. REFER TO SPECIFICATION SECTIONS 275123 AND 284619 FOR ADDITIONAL INFORMATION.

18. FURNISH AND INSTALL A IEB-400-21 FOR EACH PAGING SPEAKER IN THE SYSTEM. ROUTE PAGING SPEAKERS BACK TO THE DCC AND DCE INDIVIDUALLY. PAGING ZONE SWITCHING WILL BE DONE THROUGH THE PLC.

19. FURNISH AND INSTALL NEW COMPONENTS FOR THE LOCKING CONTROL SYSTEM. PROVIDE THE NECESSARY CONTROL RELAYS, DOOR BOARDS, POWER SUPPLIES, AND PLC I/O COMPONENTS TO CONTROL ALL THE EXISTING CONTROLLED DOORS, GATES, AND MONITORED LOCKS. PROVIDE THE PROGRAMMING TO ACCOMPLISH ALL OF THE FEATURES IDENTIFIED IN THE PROJECT DOCUMENTS. REFER TO SECTION 284619 FOR ADDITIONAL INFORMATION.

20. INTERCOM WIRING SHALL BE EXTENDED TO THE NEW SERVER ROOM 301F. TERMINATE WIRING IN LOCAL ROOMS ON SCREW TERMINALS BEFORE ROUTING THE WIRE TO 301F.

21. PROVIDE THE MAIN PLC IN SERVER ROOM 301F AND REMOTE I/O IN THE OTHER REMOTE SEC ROOMS.

22. DEMO EXISTING, COMPLETE INSTALL OF NEW, ENERGIZE. ACTIVATE, AND TEST LOCKING CONTROL AND INTERCOM SYSTEM EQUIPMENT IN EACH AREA BEFORE MOVING TO THE NEXT TO AVOID UNNECESSARY OPERATIONAL OR STAFFING ISSUES.

23. PROVIDE AN INDIVIDUAL FUSE IN THE RACK FOR EACH DOOR AND GATE LOCK.

24. CONTRACTOR TO PROVIDE ALL PLC AND INTERCOM PROGRAMMING FOR ALL INTEGRATION WITH THE VIDEO MANAGEMENT SOFTWARE FOR CAMERA CALL UP. PROGRAMMING IN VIDEO MANAGEMENT SOFTWARE TO BE FURNISHED BY OWNER. CAMERA CALL-UPS SHALL BE REVIEWED AND SIGNED OFF ON BY THE OWNER.

25. FURNISH AND INSTALL A #8 COPPER GROUND WIRE TO ALL EQUIPMENT RACKS AND/OR CABINETS CONTAINING COMPONENTS OF THE LOCKING CONTROL SYSTEM. CONNECT GROUND WIRE TO THE WALL MOUNTED GROUND BUS LOCATED WITHIN EACH SECURITY EQUIPMENT ROOM.

26. FURNISH AND INSTALL A DATA COMMUNICATION CONNECTION BETWEEN THE EXISTING IP CAMERA VIDEO NETWORK AND THE NEW LOCKING CONTROL PLC FOR CAMERA CALL-UP FEATURES IN ACCORDANCE WITH THE PROJECT DOCUMENTS. OWNER SHALL HAVE FINAL APPROVAL.

ADD-1 27. DIVISION 26 SHALL ENSURE 4 UPS EM CIRCUITS ARE FURNISHED AND INSTALLED AT CENTRAL CONTROL AND 4 UPS EM CIRCUITS ARE FURNISHED AND INSTALLED IN SEC ROOM 202A.

28. CONTRACTOR SHALL CONFIGURE THE NEW EQUIPMENT LAYOUT UTILIZING THE NEW RACK AND/OR CABINET SPACE. THREE NEW EQUIPMENT RACKS IN SEC 301F SHALL BE PROVIDED BY THE CONTRACTOR. NEW EQUIPMENT COMPONENTS SHALL BE MOUNTED AND SPACED WITHIN THE RACK AND/OR CABINET SO THAT WIRING CONNECTIONS AND SERVICEABLE EQUIPMENT CAN BE EASILY ACCESSED FROM THE FRONT AND/OR BACK OF THE RACK. CONFIRM FINAL RACK LAYOUT WITH OWNER.

ADD-1 29. ESC SHALL FURNISH AND INSTALL ALL BACNET INTERFACE DEVICES INCLUDING ALL RACEWAYS, CONDUIT, AND TERMINATIONS. TEST AND COMMISSION THE BACNET INTERFACE DEVICE FOLLOWING THE PROVISIONS OF 25.20.28.46.19.

30. FURNISH AND INSTALL A FLOOR STANDING RACK EQ/UILAENT TO AMCO THAT IS 83"X23"X27".

31. FURNISH AND INSTALL THREE (3) 20 AMP 120 VAC UPS CIRCUITS FOR EACH NEW AND EXISTING SECURITY RACK AND/OR CABINET.

32. FURNISH AND INSTALL A HARDING TMM-641 WITH GOOSE NECK AT EACH OWS.

33. FURNISH AND INSTALL A HARDING TMM-641 FLUSH TO COMMUNICATE DIRECTLY WITH CENTRAL CONTROL.

34. FURNISH AND INSTALL BACNET COMMUNICATION INTERFACE MODULE PS56-BAS-XXX AND CONTROLLOGIX TO BACNET/IP 460ETCBS-N34-D AS REQUIRED FOR ALL SECURITY ELECTRONIC SYSTEMS. COORDINATE INSTALLATION OF BACNET EQUIPMENT TO THE PLC WITH ALL TRADES. REFER TO SPECIFICATION 280505.

35. FURNISH AND INSTALL ONE UPS CIRCUIT WITH A QUAD OUTLET AT EACH POD OWS.

36. FURNISH AND INSTALL WIRING AND CONDUIT FROM THE UPS TO THE PLC SYSTEM TO MONITOR UPS SYSTEMS ALARMS. COORDINATE WITH DIVISION 26.

ISSUED FOR BID

FRANK A. NEMEC 062-054577 LICENSED PROFESSIONAL ENGINEER EXPIRES: 11/30/2020

SYSTEMS DESIGN

RN

DLR Group
Architecture Engineering Planning Interiors

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SEC. ELEC., LARGE SCALE PLANS
DEPKE JUVENILE JUSTICE COMPLEX
FIRE ALARM AND DOOR CONTROL REPLACEMENT

SE2.1
22-17132-00
02/25/2019
Revisions
ADD-1 03.27.2019

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SECTION 271500 – COMMUNICATIONS HORIZONTAL CABLING

GENERAL

1.1 RELATED DOCUMENTS

~~A. This section is not in contract and is provided for reference only.~~

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, to this Section.

1.2 MANUFACTURER

A. Subject to compliance with specified requirements, provide specified materials equal to the referenced products included for the design of the Local Area Network Cabling system.

1.3 PRODUCT SUBSTITUTION

A. No manufacturer substitutions will be allowed for the structured cabling system.

1.4 UTP COPPER CABLE LENGTHS, TERMINATIONS, MARKINGS

A. Copper Cable runs shall be compliant with EIA/TIA recommended lengths:

1. Horizontal cables shall not exceed 295 feet (90 meters). Cable runs shall be continuous with no allowance for splicing.

B. Copper cable Eight-Position Jack Pin/Pair Assignments shall match EIA/TIA T568A cabling standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide a certified structured cabling system by the following:
1. CommScope, Inc. Optispeed Series

2.2 CATEGORY 6 PERMANENT LINK

A. The Category 6 4 pair UTP channel consists of all cable and components with up to four connections that comprise the full 100-meter circuit from the LAN Electronics to the workstation device. The channel shall support applications such as 10Base-T, 100Base-T, 155 Mbs ATM, 77 channel broadband video, 1.0 Gbps Ethernet, 1.2 Gbps, and proposed 2.4 Gbps ATM technologies.

B. The Category 6 permanent link (4-pair UTP) consists of a maximum of 90 meters of horizontal cable from the telecommunications room and will connect patch panels to the workstation faceplate/ RJ45 jack in the work area. The permanent link/channel shall support applications such as 10Base-T, 100Base-T, 155 Mbs ATM, 77 channel broadband video, 1.0 Gbps Ethernet, 1.2 Gbps, and proposed 2.4 Gbps ATM technologies.

C. The channel shall include the patch cord, patch panels, horizontal cabling, and the station cord, and shall have a positive 10dB PSACR across the full frequency range of 1MHz - 250MHz.

D. All components shall be backward compatible with existing Category 3, 4, 5 and 5e networks.

E. The cabling permanent link with specified manufacturers above shall exceed Category 6 requirements.

2.3 INFORMATION OUTLETS

A. Activations: The numbers adjacent to data information outlets as shown on the plans indicate the number of data cables terminated to jacks at each information outlet. If no number, or the number zero is shown, no data cables shall be terminated at that location, but a blank 4-position faceplate shall be provided.

B. Modular Faceplates COMMSCOPE M14L-246 (108168550), four hole ivory faceplate:

1. Data or telephone information outlets: The number next to each outlet indicates the number of data activations at that location (ie. “1" indicates one data cable installed, with blank inserts over the remaining faceplate positions).
2. Wall mounted telephone outlets: Stainless steel faceplate suitable for wall mounted telephone. Provide CAT 6 cable at each location unless noted otherwise. COMMSCOPE stainless steel 630B8 (104206701), type plate with an 8 conductor jack.

C. Mini-Com Modules: Provide modules that snap into the faceplate that are designed for the application.

1. Data jack: COMMSCOPE MGS400-318 (700206758) 8C/8P blue Category 6 jacks wired 568A

2. Voice jacks: COMMSCOPE MGS400-246 (700206717), 8C/8P ivory Category 6 jack wired 568A.

D. Minimum electrical requirements:

1. Insulation resistance: 500 MΩ minimum
2. Dielectric withstand voltage 1,000 VAC RMS, 60 Hz, minimum contact-to-contact and 1,500 VAC RMS, 60 Hz minimum from any contact to exposed conductive surface.
3. Contact resistance: 20 MΩ maximum
4. Current rating: 1.5A at 68 degrees F per IEC Publication 512-3, Test 5b

E. Dust Cover/Blank: Contractor shall provide dust covers for each outlet as required to close all faceplate openings.

2.4 MODULAR PATCH PANELS

A. Furnish and install Patch Panels, Panduit DP48688TGY & DP24688TGY. The panels shall be flat with extended strain relief bar in the rear of the patch panel. The panels shall be equipped with 110 IDC style connectors. Provide labeling strip above each jack. The Contractor shall be responsible for sizing the modular patch panels according to the following specifications:

1. Number of Modular Patch Panel Ports shall be 120 percent of the total number of terminated information outlets at each closet.

2.5 PATCH CORDS

A. By owner.

2.6 STATION CORD

A. By owner.

2.7 HORIZONTAL UTP CABLE

A. Furnish and install CommScope copper Unshielded Twisted-Pair (UTP) horizontal cable as follows:

1. Plenum rated, 24 AWG bare solid copper conductor. The cable shall conform to UL Type CMP listing for plenum and riser applications.
2. Each cable sheath shall contain 4 pairs of unshielded copper twisted-pairs with each pair having a different twist ratio of 12 to 24 twists per foot and cable shall have a pair isolator.
3. The cables shall exceed the requirements of:

    a. EIA/TIA 568A Commercial Building Wiring Standard Horizontal Cable Section for category 6.
    b. Plenum - UL 910, CMP.

4. Provide colors for each defined system as follows:
    a. All voice cabling color will be (gray), also second wire a white background and a stripe of same color.
    b. All data cabling color will be Blue, also second wire a white background and a stripe of same color.
    c. All Camera cabling color will be Yellow, also second wire a white background and a stripe of same color.
    d. All HVAC cabling color will be Purple, also second wire a white background and a stripe of same color.

PART 3 - EXECUTION

3.1 GENERAL

A. Install equipment and components in accordance with manufacturer's written instructions, in compliance with NEC, and with recognized industry practices. Ensure that all work complies with specifications and serves the intent of the construction documents. Cabling and equipment shall be installed in accordance with good engineering practices as established by the EIA/TIA and the NEC.

3.2 INSTALLATION

A. UTP Cabling - General:

1. Provide intra-building cabling runs between MDF/TC rooms. Provide dedicated horizontal cable runs from TC rooms to all "terminated" data information and phone outlets as described above and indicated on the Drawings.
2. Provide Faceplates for all data, voice, TV, CV, lcd, camera and card reader information outlets.
3. Where outlets are shown on plans, this contractor shall provide jack termination, faceplate, and cabling.
4. Provide Modular Information Outlets in Outlet Boxes for all "terminated" data information outlets.
5. Provide a 10’ service loop above accessible ceiling for each data drop.
6. A minimum 15-foot loop of extra horizontal cable shall be secured above the data rack. All cables shall be bundled in groups of no more than 24 cables.
7. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors.
8. Avoid excessive and sharp bends that may damage cabling. Do not exceed manufacturer's recommended pulling tensions for backbone and horizontal cables.
9. Allow sufficient slack (15 feet) in cable to prevent premature deterioration of cable system components and to assist in the maintenance and servicing of cable and/or other building systems and components.
10. Provide Cable Distribution J-Hooks as necessary to route and support cables. All cables shall be supported from the building structure and shall not lie on ceiling grid. J-hooks shall be spaced no more than five feet on center.
11. Provide Velcro straps to bundle and organize cabling for a quality and professional installation. Vinyl cable straps are prohibited.
12. Fittings or connections are allowed only at the input and output of devices. Splicing shall not be accepted in cable runs. Spliced cable runs shall be rejected and replaced with continuous cables, prior to acceptance.
13. Separation of Wires: Comply with EIA/TIA-569 rules for separation of UTP cables from potential EMI sources.
    a. When routing cables through walls and ceilings the Contractor must keep the cable a minimum of six inches away from sources of electromagnetic interference (EMI) and radio frequency interference (RFI). Likely sources of EMI/RFI include fluorescent lights, electric panels, and light dimmers. Phase transformers and electric motors, such as those found in air handlers and elevator rooms can also generate high levels of interference.

14. Cable and wiring routed through inaccessible spaces or spaces where there is a risk of damage to conductors shall be installed in conduit, conduit provided by this contractor
15. The Contractor placed drops for Wireless Data Access Points (WAP's) shall be terminated at the serving TC end in the Panduit patch panels, with the other Category 6 terminations and labeled in the same fashion as all other cables. The device end of the cable will be terminated with a Panduit RJ45 Category 6 Minicom jack and 20' of cable coiled and left supported above the drop ceiling. In all other applications (i.e. hard deck ceiling or wall penetration), the device end of the cable will be terminated with a Panduit RJ45 Category 6 Minicom jack and installed in a two port flush mount or surface mount box.

B. Conduit Sleeves: Where additional conduit sleeves are required for cable routing (beyond those shown on the drawings), provide conduit sleeve rough-in and fire stopping through fire-rated and block walls for all "terminated" and "future" information outlets. Sizing of conduit sleeves shall be based on NEC 40% fill capacity and industry standard recommendations. Sizing of conduit sleeves shall take into account all horizontal cable routing. Provide insulated bushings on all conduit sleeves to protect cabling from damage. Split bushings are strictly prohibited, and any cabling installed with split bushings must be replaced with new. Do not install cable in conduits / sleeves prior to bushing installation. If upon inspection by the Project Manager, it is noted that the bushings are not in place or it appears that the bushings were placed after the cable was pulled (split bushing), the Contractor will be directed to remove the wiring that was placed, destroy that wiring, and re-pull the wiring with the appropriate bushings in place. The electrical sub-contractor will place bushings for conduits they install. Conduits is excess of 100' in length shall have a pullbox installed. Conduits will also have a pull-box installed for every 180º of bend.

C. Conduit Pathways: Where conduit is required for cable routing, provide EMT rough in as required or shown on the drawings. Where installed in finished locations as shown on the drawings, paint the conduit to match the adjacent surfaces. Sizing of conduit shall be as indicated or if not indicated then based on NEC 40% fill capacity and industry standard recommendations.

D. Fire Stopping: Provide fire stopping for all conduit sleeves shown on the plans and as added as required at all fire rated walls. Firewalls are indicated on the architectural drawings and are available for review at the General Contractor's / Construction Manager's office. Fire stopping shall be required at all fire rated walls for all sleeves, including those provided by the Division 16 contractor that are shown ½ tone on the technology drawings.

E. Training: Provide on-site, hands-on training for a minimum of two (2) individuals on cabling-related equipment specified herein. A minimum of two (2) hours of training shall be provided for UTP and Fiber Cabling. Tasks necessary to perform on-going management of the cabling system shall be addressed as part of the training. The following topics shall be included as part of the training for the Cabling System:

1. Labeling Conventions
2. Moves, Adds & Changes
3. Reading and updating Record Drawings
4. Proper cable management in accordance with EIA/TIA 568A.

3.3 CABLE ROUTING INTO TC ROOMS

A. The Contractor shall segregate and bundle all workstation cables in the cable ladder rack/trough. All cables shall be bundled in groups of twenty-four (24) individual twisted pair workstation cables.

B. The twisted pair workstation cables shall divide (right or left, top to bottom) depending upon the side of the patch panel to which the twisted pair workstation cables are terminated and from the direction the cables enter the racks. The cables shall be grouped together for cable bundles destined for the same side of a wire management rack. This procedure shall produce an orderly installation with no crossovers for all visible cabling.

3.4 GROUNDING

A. Grounding: Ground all racks and cable runway to the grounding bus located adjacent to the rack. The ground bus is provided by the Division 26 contractor. This contractor shall provide #6 CU conductor from each rack / runway to the ground bus. Ground equipment per manufacturers' instructions and NEC requirements. Provide Panduit RGW paint piercing grounding washers. Provide Panduit GB2 series busbar with Panduit LCC-w series irreversible compression lugs.

B. The Contractor shall adhere to all grounding and bonding Local electrical codes. The Contractor will ensure the grounding/earthing system complies with J-STD-607-A and ANSI/TIA-942 standards. The Contractor is responsible for ensuring all grounding/earthing conductors are copper. The Contractor will use Lugs, HTAPs, grounding strips, and bus bars that are UL Listed and made of premium quality tin-plated electrolytic copper that provides low electrical resistance while inhibiting corrosion. The Contractor must use Antioxidant when making bonding connections in the field. The Contractor will use Two-hole lugs at the ground bus bar and each frame as these lugs resist loosening when twisted (bumped) or exposed to vibration. All lugs shall be irreversible compression and meet NEBS Level 3 as tested by Telcordia. Lugs with inspection windows shall be used in all non-corrosive environments so that connections may be inspected for full conductor insertion (battery rooms are an exception where windowless lugs may be used). Die index numbers shall be embossed on all compression connections to allow crimp inspection. Cable assemblies shall be UL Listed and CSA Certified. Cables shall be a distinctive green or green/yellow in color, and all jackets shall be UL, VW-1 flame rated.

C. To provide electrical continuity between rack elements, The Contractor will use *PANDUIT* paint piercing grounding washers, series RGW, shall be used where rack sections bolt together, on both sides, under the head of the bolt and between the nut and rack.

D. Bond racks and cabinets individually, not daisy chained together. Use a #6 wire using a 2-hole lug to attach (ground) each rack to the TGB in the room.

E. All grounding bus bars shall be wall mounted in the TC’s and installed by the electrical contractor. The grounding bus bar will be 3/8”x 12”x 1 1/2” utilizing long standoff insulator studs. All bus bars shall be bonded to an approved connection point of the building ground system. All conductors utilized for attaching the bus bar to the building ground system shall be a minimum of 6 AWG insulated green. The bus bar main grounding conductor shall be connected to each bus bar using an approved, two hole compression fitting.

F. The Contractor shall ground the back of each Panduit frame and cable trays with a #6 green insulated ground wire routed to the grounding bus bar supplied by the electrical subcontractor on the backboard.

G. The Contractor will place and terminate all copper and fiber optic tie cables as specified by the owner.

3.5 EQUIPMENT IDENTIFICATION

A. Identification, General:
1. All telecommunications equipment and parts furnished and installed by the Contractor shall be equipped with a permanent numbering identification indicating its individual location within the facilitiy.
2. Labeling Patch Panels: Label each patch Panel with the rack number and Panel number. For example, the top patch panel in rack 1 will say Rack 1 Panel 1.
   a. On the patch panels, label each port with the room number the data jack is located in, (e.g., WC204.01, WC204.02, etc.).
3. Labeling the drops/jacks: Each jack shall have 2 label components; one that designates the closet-end location, and one that is a room-local designation, as follows: Label each data jack, with the closet name, rack number, panel number and port number. Example, WC1-1.3.34 (for First floor Wellness Center data equipment room 1st floor, rack number 1, panel number 3 and port number 34). Also label each jack with a local designator that matches the closet-end label, like WC204.01. Local jack numbers will start with "WCnnn.01" as the first jack to the left of the main entry door, and proceed clockwise around the room.
4. Confirm room numbers with Owner's Representative prior to labeling. The room numbers shown on the plans may not be the final room numbers.
5. Utilize manufacturer designed labeling method at Patch Panels. Labeling method shall be permanent and minimally susceptible to vandalism. Labels shall be permanent, and contractor shall replace fallen labels as part of the warranty.
6. Label both ends of each cabling run within 6 inches of termination points with Panduit Pan-Ty, or equal.
7. Final labeling shall include: face of patch panel, cable end behind patch panel, cable end within data j-box, and data faceplate.
8. Labeling shall be in accordance with owner requirements.

B. Fiber Enclosures
1. The black enclosures shall be labeled with "From - To" information. All ports shall be labeled with strand number.

C. Racks
1. Racks will need to be numbered to conform to ITS labeling requirements. For example, rack 1 should be installed closest to the wall and allowing for outward growth. The label shall be placed at the top and centered on the rack. All racks will be labeled on the front and rear with engraved plastic placards denoting row number and rack number.

3.6 COPPER CABLE TESTING

A. Notify and schedule with Engineer the final testing.

B. Testing of all copper wiring shall be performed prior to system cutover.

C. Testing shall be witnessed by ITS personnel.

D. All Category 3 backbone (multipair) unshielded twisted pair cables shall be completely tested. Each pair of every cable shall be tested with a Fluke DTX 1200 as stated previously for correct polarity, continuity, opens, shorts, the presence of ac voltage, etc.

E. Cables shall be tested for all Category 6 100% link parameters using the specified level 3 tester. A minimum of a Fluke DTX 1200 with Permanent Link field tester shall be used for testing of Category 6 Permanent Links and Channels. Test all Category 6 link parameters, including attenuation, NEXT, PS NEXT, FEXT, ELFEXT, return loss, and delay skew.

F. Patch cord, workstation cord, and cable lengths shall be recorded as part of the testing.

G. Faults shall be corrected and retested.

H. Test information along with manufacturer and model number of test equipment shall be recorded and provided to Owner as part of the project Telecommunications Manual.

I. Provide proof of factory calibration of test meter within 6 months of the beginning of testing.

J. The "* pass" option on the test meter must be set to the "on" state. The "* pass" symbol indicates a channel that is within 1 db of failing.

K. Provide test data in electronic format with corresponding software for viewing of testing documentation on CD-ROM provided from the test meter. Contractor shall provided one CD-ROM to Owner and one to Engineer. The Contractor shall also provide paper copies of all test results by Telecommunications closet for all Category 6 structured wiring. These test results will be used for comparison to the random sample performed during the final walk through.

L. The full results of the electrical characteristic tests shall be presented in an electronic media format with workstation location outlet jack easily identified. These results shall include, but are not limited to the worst-case margin and the worst-case data point. For all cases, the pair, the frequency and the test limit at the reported worst-case condition shall be reported. For multiple worst-case conditions, measurement details shall be reported at the highest frequency point.

3.7 RANDOM WORKSTATION CABLING TEST RESULTS (SELECTED CABLES)

A. The Contractor shall perform and record full data point testing for a random sampling of the workstation cabling as identified during the acceptance walkthrough. All tests shall be performed across the entire frequency spectrum capability of the field test equipment. These tests shall be done from one (1) cable minimum up to 10 percent of the installed workstation outlet locations (geographically dispersed). The testing shall be evenly divisible between the outlets at each faceplate.

B. All data points for each test shall be stored on a computer. The Contractor shall provide the results of these tests in a graphical format (e.g., ps-acr plots return loss plots, impedance plots, etc.). If the software from the field test equipment manufacturer does not support this type of data reporting, the Contractor shall use Microsoft Excel to record and graph the information.

3.8 COORDINATION MEETING

A. Provide (2) 2-hour coordination meetings with the owner prior to installation and ordering of any materials to determine final owner requirements. Items requiring further coordination include, but are not limited to:
   1. Final rack layouts and elevations.
   2. Copper and fiber patch cord lengths and colors.
   3. Labeling.
   4. Owner furniture selection and corresponding cabling coordination.

END OF SECTION 271500

SECTION 275123 – INTERCOM/PAGING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of work: Furnish and install all components to provide a complete and operational intercom system as described herein and as shown on the plans.

B. Under Base Bid B, Complete the PLC door control and intercom system replacement with all labor, conduit, new cameras, new workstations, and new cabling as indicated on the plans or required for a complete and functioning system. Integrate with existing card access and existing video system. Furnish and install new paging wiring and extend wiring for intercoms devices to SA file room 301f. existing devices will be reused.
   1. Test of continuity of wire to ensure that it is operational.

C. Under Add Alternate 3, replace all intercom wiring in addition to the base bid item B security system replacement.

D. Under Add Alternate 5, furnish and install wiring and electronics to connect four doors currently controlled by the card access system to the PLC door control system. Furnish and install wiring to indicate each door position and to unlock each individual door. Also furnish and install an intercom in each of the two holding cells in the court building.

E. Paging should be by task group. The tasks groups can be found on detail 1/SE0.00.

F. The ESC shall be responsible for providing accurate intercom-camera call up. Intercoms and their associated cameras can be found on detail 1/SE2.2.

G. The ESC shall be responsible to provide a functional report for the existing intercom system.

H. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.

I. Refer to 280500 Common Work Results for a list of base bid and add/deduct alternates.

1.2 SYSTEM DESCRIPTION

A. Intercom Control: The intercom system shall provide two-way communications from each area to the master station in Main Control. Local Control stations shall provide two-way communications from the local station to the respective inmate pod. Communications shall be established between the local control room and the areas as indicated on the plans.

B. Intercom Annunciation: When the intercom call is placed, the related intercom icon will flash on the graphic monitoring the area until the call is answered. Once answered, the icon will illuminate steady until another station is selected or the system is reset.

C. Intercom Answer: Selecting the appropriate icon on the graphic operator interface shall connect the intercom voice path to the related intercom station as indicated on the plans.

D. Inmate Monitoring: The intercom system into inmate areas shall not utilize any tone or audible signal when the audio path is open.

E. Paging: General paging shall be provided throughout the facility as indicated on the plans. Provide zoned paging as shown. Provide sound conditioning equipment as required. Route paging conduit and wire back to headend equipment individually so paging zones can be dynamic.

F. Group Monitoring: The system shall allow the operator in Main Control to individually select individual intercoms to form a monitoring group for extended audio monitoring. The familiarity of staff with the detainees will allow them to recognize individual voices. Group monitoring shall not interfere with normal intercom calls places on stations selected for group monitoring.

1.3 SUBMITTALS

A. Basic Submittals: Provide any submittals as required by the General Conditions and Section 280500.

B. Special Submittal Requirements: In addition to the general requirements for submittals, provide the following for approval:
1. System interconnection one-line diagram.
2. Datasheets of all products proposed.
3. Complete Bill Of Material.
4. Diagram of equipment layout in racks and cabinets.
5. Loading calculations for each paging zone and amplifier.
6. Wiring diagrams and function for group monitoring.
7. Wiring label designations for all conductors.

1.4 SYSTEMS INTEGRATION

A. Integration: Integrate the intercom system with the other systems to call up camera viewing station when the call is selected in Main Control.

B. Sub Systems: Integrate the intercom control with the following sub systems.
1. Programmable Logic Controller (PLC)
2. IP Video Camera System
3. Operator Work Station

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Acceptable Manufacturers:
1. Harding (No substitute).
2. Biamp (Paging Amplifier).
3. Quam (Paging Speakers only)
4. Dukane

2.2 EQUIPMENT

A. All major electronic components shall be on printed circuit boards and the printed circuit boards shall utilize **push-on connectors with set screw terminals** (Phoenix Contact Type MSTB, screw-type, 24-12AWG, strand or solid) or equal for ease in maintenance and replacement. Push-in wire connections will not be allowed.

B. The system shall provide for two-way conversations between the Operator Work Station (OWS) and the selected intercom station. The system shall allow one (1) two-way conversation to occur for each OWS. Each intercom station may communicate with the OWS to which it is directly connected. An OWS shall be able to connect to any intercom that is in the station's assigned task group.

C. The intercom system shall consist of a Harding DXL intercom system. It will have a digital central communication controller (DCC), communication expanders (DCE), necessary DXL software, SCC 400 for station intercom cards, talkback expanders (TBE), Page zone expanders (PZE), VoIP Paging/Talkback amplifier (PTA-620), SPA-120 station port adapter, and DSM-140 intercom master stations as required.

D. Paging Amplifier: Furnish and install a Biamp MCA 8050 (or equal) amplifier to power paging speakers as indicated on the plans. Provide only if there are compressions driven paging speakers. Provide features as follows:
1. Frequency response of 20 Hz to 20 KHz.
2. Signal-to-Noise ratio shall be greater than 78 dB from 20 Hz to 20 KHz at line input at rated power.
3. Balanced or single-ended 25 volt and 70 volt outputs at a screw terminal.
4. The Mixer/Amplifier shall provide a minimum of 4 balanced input channels.
5. Automatic and/or manual muting shall be selectable on each channel.
6. Mixer/Amplifier shall provide an internal “pre-announcement” chime tone with level control.
7. Amplifier shall be sized to drive 125% of the connected load.
8. Provide zone relays as indicated.

E. Intercom stations (IC) and Emergency Call stations (EC) shall be flush mounted with 11 gauge stainless steel security cover plate where shown on the drawings with pushbutton for call origination to a OWS. These stations should be Harding ICE-420 series intercoms.

F. Paging Speakers: If paging speakers need to be replace furnish and install Quam 8C10PAOT speakers with a recessed enclosure and all applicable parts. Furnish and install a Harding IEB-400-21 IC board mounted inside the quam enclosure for each speaker. Speakers are to be individually addressable for the Harding system.

G. Pedestals: Furnish and install heavy-duty pedestals for intercoms at all vehicle sallyports as indicated on the drawings. Pedestal shall be height adjustable and shall be anchored to a concrete base. Provide hooded intercom stations with surface boxes. Pedestal shall be constructed of round pipe allowing the housing to spin without breaking if sufficient pressure is applied from the side. Protective pipe bollards shall be installed at all vehicle traffic areas.

H. Fiber Transmitter: Furnish and install fiber transceivers equal to AFI-89D series for transmission of audio between Main Control and remote buildings over multimode fiber.

I. Talk Path: Each OWS shall have an independent talk path allowing simultaneous communication from all OWS to the stations under their control. Intercom stations can establish a talk path with only one master at a time.

2.3 TRANSIENT SURGE SUPPRESSION

A. Acceptable manufacturers are as follows:
1. EDCO (Formerly Northern Technologies)
2. Transtector

B. Intercom Suppression: Provide surge protection for intercom wiring that leaves the building. Devices should be equal to Northern-Technologies PLP-S Surge Protector series units matched to the voltage of the circuit suppressed. The suppressors shall have a peak pulse power dissipation rating of 10 joules each mode, minimum.

C. Security System Power: Provide surge protection for all power connections both inside and outside the building. Devices shall be equal to Northern-Technologies TCS-HWR Surge Protector series rated for the power of the circuit suppressed. The suppressors shall have a peak pulse power dissipation rating of 300 joules L-N, minimum. Units shall provide a dry contact monitored by the security system and identified by electrical panel circuit number.

D. Provide connection to the local equipment grounding system at all TVSS devices provided.

2.4 FIBER OPTIC MODULES

A. Furnish and install all fiber optic modules required for transmitting audio between security electronics rooms.

B. Furnish and install a fiber optic module pair to establish one audio link from each Security Electronics room to Main Control over fiber.

2.5 FIBER OPTIC NETWORK

A. Provide fiber optic cable Light Interface Unit (LIU) as manufactured by Corning mounted at the top of each security equipment rack located on the plans.

B. Provide conventional OM3 50 UM Multi-mode fiber optic cable as manufactured by Corning for all PLC network and Intercom system communications. Refer to SE1.00 for additional information and routing details.

C. Provide fiber optic cable connectors for each fiber installed. Install connectors as manufactured by Corning Unicam in the style (ST/SC) to match the equipment being provided.

D. Provide fiber optic cable testing for all fiber strands being furnished in accordance with the applicable requirements of:
A. ANSI/TIA/EIA – 568-C: “Commercial Building Telecommunications Cabling Standard”
B. ANSI/TIA/EIA – 526-14B: “OPTICAL POWER LOSS MEASUREMENTS OF INSTALLED MULTIMODE FIBER CABLE PLANT”
C. NFPA 70
D. BICSI TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL

E. Utilize a high-resolution OTDR to characterize the power loss and power reflected along optical fibers. The OTDR must operate within the range of 850 ± 30 nm or 1300 ± 20 nm for multimode testing in accordance with ANSI/TIA/EIA-526-14-B.

F. Test for continuity and quality of all optic fibers installed. Any deficiencies found shall be corrected by the installer and the corrected fiber retested and documented. The final signature traces for each fiber as corrected shall be submitted for review prior to being placed into service and be included in the O&M manuals.

2.6 CABLING AND WIRE

A. Acceptable manufacturers:

1. Belden.
2. Carol.
3. West Penn Wire.

B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.

C. Refer to PLC specification section 284619, 2.10, for additional wiring information requirement.

2.7 EQUIPMENT ENCLOSURES

A. Acceptable Manufacturers:
1. AMCO Cabinets.
2. Hoffman.
3. Lowell Manufacturing.

B. Standing Rack: Furnish and install a free standing rack equivalent to AMCO 83-23-27 Frame.

C. Wall Cabinets: If there is available space to mount wall cabinets in each area. Submit to engineer for approval prior to incorporating wall cabinets.
1. Wall cabinets shall be rated a minimum of NEMA 4.
2. Furnish and install mounting hardware as required to install all intercom security electronics equipment required in the space allowed.
3. Key all cabinets the same. Furnish and install door (4) keys.
4. Furnish and install ventilation fans as required to enable proper ventilation for the equipment.

PART 3 - EXECUTION

3.1 COORDINATION

A. Preliminary Coordination: The impact to daily operations shall be minimized. Where possible all electronics and cabinets shall be installed before the existing system is disconnected. The ESC shall work with the owner’s representative to plan what portion of each area will be transferred from the existing system to the new system,

B. Control Coordination: Verify that all stations are provided with an appropriate control and an annunciating icon on the appropriate control panel.

3.2 INSTALLATION

A. Speakers: Initially tap all speakers at the lowest tap provided. Move to higher taps in high noise areas to balance the page output throughout the facility. All attenuation controls shall be set to the minimum practical level. All costs for balancing shall be included in the base bid. Record and submit with closeout documents all tap settings.

B. Devices: Install all devices per manufacturer's recommendations. Wall mounted square devices shall be installed with the bottom line parallel with the floor at designated heights.

C. Intercoms: Initially tap all intercoms at the lowest tap. Move to higher taps in high noise areas. All costs for balancing shall be included in the base bid. Record and submit with closeout documents all tap settings.

D. Field Wiring: The wiring shall be installed in raceways and equipment enclosures with other conductors, within limitations defined by Article 725 of the National Electric Code.
   1. Installation: Dress wires and cables to provide a neat and orderly appearance within all enclosures, equipment racks, cabinets, and consoles by routing in snap-cover, plastic wiring duct. In locations where wiring duct is not feasible, organize by cable clamping, dressing and tie-wrapping.
   2. Strain Relief: Relieve strain on all loose wire bundles using tie-wrap, supports fastened with machine screws or bolts. Do not use self-adhesive type supports.
   3. Shrink Tubing: Neatly form cable ends and apply shrinkable tubing to shielded cables or where necessary to secure the insulation against fraying or raveling.
   4. Edge Protection: Install edge protection materials on edges, holes, lips of ducts, or any other place where wires or cables cross sharp metallic edges.
   5. Service Loops: Allow sufficient service loops where conductors leave cabinet or transition to door mounted electronics.
   6. Splicing: Field wiring shall not be spliced. All wiring shall be continuous from the field device to the termination in the control panel.
   7. Connections: Terminate all existing field wiring on terminal strips in the existing cabinet. Label all wiring with designations indicated in the shop drawings and Operation Manuals. Wire designations shall be consistent throughout the project and as approved by the owner,
   8. Listings: Wiring shall be listed for the installation. Wire identified herein is intended to provide electrical characteristic requirements.
   9. Wire Termination: All wiring shall be terminated at both ends and labeled in accordance with the equipment wiring plans. Wire not energized or connected to active devices shall be capped off and labeled for future use.

3.3 SPARE PARTS

A. Furnish to the owner the following spare parts:
   1. (10) spare IEB boards.
   2. (10) spare system audio speakers of each type installed.
   3. (10) spare intercom stations of each type installed.

B. Spare parts shall be packaged in appropriate protective packing material.

C. Box spare parts for easy storage and clearly identify the contents of each box on all four sides of each container.

3.4 FIELD QUALITY CONTROL

A. Operation: Verify and document that intercom systems operate as specified. Verify that all controls are operational.

B. Wattage Taps: Verify and document the tap setting of each speaker and record the level setting of each volume control station after testing is complete.

C. Intercom Operation: Verify and document that intercom calls register on the appropriate control station and that each intercom can be called from the control station. Check that all integrated events occur as specified for each intercom actuation.

D. Audio Path: Verify and document the voice path of each intercom station to the local control station for clarity and volume. List the final tap setting for each intercom after testing is complete.

E. Test Reports: Provide written test reports documenting all of the above with either a narrative for each point or a list of features noting “pass” or “fail”. Submit copies to the Engineer three weeks before acceptance testing.

INTERCOM AND PAGING VERIFICATION AND CHECK-OUT FORM

√ = OK

Job #
Job Name:
Panel #

FIELD TEST CODE:		**REPAIR CODE:**	
A - No status change	M -Adjust paging amp	1-SSI	Software Test By:_____ Date_____
B- No power to intercom	N -Paging reversed	2-ELECTRICIAN	
C -No audio	O -	3-IRONWORKER	Hardware Test By:_____ Date_____
D -Poor audio	P -	4-CARPENTER	
E -No Video call-up	Q -	5-OWNER/REP	System Test By:_____ Date_____
F -Intercom button sticks	R -	6-ENG	
G -Intercom Reversed	S -	7 -	Design Engineering By:_____ Date_____
H - Adjust intercom amp	T -	8 -	
I - Software problem	U -	9 -	Wiring By:_____ Date_____
J -Not installed	V -	10 -	
K -Paging zone failure	W -	11 -	Field Test By:_____ Date_____
L - Paging speaker failure	X -	12 -	

							ON-SITE				
ICON ID#	**ICON TYPE**	**C/U CAM. NO.**	**VIDEO INTLK WITH**		**SOFT-WARE TEST**	**IC TEST**	**FIELD TEST CODE**	**REPAIR CODE**	**RE-CHECK "X"**	**FIELD CHECK OUT NOTES**	**PROBLEM RESOLVED (BY/DATE)**

END OF SECTION 275123

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Nonsystem smoke detectors.
5. Heat detectors.
6. Notification appliances.
7. Device guards.
8. Magnetic door holders.
9. Remote annunciator.
10. Addressable interface device.
11. Digital alarm communicator transmitter.
12. Network communications.
13. BACnet Interface Devices
14. **Network Display Unit**

B. Related Requirements:

1. Section 280513 "Conductors and Cables for Electronic Safety and Security" for cables and conductors for fire-alarm systems.
2. Section: 25 20 28 31.11 Integrated Automation - BACnet Interface Device (Gateways/Native BACnet Devices) - Fire Detection and Alarm (All Types)

3. Division 25 Section 25 00 13 – All Trades Work Responsibilities

1.3 DEFINITIONS

A. EMT: Electrical Metallic Tubing.

B. FACP: Fire Alarm Control Panel.

C. NICET: National Institute for Certification in Engineering Technologies.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including furnished options and accessories.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include rated capacities, operating characteristics, and electrical characteristics.

B. Shop Drawings: For fire-alarm system.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.

    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.
    b. Show field wiring required for HVAC unit shutdown on alarm.
    c. Locate detectors according to manufacturer's written recommendations.
    d. Show air-sampling detector pipe routing.

13. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:

    a. Trained and certified by manufacturer in fire-alarm system design.
    b. NICET-certified, fire-alarm technician; Level III minimum.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following and deliver copies to authorities having jurisdiction:

a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
d. Riser diagram.
e. Device addresses.
f. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:

1) Equipment tested.
2) Frequency of testing of installed components.
3) Frequency of inspection of installed components.
4) Requirements and recommendations related to results of maintenance.
5) Manufacturer's user training manuals.

g. Manufacturer's required maintenance related to system warranty requirements.
h. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
2. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
3. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
4. Keys and Tools: One extra set for access to locked or tamperproofed components.
5. Audible and Visual Notification Appliances: One of each type installed.

6. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.

1.9 PROJECT CONDITIONS

A. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:

1. Notify Architect no fewer than seven days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Architect's written permission.

B. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.10 SEQUENCING AND SCHEDULING

A. Phase project by zones. Coordinate the cut over of completed zones with owner. Include all manufactures fees and time constrains to complete the project within the bid proposal.

B. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

C. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Noncoded, UL-certified addressable system, with multiplexed signal transmission and voice/strobe evacuation.

B. Automatic sensitivity control of certain smoke detectors.

C. All components provided shall be listed for use with the selected system.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices and systems:

1. Manual stations.
2. Heat detectors.
3. Smoke detectors.
4. Duct smoke detectors.
5. Automatic sprinkler system water flow.
6. Fire-extinguishing system operation.
7. Fire standpipe system.

B. Fire-alarm signal shall initiate the following actions:

1. Continuously operate alarm notification appliances, including voice evacuation notices.
2. Identify alarm and specific initiating device at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
3. Transmit an alarm signal to the remote alarm receiving station.
4. Release fire and smoke doors held open by magnetic door holders.
5. Activate voice/alarm communication system.
6. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
7. Close smoke dampers in air ducts of designated air-conditioning duct systems. Monitor smoke damper statuses. Provide an event notification when the statuses do not match the commanded state of the smoke damper. Note that the term smoke damper and fire/smoke damper refer to the dampers installed in the Work.
8. Recall elevators to primary or alternate recall floors.
9. Activate elevator power shunt trip.
10. Record events in the system memory.
11. Indicate device in alarm on the graphic annunciator.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. User disabling of zones or individual devices.
3. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.

6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.
10. Voice signal amplifier failure.

E. System Supervisory Signal Actions:
1. Identify specific device initiating the event at fire-alarm control unit, connected network control panels, off-premises network control panels, and remote annunciators.
2. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
3. Transmit system status to building management system.

2.3 FIRE-ALARM CONTROL UNIT

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

B. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.

a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
b. Include a real-time clock for time annotation of events on the event recorder and printer.
c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
d. The FACP shall be listed for connection to a central-station signaling system service.
e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.

2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, three line(s) of 80 characters, minimum.

2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.
2. Pathway Survivability: Level 0.
3. Install no more than 50 addressable devices on each signaling-line circuit.
4. Serial Interfaces:

a. One dedicated RS 485 port for central-station operation using point ID DACT.
b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
c. One USB port for PC configuration.
d. One RS 232 port for voice evacuation interface.

E. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.
2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

~~F. Elevator Recall:~~

~~1. Elevator recall shall be initiated only by one of the following alarm-initiating devices:~~

~~a. Elevator lobby detectors except the lobby detector on the designated floor.~~
~~b. Smoke detector in elevator machine room.~~
~~c. Smoke detectors in elevator hoistway.~~

~~2. Elevator controller shall be programmed to move the cars to the alternate recall floor if lobby detectors located on the designated recall floors are activated.~~
~~3. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.~~

~~a. Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.~~

G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

H. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and

sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

J. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.

1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.

a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
b. Programmable tone and message sequence selection.
c. Standard digitally recorded messages for "Evacuation" and "All Clear."
d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.

2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

L. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed lead calcium.

M. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.4 NEWORK DISPLAY UNIT

A. General Requirements for Network Display Unit:
a. Provides alphanumeric annunciation and manual control for up to 12,000 network points and/or point lists.

b. Selectable service override allows authorized operators to clear alarm conditions during System Reset even if status has gone to trouble before reset occurred
c. It can be programmed to function as the network master controller for Alarm Silence, Trouble Acknowledge, and System Reset..

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, three line(s) of 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters.

C. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided as a special module that is part of fire-alarm control unit.

1. Indicate number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711.

a. Allow the application of, and evacuation signal to, indicated number of zones and, at the same time, allow voice paging to the other zones selectively or in any combination.
b. Programmable tone and message sequence selection.
c. Standard digitally recorded messages for "Evacuation" and "All Clear."
d. Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification-appliance circuits of fire-alarm control unit.

2. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
3. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.

D. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and digital alarm communicator transmitters shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

E. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed lead calcium.

F. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe

appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
   1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
   2. Station Reset: Key- or wrench-operated switch.

2.6 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

   1. Comply with UL 268; operating at 24-V dc, nominal.
   2. Detectors shall be four-wire type.
   3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
   4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
   5. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
      a. Multiple levels of detection sensitivity for each sensor.
      b. Sensitivity levels based on time of day.

B. Photoelectric Smoke Detectors:

   1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
   2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

      a. Primary status.
      b. Device type.
      c. Present average value.
      d. Present sensitivity selected.
      e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

   1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.

2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).
3. Each sensor shall have multiple levels of detection sensitivity.
4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
5. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.7 HEAT DETECTORS

A. General Requirements for Heat Detectors: Comply with UL 521.

1. Temperature sensors shall test for and communicate the sensitivity range of the device.

B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F or a rate of rise that exceeds 15 deg F per minute unless otherwise indicated.

1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet from the horn, using the coded signal prescribed in UL 464 test protocol.

C. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "Fire" is engraved in minimum 1-inch-high letters on the lens.

1. Rated Light Output:
    a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, white.

D. Voice/Tone Notification Appliances: The word "Alert" is engraved in minimum 1-inch-high letters on the lens.

1. Comply with UL 1480.

2. Networkable.
3. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
4. High-Range Units: Rated 2 to 15 W.
5. Low-Range Units: Rated 1/4 to 2 W.
6. Mounting: Flush.
7. Matching Transformers: Tap range matched to acoustical environment of speaker location.

2.9 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.

B. Material and Finish: Match door hardware.

2.10 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Flush cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.11 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall or to circuit-breaker shunt trip for power shutdown.

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.12 NETWORK COMMUNICATIONS

A. Provide network communications for fire-alarm system according to fire-alarm manufacturer's written requirements.

B. Provide a conduit encased fiber connection to existing Main Fire Alarm Main panel in the courts building conforming to manufacturer's requirements and requirements in NFPA 72 and NFPA 70. Coordinate path with owner.

C. Provide integration gateway using BACnet for connection to building automation system.

D. Provide BACnet Interface Devices for each Fire Detection and Alarm Panel so that the units are presented as a series of AV and BV BACnet objects. Reference section 25 20 28.31.11 for the list of objects that must be supported. This list is the minimum acceptable.

2.13 BUILDING-WIDE MASS NOTIFICATION REQUIREMENTS

A. Provide the necessary equipment, initiating devices, notification appliances, conduit, wiring, programming, and appurtenances into the fire alarm system scope of work to incorporate building-wide mass notification into the fire alarm system.
1. Comply fully with National Fire Alarm Code NFPA 72 emergency communications systems requirements including Annex and Supplement requirements.
2. The system and its components shall be UL listed and shall meet UL 2572.
3. Provide speakers for audible notification appliances in lieu of horns if the base fire alarm system scope of work specifies horns. Provide sufficient speakers to meet NFPA 72 voice intelligibility requirements.
4. Provide combination white cover and clear lens (with the word ALERT in red lettering) for visual notification appliances.
5. Provide the following additional features in the main fire alarm control panel and in each remote fire alarm annunciator panel.

a. Emergency voice/alarm communications and a microphone for Fire Department use if not required by the Base Bid scope of Work.
b. The ability to generate a building-wide three second continuous alert tone. This alert tone shall be significantly different from the fire alarm system's three-pulse temporal pattern evacuation tone.
c. A minimum of 12 pushbuttons to initiate the amber alert strobe lights and the building-wide evacuation or alert tone followed by a unique pre-recorded voice message.
    1) Actuation of any pushbutton shall override any fire alarm notification and instead initiate the amber alert strobe lights and the building-wide evacuation or alert tone over the fire alarm system speakers. The associated pre-recorded voice message shall alternate with the tone.
    2) Alarm and supervisory signals shall be sent through the network to the Fire Department.
    3) At any time during the alert, actuation of any microphone shall permit building-wide live voice announcements to be made. If at any time a remote annunciator panel microphone is keyed simultaneously with the main fire alarm control panel microphone, the main fire alarm control panel microphone shall have priority.
    4) The strobe lights shall continue to flash and the tone and pre-recorded voice message shall continue to sound until the fire alarm system is reset.
d. The tone and pre-recorded voice message shall be as follows for each pushbutton:
    1) Alert tone alternating with - This is a test of the building mass notification system. This is only a test."
    2) Alert tone alternating with - "Your attention please – This is a non-fire evacuation. Evacuate the building now. Remain calm and do not run. Evacuate now."
    3) Alert tone alternating with - "Your attention please – This is a tornado warning. Take shelter now."
    4) Alert tone alternating with - "Your attention please – This is a severe weather warning. Take shelter now."
    5) Evacuation tone alternating with - "Your attention please – This is a power outage. Remain in the building."
    6) Alert tone alternating with - "Your attention please – This is a shelter emergency. Take shelter now."
    7) Alert tone alternating with - "Your attention please – There is a bomb threat. Evacuate the building now. Remain calm and do not run. Evacuate now."
    8) Alert tone alternating with - "Your attention please – There is a Hazmat alarm. Evacuate the building now. Remain calm and do not run. Evacuate now."
    9) Alert tone alternating with - "Your attention please A hostile intruder has been reported in this area. Lockdown now.
    10) Alert tone alternating with - "Your attention please - This is an all clear. The emergency has been resolved. Resume normal operations."
    11) Spare for project-specific use.
    12) Spare for project-specific use.

6. Provide a remote microphone cabinet with microphone for Facility Manager use at the location shown on the drawings. The cabinet shall include the following features:
    a. Provide a minimum of 12 pushbuttons. These pushbuttons shall be identical to those in the main fire alarm panel and in each remote fire alarm annunciator panel.

Each pushbutton shall be capable of initiating the building-wide evacuation or alert tone followed by the same unique pre-recorded voice message.

1) Actuation of any pushbutton shall override any fire alarm notification and instead initiate the alert strobe lights and the building-wide tone over the fire alarm system speakers. The associated pre-recorded voice message shall alternate with the tone.
2) The pre-recorded message shall be in English and Spanish.
3) Alarm and supervisory signals shall be sent through the Fire Department.
4) At any time during the alert, actuation of the Facility Manager's microphone shall permit building-wide live voice announcements to be made. If at any time the Facility Manager's microphone is keyed simultaneously with the main fire alarm control panel or any remote fire alarm annunciator panel microphone, the fire alarm panel microphone(s) shall have priority.
5) The strobe lights shall continue to flash and the tone and pre-recorded voice message shall continue to sound until the fire alarm system is reset.

b. Provide a uniquely keyed cabinet door lock and special Facility Manager keys so a fire alarm panel key or a special Facility Manager key can access this cabinet, but a Facility Manager's key cannot access the other fire alarm panels.

7. Provide the capability inside the main fire alarm control panel to add a future interface module or circuit card. This interface shall permit the Owner to actuate the amber alert strobe lights, actuate the building-wide evacuation or alert tone, actuate any of the pre-recorded voice messages, and make live voice announcements from a head end device located at one or more Owner remote locations. This capability shall include:
   a. Physical space inside the fire alarm control panel.
   b. Power supply capacity.
   c. Means to plug the interface into the fire alarm control panel circuitry.
8. Provide system interconnecting raceways, wiring and routing in compliance with the system "survivability" requirements contained in NFPA 72.
9. Provide a minimum of 25 BACnet objects for the Mass Notification controller board. Provide manufacturer standard BACnet points for the new devices such as the speakers. Include the costs of these additional BACnet points in the Base Bid.

2.14 NONSYSTEM SMOKE DETECTORS

A. General Requirements for Nonsystem Smoke Detectors:

1. Nonsystem smoke detectors shall be listed as compatible with the fire-alarm equipment installed or shall have a contact closure interface listed for the connected load.
2. Nonsystem smoke detectors shall meet the monitoring for integrity requirements in NFPA 72.

B. Single-Station Smoke Detectors:

1. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device.
2. Auxiliary Relays: One Form A and one Form C, both rated at 0.5 A.
3. Audible Notification Appliance: Piezoelectric sounder rated at 90 dBA at 10 feet (3 m) according to UL 464.

4. **Test Switch: Push to test; simulates smoke at rated obscuration.**
5. **Tandem Connection: Allow tandem connection of number of indicated detectors; alarm on one detector shall actuate notification on all connected detectors.**
6. **Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.**
7. **Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.**
8. **Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.

1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.
2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches above the finished floor.

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.

3. The operable part of manual fire-alarm box shall be between 42 inches and 48 inches above floor level. All devices shall be mounted at the same height unless otherwise indicated.

D. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches long shall be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

F. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

G. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

H. Audible/Visible Alarm-Indicating Devices: Install not less than 6 inches below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

I. Device Location-Indicating Lights: Locate in public space near the device they monitor.

J. INSTALLATION OF EQUIPMENT BACNET INTERFACE DEVICE
1. See Division 25 Responsibility Matrix for the execution responsibilities for Equipment Supplier, Controls and Electrical Subcontractor.
2. Equipment Supplier is responsible for supplying and installing the BACnet Interface Device.
3. Electrical is responsible for power and any control wiring if the device does not have a single point of connection.
4. This BACnet Interface Device is a BACnet/IP device. Provide all necessary components for a fully functional system.
5. Provide a BACnet card in each addressable fire alarm panel.
6. See Division 27 for networking responsibilities.

3.3 PATHWAYS

A. Pathways shall be installed in EMT.

B. Exposed EMT shall be red.

3.4 CONNECTIONS

A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches from the device controlled. Make an

addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Smoke dampers in air ducts of designated HVAC duct systems.
2. Magnetically held-open doors.
3. Electronically locked doors and access gates.
4. Alarm-initiating connection to elevator recall system and components.
5. Supervisory connections at valve supervisory switches.
6. Supervisory connections at elevator shunt-trip breaker.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visual Inspection: Conduct visual inspection prior to testing.
    a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72

and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

B. Provide BACnet Interface Device training and commissioning.

END OF SECTION 283111

SECTION 280500 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this and all 270000 and 280000 Sections.

B. Under Base Bid B, Complete the PLC door control and intercom system replacement with all labor, conduit, new cameras, new workstations, and new cabling as indicated on the plans or required for a complete and functioning system. Integrate with existing card access and existing video system. Furnish and install new paging wiring and extend wiring for intercoms devices to SA file room 301f. Existing devices will be reused.
   1. Test of continuity of wire to ensure that it is operational.

C. Although summarized below refer to section 012300-“Alternates” for a detailed list of Alternate scopes required by these documents at bid.

D. Under Add Alternate No.1, deduct alternate if base bids A, B, and C are accepted together and mobilization and work is accomplished in each area at the same time.

E. Under Add Alternate No.2, replace all lock wiring in addition to base bid item B security system replacement.

F. Under Add Alternate No.3, replace all intercom wiring in addition to the base bid item B security system replacement.

G. Under Add Alternate No.4, use existing camera conduit to parking lot and extend mass notification audio parking duress station speaker. Furnish and install all cabling and controls. Also furnish and install cabling and electronics to connect alarm contacts on the parking duress stations to plc inputs for annunciation in Central Control and camera callup on duress activation.

H. Under Add Alternate No.5, furnish and install wiring and electronics to connect four doors currently controlled by the card access system to the PLC door control system. Furnish and install wiring to indicate each door position and to unlock each individual door. Also furnish and install an intercom in each of the two holding cells in the court building.

I. Under Deduct Alternate No. 6, the owner shall furnish and install fiber loop between each network switch. This includes all fiber, LIU’s, terminations and testing of all fiber required by SE0.0 and SE1.0.

J. Limits and scope of work under the Electronic Security Contractor (ESC) and Electronics Security Contractor (ESC) Section shall be defined in these specifications and correspondingly shown on the drawings.

K. Furnish and install new conduit concealed into the wall where installed below the ceilings. All exposed security conduit shall be painted black.

L. Connect the PLC system to the BACnet system for system alarm recording purposes. Coordinate with division 25 and section 280505.

M. Coordinate all power requirements with division 26 and the UPS system provider.

N. Provide materials, labor, equipment and services necessary to furnish, deliver and install a completely functional integrated system.

O. All equipment and work shall comply with all applicable codes.

P. The existing facility will be occupied while the controls are replaced. Contractor shall closely and regularly coordinate their work with staff to minimize the impact of construction on daily operations.

1.2 SUMMARY

A. Electronic Security Contractor (ESC)
1. The ESC shall submit an aggregate bid for Work described in the following specification sections. The ESC shall be responsible for performing and the coordination of all of the work described herein.
    a. Security Electronic Systems Work required by, but not specified in, this Section includes the following:
        1) Division 27, Section 275123 “Intercom/Paging System”
        2) Division 28, Section 280500.2 “ Conduit and Raceways”
        3) Division 28, Section 284600 “Operator Work Station”
        4) Division 28, Section 284600.1 “Security Electronics Control Matrix”
        5) Division 28, Section 284619 “PLC Electronic Detention Monitoring and Control Systems”

2. Approved ESC firms must base their bid on the equipment and products specified herein. Design changes or substitutions will not be allowed unless approved prior to bidding. Value engineering proposals will not be considered. Substitutions on the specified software will not be approved.
3. The ESC shall have in their employ a full time project manager and superintendent to supervise the work of this section. The superintendent’s sole responsibility shall be to supervise and coordinate the scope of work of the ESC. **The superintendent shall be at the site at all times when the work is being performed.**
4. If any portion of the work listed in paragraph 1.2.A.1.a above is subcontracted, the responsibility for system coordination and integration remains with the ESC.
5. The ESC shall be fully responsible for reviewing the conduit routing for the security electronic systems and devices and notify the Architect / Consultant of any modifications are required prior to any conduit installation. If the conduit is provided under another subcontractor’s scope of work the ESC shall meet with the Contractor prior to conduit installation and provide any coordination information associated with the systems and devices provided by the ESC. The ESC shall be responsible for providing a backbox schedule to the Contractor prior to conduit installation. Ensure that new conduit and wiring complies with the color-coding of Lake County.

6. The ESC shall be fully responsible for acquiring and paying for any and all licenses and permits required to perform their Work. If licenses are required before bidding, then the ESC shall not bid any portion of the Work until the required licenses are obtained.
7. The owner shall be responsible for providing a high-speed internet connection to the Security Management System for remote diagnostics by the ESC.
8. The contractor shall test the continuity of wire to ensure it is operational.

B. Status Report.
1. ESC is to provide a status report documenting the functionality of all existing security field devices. Prior to beginning the "Existing Systems Status" test submit a draft of the report for the Engineers review.
2. Include the functionality status for the devices of the following system at a minimum.
   a. Intercom and Paging (note automatic Camera call up functionality).
   b. IP Video Management System.
   c. Locking Controls (include individual and/or group release controls for swing doors, sliding doors, vehicle, pedestrian, site and recreation yard gates).
   d. Duress system.
3. The contractor, upon completion, shall immediately submit a written report identifying any problems with the existing field devices to the Owner and Engineer. This report shall also be included with the project submittals and O&M manuals.
4. This report shall set the reference for the existing device functionality at the end of the project. It shall be the responsibility of the contractor to confirm that all existing field devices, other than those noted in the status report, are functioning after the new equipment is installed.

1.3 SCOPE AND RESPONSIBILITY

A. The General Contractor may choose to divide the scope of work for the security electronic system. This scope of work may be done by an Electronic Security Contractor (ESC). Division of scope will not relieve the responsibility of all parties involved to perform full coordination to insure a fully functional system. During the testing, troubleshooting and inspection of this work the ESC will be required to have a knowledgeable representative present. All of the work specified in divisions 27 and 28 can be performed by a single ESC contractor. If this is done the ESC must self-perform their designated scope of work with their own work force unless approved in writing by the Architect and Engineer.
1. The Electronic Security Contractor (ESC) is the pre-qualified contractor that is responsible for furnishing and installing the custom fabricated equipment, programming, and systems integration for all security electronic systems specified in divisions 27 and 28

B. Electronic Security Contractor (ESC)
1. Approved ESC firms must base their bid on the products listed herein or approved by Addendum.
2. The ESC shall have in their employ a full time superintendent to supervise the work of this division. The superintendent's sole responsibility shall be to supervise and coordinate the work of this division. The superintendent shall be at the site at all times when the work of this division is being performed.
3. The ESC may subcontract portions of the work to individuals approved in writing by the Architect/Consultant. The responsibility for system coordination and integration remains with the ESC.

4. The ESC shall be fully responsible for acquiring and paying for all licenses and permits required to perform their Work. If licenses are required before bidding, then the ESC shall not bid any portion of the Work until the required licenses are obtained.

C. Related Work Furnish and Installed by Others.
1. Furnishing and installing hardware for security and non-security doors.
2. Casework and Millwork.
3. Equipment grounding system.
4. All 120/208/240 VAC branch circuits including conduit, wiring and connections from power distribution panels to terminal strips and/or receptacles in electronic control panels and/or at electronic system devices. All distribution and branch circuits described above shall be connected to the emergency power source.

1.4 SYSTEM MANUFACTURERS

A. The following ESC firms are system manufacturers able to perform the work of this Section:
1. Stanley Convergent Security Solutions, Inc
2. Accurate Controls
3. Cornerstone Security/ComTech Security
4. CML Security

Note: Approval of a firm as an ESC does not relieve that ESC from furnishing all materials from manufactures as herein specified.

B. Electronic Systems Contractor (ESC) Qualifications:
1. ESC firms shall request approval and shall submit the following qualification data to the Architect in writing fourteen (14) days prior to bid date and, if approved, shall be acknowledged by Addendum prior to bid date. Verbal approval will not satisfy this requirement. Submit a completed AIA 305 form and all additional information herein requested. State that approval is requested for ESC. Grounds for disqualification shall exist if in the opinion of the Architect, the information submitted is inaccurate or does not satisfy the qualification requirements.
2. List at least five (5) correctional facility installations of security monitoring and control systems similar to the requirements of this project furnished and installed by this firm. The minimum period of operation for each of the five facilities is 12 months.
3. For each facility: List name and location of installation, date of occupancy by Owner, and Owner's representative to contact with telephone number. Also list the Construction Manager or General Contractor. List the Architect.

C. Manufacturer's Qualifications
1. Refer to each individual specification section for a list of acceptable manufacturers.
2. Throughout the specifications and drawings, types of materials may be approved and specified by the manufacturer's name and catalog number in order to establish standards of quality and performance. If the bidder desires to substitute, he must request the Architect's approval in writing fourteen (14) days prior to bid date. Approval must be issued by written Addendum prior to bid date. The following paragraphs outline the submittals required by the Architect for review in order to consider approval of a substitute product.

D. Electronic Components

1. Provide electronic components from manufacturers who at present have not less than ten (10) years continuous successful experience in the design and manufacture of the type products required for this project.
2. Provide three owner representatives who have utilized the proposed equipment for at least a year. The owner representative must have technical and operational experience with the equipment

1.5 SUBMITTALS

A. Submittals shall be organized into four (4) major sections as follows:
   1. General data:
      a. Table of contents.
      b. Descriptive responsibility for all parties where the ESC must interface with other trades/contractors.
      c. System theory of operations that clearly defines the operating parameters of all systems being supplied.
      d. A functional systems block diagram showing single-line interconnection of all integrated systems and the major components of each system and methods of integration.
      e. Signed certification that the control panels have been coordinated with approved millwork shop drawings.
      f. Signed certification that the controls have been coordinated with the approved detention hardware submittals.
   2. Manufacturer's data sheets organized by specification section:
      a. Table of contents.
      b. Bill of material for each system listing specification paragraph and device model number submitted.
      c. Device sheets to be organized in the same order as equipment are specified.
      d. Provide data sheets for additional items as required at the end of each section.
      e. The product cut sheets shall be annotated to clearly identify only those specific functions and features that are applicable to this project.
   3. Calculations and schedules organized by system:
      a. Table of contents.
      b. Calculations as specified in each section.
      c. Voltage drop calculations for all circuits. Where multiple runs of the same conductor are furnished, figure worse case only. Provide certification that all other runs are shorter.
      d. Schedule of points of all electronically operated devices and their functional attributes for all systems being supplied. The schedules shall be organized by system (i.e., locking, audio, lighting, duress, etc.) and shall be formatted in alphanumeric order by architectural identification number. As a minimum for each commodity entry, the schedules shall include the following:
         1) Associated architectural number (i.e., door 108)
         2) Assigned operation number (i.e., D108)
         3) Security Hardware group (i.e., SHW-1). This is a designation given to a standard set of complete hardware being utilized. Identify all part numbers (P/N):
         4) EX IC-1 consists of:
            a) 1 5" Speaker P/NXXXX
            b) 1 Baffle P/NXXXX
            c) 4 Security Screws
   4. Shop Drawings

a. Complete list of drawings.
b. Data sheets for wire and installation components to be used.
c. Wiring diagrams for each device.
d. Review and coordinate conduit drawings and confirm routing locations prior to installation. Provide wiring information for each device and conduit run and provide wire fill information along with interconnection for all security items.
e. Computer Control Station drawings/artwork that depict configuration of all control maps. Include utility and administrative screens
f. Graphic control/annunciation panel overlay layout drawings/artwork that depict configuration of all control panels. Layout shall be a color plot that indicates the final colors to be fabricated of the graphic, switches, and LED's.
g. Cabinet layout drawings.
h. Large scale equipment rack layout drawings detailing all component, relay and termination locations.
i. Control room and security electronic room layout large scale elevations.
j. One-line diagrams reflecting interconnections and interfaces between each of the systems components.

B. Submittals not organized as specified shall be considered incomplete and will be rejected.

C. Submittals for all security electronics sections shall be submitted at one time regardless of which firm is providing equipment or installation. It is the responsibility of the ESC to organize and coordinate the work of divisions 27 and 28.

D. Submit a single electronic "Draft" copy of the submittal documents for review to the Engineer. Following review of draft submittal, the ESC shall proceed with creating and submitting the final version for review.

E. Unless required otherwise in Division 1, the ESC shall electronically submit a complete set of documentation for final approval. This is in addition to the draft submittal. Submittals shall include items listed in "A" above. Confirm at this time with the Architect the requirement for any printed materials.

F. Provide electronic copies of the submittal and operation manuals in Portable Document Format (PDF). All files shall be compatible with the free Adobe Reader available from Adobe at www.adobe.com. All files shall be searchable by text through Adobe Reader.

G. The submittal shall reflect the systems as they are defined by the project plans and specifications, contract and signed/documented clarifications, substitutions and changes to the above documents by the Engineer.

H. The submittal documents shall be updated throughout the project construction and be included with the operation and maintenance manuals to provide accurate as-built documentation of all systems.

1.6 OPERATING/MAINTENANCE MANUALS

A. ESC shall furnish two (2) printed and two (2) electronic copies of Operation and Maintenance Manuals for all security electronics systems furnished under this specification. The O&M manual submittal shall coincide with the final inspection and precede ESC's request for final payment. These manuals shall include:

1. Instructions for the care and operation of the systems and materials.
2. Parts list to aid the Owner with ordering replacement parts.
3. As-Built conditions. **The ESC shall have a draft copy of the as-built drawings onsite for the final system inspection.**
4. Training materials, training session sign in sheet. Provide two electronic copies of each training session.

B. Telephone, Fax, Address, website and instructions for contacting the appropriate personnel during the warranty The electronic version provided shall be an interactive manual. The interactive manual will utilize the files described in 1.6 A above as a basis for an interactive document utilizing a web browser. All manuals, files, and data sheets would be published in format compatible with Internet Browsers equal to Microsoft Internet Explorer. Hyperlinks would link each item in a master table of contents to individual manuals, CAD drawings, and files.

C. One (1) copy of the programming and source code of the applications and programming software. This copy shall have all programmer comments, variable names, and mnemonics included.

D. All keys, passwords, access codes, and software required to access the programming shall be furnished to the owner as part of this project. Turn over to the owner at the end of the project.

1.7 SUBSTITUTIONS

A. No substitutions of equipment or material will be permitted where specific trade names or a manufacturer is listed, unless the architect adds them by an addendum.

B. Materials and products specified by name of manufacturer or brand trade name shall be the basis of the bids received unless changed by addendum prior to the bid dates.

C. In the event a contractor wishes to use any materials or products other than those specified, he shall make a written request to the Architect, naming the proposed substitution.

D. All additional costs resulting from the use of an approved substitution shall be borne by the contractor without additional expense to the Owner. Such additional costs shall include necessary modifications and alterations to structures, equipment, raceways and furnishing of all additional materials required to affect the substitution.

1.8 COORDINATION

A. Coordinate work to ensure efficient and orderly installation of each part of the detention work. Coordinate and schedule detention work that depends on other work for proper and timely installation, connection, and operation.
   1. Coordinate installation of different electronic components to ensure maximum accessibility for required maintenance, service, and repair.
   2. Coordinate provisions to accommodate electronic work scheduled for later installation.
   3. Coordinate electronic work with work by the Detention Equipment Contractor (DEC).

B. Coordinate selection of electronic products for compatibility.

C. Coordinate sequencing and scheduling of electronic work. Secure time commitments for performing critical construction activities from separate entities responsible for electronic work.
   1. Schedule construction operations in sequence required to obtain best results where installation of one part of electronic work depends on installation of other components before or after its own installation.
   2. Coordinate sequence of electronic work activities to accommodate tests and inspections.

D. Coordinate installation of anchorages and embedment's for electronic work.

E. Coordinate temporary facilities required for electronic work.
   1. Arrange for a secure, dry, locked storage area or room in the building for storing electronic equipment products prior to installation.
   2. Receive, unload and distribute products to site storage location and/or installation locations. Defective disfigured products shall be rejected.

F. Coordinate protection of installed electronic work.

G. Coordinate preparation of Project Record Documents for electronic work and integrate information from entities responsible for electronic work to form one combined record.

H. Coordinate preparation of operation and maintenance manuals for electronic work and integrate information from entities responsible for electronic work to form one combined record.

I. Defective Products: Items found to be defective, either through manufacturing, damage in transit, or by field installation shall be replaced prior to final completion. The ESC shall make special manufacturing and shipping arrangements to accomplish this replacement prior to completion.

J. Coordination Meetings: Conduct coordination meetings specifically for electronic work at regular intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.

1.9 WARRANTY

A. The ESC shall warrant the systems and equipment furnished by each under this Section to be free from defects in material and workmanship for a period of one (1) year after substantial completion. Should the General Contractor serve written notice on the ESC during the warranty period of any such defect (for the convenience of the General Contractor, the ESC will accept such written notice directly from the Owner), the ESC shall make good the defect at its own expense.

B. The ESC must have full-time employees trained in and devoted to the maintenance and repair of systems and equipment furnished.

C. Additional Programming: The ESC shall include all associated costs for eighty (80) hours of site specific program changes to the security electronics systems. All changes, to the documented design, shall be submitted to the Engineer and Owner for review and approval prior to implementation. No changes shall occur without documented approval by the owner's representative.

D. The ESC shall provide all associated cost to return to the site, no sooner than eleven (11) months from substantial completion, and provide a complete systems recertification. Coordinate and schedule this work with the owner a minimum of four (4) weeks prior to arrival. Provide a post recertification report identifying status and identifying related issues.

E. The ESC shall provide service to the system throughout the warranty period in a timely manner.
   1. Service response requirements shall include the following:
      a. Twenty-four (24) hour phone number.
      b. Ability to restore functionality within eight (8) hours after notification on a twenty-four (24) hour basis.
      c. Response personal shall be factory technicians trained by the manufacturers of the system components, with five years of experience, servicing systems of the type included in this project.

F. ESC shall provide all associated cost to return to the site, no sooner than eleven (11) months from substantial completion, and provide a complete systems recertification. Coordinate and schedule this work with the owner a minimum of four (4) weeks prior to arrival. Provide a post recertification report identifying status and identifying related issues.

PART 2 - PRODUCTS

2.1 SECURITY SCREWS

A. Equipment: All security equipment specified within divisions 27/28 shall have stainless steel torx-head with center-pin security screws. Such areas include but are not limited to corridors, dayrooms, cells, multipurpose rooms, visitation areas, kitchens, libraries, dining halls, classrooms, and gymnasiums.

B. Alternatives: Additional means of locking or securing devices are as indicated in each section.

2.2 SECURITY COVERS

A. Equipment: All security equipment specified within divisions 27/28 located in inmate areas within reach of inmates, which are not of detention grade because of code requirements, or application shall be protected with security covers. Provide covers sized to completely surround the device with out substantially degrading the function.

B. Alternatives: Other options for protecting devices are as indicated in each section or shown on plan details and elevations.

2.3 TERMINAL BLOCKS

A. Furnish and install a single level screw clamp terminal block equal to Entrelec/ABB 0115116.07.
   1. Basically, only one level of screw terminals.
   2. Maximum allowed if real-estate is an issue, (must be pre-approved by engineer) is two (2) levels of screw terminals.
   3. No Multi-level (tier) terminal blocks allowed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting Screws: When mounting devices to walls or structures, install all screws and mounting hardware for each device.

B. Devices: Align rectangular devices so that the bottom edge of the device is parallel to the floor.

C. Wiring: Wiring to be continuous between device and rack termination points. Wiring to be supported and protected as required by the NEC. Strap all wiring into neat bundles for a quality installation inside panels and cabinets. All wiring to be identified between systems.

D. All wire is to be landed on screw terminal units of size, ampacity rating, material, type, and class suitable for service indicated. All wire terminals shall be equal to the Phoenix Contact module UT 4 modular screw terminal. Terminals shall be constructed to limit fanning of stranded wire and rated for 1000 volts and 32 amps with appropriately sized wire

E. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the National Electric Code as required by the conditions of where it is stalled. This includes but is not limited to ratings for riser, plenum, or wet installations.

F. Abandoned Wire: All wiring not energized shall be terminated at both ends and labeled for future use.

G. All wiring/cabling shall be labeled with the system type and the device ID at each end. The numbering system used should match the equipment wiring plans and be similar to the following:
   1. C### camera coax
   2. CP### camera power
   3. IC### intercom
   4. L### locking device
   5. All fiber and fiber tubes should be labeled with the system ID and identified as to which building each fiber feeds.
   6. The label shall be generated by a Brady I.D. Plus Pro Printer or equal and utilize a Brady part# WML-511-292 label or equal. The label used should allow for the clear part of the label to overlap and protect the printed portion of the label from being exposed to damage and/or being rubbed off over time. Hand written labels are not acceptable.

H. All wiring is to be in conduit.

3.2 INSPECTIONS AND TESTING

A. The Construction Manager, General Contractor and ESC shall be responsible for issuing a letter to the Architect and R&N Systems Design confirming that the work is complete and ready for inspection and testing. If the project is completed in phases, a letter will be submitted for each phase to be inspected. As an attachment to the letter confirming the work is “complete” and ready for inspection, the ESC must attach a self generated “field test” report for each device

which confirms in detail that the ESC has performed their own inspection and test prior to the inspection by the Architect / Engineer.

B. The inspection shall include Systems, Subsystems, Equipment, and Components. Where these terms are used together or separately, they shall be referred to as "the system". The ESC shall be prepared to test every point for each system.

C. The Superintendent and Project Manager shall be present to demonstrate and assist in the inspection / testing of the Work. A system programmer, capable of making changes to the system, should be present should the need arise to make corrections during the final testing of the system.

D. If additional inspections are required because the Work is incomplete at the time of the scheduled inspection or if any portion of the system fails to function as designed the ESC shall be responsible for paying for the time and expenses for the Architect and Security Consultant to re-schedule and re-inspect the Work. This cost shall include time and expense for all personnel of the Architectural and Security Consulting firm. The "time" cost shall be based on an hourly rate of $185 per hour. This time will include travel time and inspection time. An estimated amount of this time and expense must be paid prior to re-scheduling the inspection.

3.3 SHAKEDOWN PERIOD

A. Coordinate with the Owner and Construction Manager/General Contractor to establish a shakedown period for the security systems. This shakedown period shall not begin until after "substantial completion" is issued. The shakedown period shall be a minimum of 30 days. If functionality or programming problems occur during the first 30 day, the shakedown period shall be extended for a minimum of two weeks after the systems are functioning dependably.

B. The ESC shall be responsible for providing a full time technician / programmer at the facility at all times during the shakedown time period to support operation of the facility by the Owner's staff.

C. Maintain a detailed log of all anomalies, malfunction and repairs encountered during the shakedown period. Submit log to the Architect for assessment at the conclusion of the shakedown period.

D. Additional training of Owner's staff may occur during the shakedown period.

3.4 SPARE PARTS

A. The ESC shall deliver all spare parts at the completion of the project. The spare parts shall be clearly marked as to content and packaged for ease of handling by one (1) person without the use of forklifts or other equipment. The ESC shall obtain a signature from the owner's representative receiving the spare parts.

B. The ESC shall furnish the parts described in each subsection of the specifications provided by the ESC. Mark the specification section on the packaging for each device.

C. Furnish 2 spare security covers of each type installed.

3.5 TRAINING

A. The ESC shall provide without additional cost to the owner representatives specially trained in the operation of security systems provided. The representatives shall train the Owner's personnel in operation, repair, and upkeep of each system. Provide the training for all shifts as coordinated with the owner.

B. The ESC shall be responsible for notifying the architect five (5) weeks prior to substantial completion of the total security system that training is scheduled. The ESC will coordinate the number to be trained with the owner's representative.

C. The length of training is directly related to the size and complexity of the detention facility, but in no case shall the security electronics system training be less than three (3) days.

D. Course Structure
   1. The ESC shall prepare and present to the Engineer a detailed course outline that specifies each major training module to be covered. The training program on the security equipment shall include the sequences and instructions for proper use and maintenance of all hardware, locking devices, control and monitoring systems and panels. The material content shall be in simple layman's terminology, describe and demonstrate all step-by-step physical operations necessary for proper operation and necessary equipment adjustments. At the time of training, each trainer shall present to the trainees detailed outlines of each training module to be covered and the specific skills and knowledge which the trainee is expected to master within each training module
   2. At a minimum the training program shall be subdivided into the following training modules:
      a. Operation of the Security System.
      b. Troubleshooting, General Maintenance, Equipment Adjustments, Repair and Replacement of Security System Components.
      c. Operator Controls.
      d. Descriptive modules organized by specification section.

E. The ESC shall video record each training module. Maintain separate recordings for Operations and Maintenance Training sessions. The video recording does not have to include individual student practice. The ESC in preparing the video recording shall structure it for easy reference by the facility's training officer for future use. Provide two (2) CD copies of each training session with the O&M manual submittal. Furnish digital copies of the facility training videos in a Windows Media file format (.wmv or equal).

F. Training Certification:
   1. Each facility employee shall receive at the conclusion of the security systems training program a certificate certifying his attendance of the total session or portion thereof.
   2. Contractor shall maintain separate attendance records of each class. Each record shall include facility name, date, type of training, attendees name and signature.

G. Operation and Maintenance manuals:
   1. Utilize the Operation and Maintenance manuals prepared for the facility for the training.
   2. Review all procedures in the Operation and Maintenance manuals.

3.6 SAMPLE PRE-CONSTRUCTION STATUS REPORT

A. The ESC shall submit a report similar to the one shown below before any construction work begins at the facility. The Status Report shall be complete and test every camera, intercom and controlled opening from all possible locations. Failure to test a device from a location does not absolve the ESC from responsibility if the device does not work after construction is complete.

CCTV Camera and Camera Call-up Report

Job#	**EXAMPLE 1234**
Job Name	**CCA Facility**
Tested By	**John Doe**
Date	**1/1/2013**
Facility Rep.	**Jane Doe**
Date	**1/1/2013**

Field Test Code	
Functioning	Y
Malfunctioning	N

Text in Bold represents example text to show how a field shall be filled.

Camera Tested From Control Station/Site Panel Icon

Camera ID	Opperational	Comment
C01	Y	
C02	N	EX: Icon has been removed
C03…….		

Camera Tested From CCTV Keyboard

Camera ID	Opperational	Comment
C01	Y	
C02	N	EX: Camera has been removed
C03…….		

Camera Calls-up Automaticaly When an Intercom is Activated

Intercom ID	Camera Called	Operational	Comment
IC01	CXX	Y	
IC02	CXX	N	EX: Camera needs Refocusing
IC03…			

Camera Calls-up Automaticaly When a Duress is Activated

Duress ID	Camera Called	Operational	Comment
D01	CXX	Y	
D02	CXX	N	EX: Wrong camera Called up
D03…			

END OF SECTION 280500

SECTION 284619 – PLC ELECTRONIC DETENTION MONITORING AND CONTROL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of work: Furnish and install all components for a complete and integrated Programmable Logic Controller (PLC) integrated with the security systems as indicated on the plans and described herein.

B. The ESC as defined in Section 280500 Common Work Results for Electronic Safety and Security shall be responsible for providing and coordinating this system.

C. Interface with the existing Genetec IP Video Management system for camera call-up on selection of intercom, door, and as required for system alarms.

D. The ESC shall be responsible for providing, installing and coordinating this system with the existing conditions and facility staff.

E. Provide a separate fiber optic communications network for the new PLC system as indicated on the project SE drawings. No other security system will be allowed on the PLC/HMI network.

F. Furnish and install new PLC headend equipment as indicated on the plans.

G. PLC CPU battery shall be monitored through the PLC/HMI system. Provide icon on OWS for each CPU battery, system shall indicate when the there is a “low battery”.

H. Integrate new PLC’s, OWS’s, Intercom system, and IP Video system (existing) into a single control system enabling the staff to control and monitor all locations.

I. Provide new Operator Work Stations (OWS) as indicated on the plans. Provide new conduit and CAT 6 cabling for the communication from the PLC to the CCS.

J. Although summarized below refer to section 012300-“Alternates” for a detailed list of Alternate scopes required by these documents at bid.

K. Under Base Bid B, Complete the PLC door control and intercom system replacement with all labor, conduit, new cameras, new workstations, and new cabling as indicated on the plans or required for a complete and functioning system. Integrate with existing card access and existing video system. Furnish and install new paging wiring and extend wiring for intercoms devices to SA file room 301f. Existing field devices will be reused.
   1. Test of continuity of wire to ensure that it is operational.

L. Under Add Alternate No.2, replace all lock wiring in addition to base bid item B security system replacement.

M. Under Add Alternate No.4, use existing camera conduit to parking lot and extend mass notification audio parking duress station speaker. Furnish and install all cabling and controls.

Also furnish and install cabling and electronics to connect alarm contacts on the parking duress stations to plc inputs for annunciation in Central Control and camera callup on duress activation.

N. Under Add Alternate No.5, furnish and install wiring and electronics to connect four doors currently controlled by the card access system to the PLC door control system. Furnish and install wiring to indicate each door position and to unlock each individual door. Also furnish and install an intercom in each of the two holding cells in the court building.

O. Under Deduct Alternate No.6, eliminate the base bid PLC fiber loop between each network switch. This includes all fiber, LIU's, terminations and testing of all fiber required by SE0.0 and SE1.0.

P. Refer to 280500 Common Work Results for a full list of base bid and add alternates.

1.2 SYSTEM DESCRIPTION

A. PLC: The PLC network shall control all of the logic functions of the operator interface stations for control and annunciation of locking control and security systems.

B. PLC CPU: The PLC CPU shall provide the necessary logic and timing functions, memory, software variables, and communication capabilities required to meet the functions described in the specifications. Each PLC location shall be provided with a CPU to allow independent degraded operations in the event of lose of network communications.

C. Master Clock: Furnish and install programming to automatically update the PLC clock for daylight savings time across all PLC's, CCS's, and maintenance computers. The current time shall be transmitted to all PLC CPU's and all graphic panel mounted clocks in the system. All system clocks shall be updated within 2 seconds of a change being entered at the main PLC master clock.

D. The PLC system shall be industrial general purpose in nature, not custom designed and built for this isolated application and shall be generally non-location specific in its construction. The controller shall be operationally customized and made location specific by installing the applicable software, making the I/O interface board system specific. All components shall be manufacturer's standard modules.

E. The PLC shall accomplish emergency release by staggering all unlock commands to minimize surges. Up to three motorized locks may be grouped together and released simultaneously. Solenoid locks shall be released individually.

F. In a single emergency release grouping, all doors shall unlock within sixty (60) seconds of the command being initiated.

G. Furnish and install a complete PLC system in each PLC rack as noted on the plans.

H. Removable Media (EEPROM): Each PLC CPU shall have a slot for a removable memory card, which allows the PLC program to be offloaded for storage. Provide a removable memory card for each new PLC CPU.

I. BACnet: Furnish and install an interface between the PLC system and the existing BACnet network using the interface modules identified in the control matrix and on the project plans. Refer to sections 252028 and 250013 for additional interface information and contractor responsibilities.

1.3 SYSTEMS INTEGRATION

A. The PLC units shall be integrated with the other systems including, but not limited to:
   1. Existing Video System.
   2. New Intercom system.
   3. New Locking Control System.
   4. New Operator Work Stations (OWS).
   5. New Uninterrupted Power Source provided by division 26.
   6. Existing Card Access System.
   7. BACnet system network by division 25.
   8. Existing field devices as indicated on the plans.

1.4 RELATED SECTIONS

A. Division 25 Section 25 20 28.46.19 Integrated Automation – BACnet Interface Device (Gateway/Native BACnet Devices) – Programmable Logic Controllers (PLCs) (All Types).

B. Division 25 Section 25 00 13 – All Trades Work Responsibilities.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer:
   1. Allen-Bradley
   2. Omron
   3. Schneider Electric

B. Except as otherwise specified herein, the equipment and materials of this section shall be products of a single manufacturer engaged in the production of logic control systems for industrial applications for a minimum of ten (10) years. Controllers shall be equal to Omron Electronics CS1 series.

C. Industrial Grade Network Switch: Industrial Grade Network Switch: Provide a din-rail industrial grade managed Hirschmann RSB20 10/100 Mbps Fast Ethernet switch or equivalent from an approved manufacture. The switch shall provide a redundant network/ ring topology (looping) for the PLC security communications. The switch shall have a minimum of 4 (2 pairs) **SC** MM optic fiber connections and a minimum of six (6) CAT 6 ports dedicated to the PLC network system. Each fiber port and RJ45 port shall be monitored at the PLC/OWS for any failure. Any communication failure shall be monitored on the PLC/OWS as “Comm Failure”. The power to the switch shall be monitored by the PLC network for failure. Approved manufactures:
   1. Hirschmann RSB20 series is the base design.
   2. Phoenix Contact
   3. Cisco

2.2 GENERAL

A. Logic control system shall be programmable controllers, which shall control all input/output functions of the graphic computer control station and control panels.

B. The logic control system shall be designed so that each control area operates totally independent of one another. Failure or loss of any controller shall not hamper the operation of any other controller.

C. The programmable controller and I/O modules shall be of modular construction and be capable of being rack mounted.

D. All modules must be key coded to ensure proper slot placement and polarity. All identical function modules shall be coded alike.

E. The controller shall be constructed to withstand as a minimum, the following climatic conditions without the need for special enclosures or additional environmental control equipment such as fans or air conditioning.
   1. Temperature: 0 to 60 C (operating), -20 to 70 C (storage)
   2. Humidity: 10 to 90% r. h. (non-condensing)

F. Controller shall be capable of operating over a voltage range of 88-132V with a frequency of 45-63 Hz.

G. Controller and I/O racks shall be capable of being front or rear mounted.

H. Where more than one controller is used, all controllers shall be of one single manufacturer and if different size controllers are used, these must be fully compatible.

I. All controllers shall share the same control language and I/O structure.

J. All controller and I/O structures of a single manufacturer shall be capable of being mounted on the same size fixing centers to allow for larger capacity controllers to be installed in the future should the facility require an expansion beyond the limits specified in the original contract documents.

K. Programmable controller manufacturers must guarantee the availability of replacement/spare parts for a minimum of ten (10) years.

L. All input/output modules and housings must be of a standard type and be fully interchangeable with all size controllers.

M. All controllers shall have built-in comprehensive self-test and self-diagnostic capabilities to ensure reliable operation.

N. All controllers shall have built-in status indication of power supply voltages and controller healthy signal to show proper operation.

O. All PLC I/O modules shall be 24V DC and each module shall have as minimum, sixteen (16) discrete circuits. Output modules for all electrically controlled **locks** shall be **SOURCING type** only. No **sinking** type output modules will be acceptable. These circuits shall be rated

such that they have a minimum of 50% more current capacity than required by the respective I/O devices connected to them.

P. Controllers must be capable of driving local I/O racks, where local is defined as up to one hundred (100) feet from the control unit, without the need for further intelligent interface modules or additional power supplies.

Q. When required, the system must be capable of controlling remote I/O up to a distance of ten kilometers (10km) from the controller, using high-speed links with a minimum data rate of 1.5 millimeters baud. Communications over this link shall be accomplished using twisted pair wires with an overall shield.

R. Fiber Optic Modules
1. Furnish and install all fiber optic modules required for proper system operation.
2. Modules to be located in PLC CPU rack with continuous fiber through the Fiber Optic Patch Panel (LIU) to the next node.
3. The PLC fiber optic communication network shall be installed in a two pair fiber “loop” configuration thus eliminating any “single“ point of failure from taking down the entire PLC system.

S. In each PLC location, furnish and install an industrial Ethernet switching hub. Provide sufficient Category 6 ports to connect each PLC and Operator Workstation. All communications between network switches shall be over the fiber optic backbone.

2.3 FUNCTIONAL REQUIREMENTS

A. The system application program and operating software and fixed database shall be stored in EEPROM. Provide an EEPROM for each new PLC CPU module.

B. Memory battery backup for general purpose ram shall be for a minimum period of twenty-four (24) months in the event of a power failure.

C. The controllers shall provide all necessary logic functions, timing functions, input points, output points memory, communication capabilities and software for the operating features shown in the contract documents.

D. Functions shall include but not be limited to the following which can be implemented in bit logic, word logic or a mixture of both bit and word logic sufficient levels, variations and quantities to provide the operating features shown in the contrast documents.

1. Logical AND, OR, XOR and INVERT
2. On/Off Delay
3. Counters
4. Timers
5. Sequencers
6. Four Function Math (Add, Subtract, Multiply, Divide)
7. VCD Input and Output
8. Contacts
9. Coils
10. Block Instructions (conditional jumps)
11. Group Logic Functions

12. Array Math Functions

E. Communications capability shall be provided in logic controllers to allow serial communication between distributed controllers, and ASCII serial devices. Serial communications shall be RS232, RS422, or 20 mA and shall operate at selectable speeds from 300 to 19,200 baud.

F. The logic controllers shall be capable of communication (if required) to other controller via industry standard Ethernet LAN network utilizing non-proprietary protocols.

G. The following modes of operation of the CPU must be selectable via a key operated switch or programming software commands:

1. PROGRAM – Processor is not scanning program in memory and all outputs are held OFF.
2. MONITOR – Processor is executing program and changes in user memory and data memory are allowed.
3. RUN – Processor is executing program in memory and outputs are controlling to the program. No editing of data registers are allowed.

H. The above settings shall require either a key, or programming console with a key, or programming software loaded on a computer to change the operating mode of the CPU.

I. The processor shall incorporate extensive self-diagnostic features that will not half the processor. In addition, separate visual indicators will annunciate at the following conditions.

1. POWER – Logic Power is applied to the CPU and I/O rack from the power supply.
2. RUN – Processor is executing the program in memory and outputs are being controlled according to the program.
3. OUTPUT INHIBIT – Processor is executing program in memory according to input status, but outputs are being held in the OFF state.
4. ALARM – A non-fatal error (such as a low memory battery condition) has occurred in the PLC hardware or program software. The PLC is still running and the outputs are being controlled according to the program.
5. ERROR – A fatal error (such as a memory parity error) has occurred, the CPU is not scanning the program and the outputs are held in the OFF state.

J. In addition to visual self-diagnostic indicators (LED's), the processor shall have a specifically designated block of at least 100 WOR of internal diagnostic words and bits. These shall provide more detailed system status and fault diagnostic information accessible by programming equipment or intelligent peripherals.

K. The processor must contain an error log area. This area must be able to log what error occurred and when the error happened, giving exact time and date. This area must be able to store a minimum of 1000 records.

L. At a minimum, the internal diagnostic registers shall provide the type of digital (input or output) or intelligent (analog, ASCII, etc.) I/O unit inserted in console or programming software.

M. The program storage medium shall be Battery Backed Random Access Memory (RAM). The memory shall be housed in the same enclosure as the processor.

N. Each Network Interface unit for each PLC shall not consume more than one I/O slot in the main PLC rack.

O. The Network Interface units on each of the PLC's shall be powered directly by the terminals located on the rack across the backplane like the other I/O units on that rack. In addition, the Network Interface units shall have auxiliary power supply terminals located on the rack, so that it can be powered separately from some uninterruptible source in the event of a CPU power supply failure.

P. The data rate of the network shall not be less than 2 millions B.P.S. This data rate will remain the same regardless of the number of nodes on the network loop.

Q. The network shall accommodate at least 62 nodes on any network loop.

R. The transmitted data packets from any node must be capable of carrying not less than 512 bytes of data.

S. The PLC and network system shall be designed so that each PLC system will accept at least four Network Interface Units operating simultaneously on their racks.

T. Any node on the network must be able to send data to every other node on the network simultaneously.

U. Using a single command, a network node can communicate with other nodes on three network levels: Nodes on the local network, nodes on the network connected directly via a gateway/bridge, and nodes on networks separated by one other network (i.e., connected via two network gateways/bridges.

V. The logic control system installed I/O shall be no greater than 80% of the controller's capacity.

W. The logic control system shall be supplied with 20% spare memory capacity available after completion of system software required by the contract documents for future system expansion.

X. Standard PLC communication protocols confirmed by a third party are acceptable for lower level controls. Protocols shall provide a means of supervision to annunciate loss of communication.

2.4 ELECTRONIC CONTROL RELAY SYSTEM

A. Acceptable Manufacturers
   1. Stanley Convergent Security Solutions, Inc, Fishers, IN; 317-572-2114
   2. Accurate Controls, Ripon, WI; 920-748-6603.
   3. CML Security, Erie, CO; 720-466-3650
   4. Cornerstone Security Electronics/Com-Tec Security, Inc., Madison, AL; 877-374-7311

B. The electronic control relay system will perform actual switching of power to locks, intercom, etc. as required and shall be capable of interfacing with other systems. All relays shall be mounted in suitable enclosures with the capability of key lockable doors and removable steel mounting plates if required. The cabinets shall be sized as required to adequately

accommodate the equipment housed therein and shall conform to the space requirements indicated on the plans. The cabinets shall be installed as shown on contract drawings.

C. Class I Circuit Control Relays: The control relays shall be electro-mechanical type that are rated for at least 50% more current capacity than required for any given steady state control function, but in no case less than 10 amps for power control functions. The relays shall be capable of operating on an input signal of 24 VDC and the output shall be capable of switching the required voltage and current for the intended applications. The unit shall have a minimum of 2500 VAC isolation between the input and output.

D. Class 2 Circuit Control Relays: The control relays shall be electro-mechanical type that are rated for at least 50% more current capacity than required for any given steady state control function, but in no case less than 5 amps for power control functions. The relays shall be capable of operating on an input signal of 24 VDC and the output shall be capable of switching the required voltage and current for the intended applications. The unit shall have a minimum of 2500 VAC isolation between the input and output.

E. Each relay for locking control shall be individually fused to meet National Electric Code distribution requirements and to protect the relay and other circuitry from a short circuit failure at the lock. Each individual door lock relay shall be rated no less than 30% more current carrying capacity then the device load requires.

F. Each relay rated at 4 amps or higher shall be socket mounted to facilitate field replacement.

G. Provide individual relays for each 120VAC exterior door, man gate, and for all sliding devices. Locate these relays separately from all other door lock control relays within the equipment rack. Individually fuse each 120VAC current carrying door lock wire with a minimum 4 amp fuse.

H. Indicators on relay base sockets must be rated for the appropriate load. LED indicators on 120VAC relay base sockets are required to function without external resistors, diodes, or other means of draining excess voltage.

I. All relays and terminations are to be clearly labeled to identify all field connections.

2.5 TRANSIENT SURGE SUPPRESSION

A. Acceptable manufacturers are as follows:
   1. Transtector
   2. DITEK
   3. Northern Technologies Incorporated
   4. PolyPhaser Corporation
   5. Emerson
   6. Eaton

B. Miscellaneous Controls: Provide surge protection as indicated on the plans for miscellaneous control circuits that leave the building. Provide Northern Technologies series DLP or PLP-s units or equal matched to the voltage of the circuit suppressed. The suppressors shall have a peak pulse power dissipation rating of 10 joules each mode, minimum.

C. Security System Power: Provide surge protection for all 120 volt power connections powering logic and control equipment. Device shall be equal to Northern Technologies TCS-HWR series rated for the power of the circuit suppressed. The suppressors shall have a peak pulse power dissipation rating of 300 joules L-N, minimum. Units shall provide a dry contact monitored by the security system and identified by electrical panel circuit number.

D. Clearly identify at each rack location all 120VAC power source information.

2.6 EQUIPMENT ENCLOSURES

A. Acceptable Manufacturers:
   1. AMCO Enclosures
   2. Hoffman Engineering Co.
   3. Lowell Manufacturing

B. Racks: Mount equipment in minimum 70” high by 19” deep by 30” wide free standing racks as indicated on the plans.
   1. Racks shall be constructed of cold rolled steel and provide standard mounting rails for 19” rack mounted equipment.
   2. Conduit shall enter from the top.
   3. Low voltage wiring shall be separated from 120 volt wiring.
   4. PLC equipment may be mounted with intercom or Video control equipment.
   5. Furnish and install solid metal doors for access to both the front and back. Doors shall be minimum 16 gauge flush mounted with air louvers and flush pulls.
   6. Side panels shall be a minimum of 16 gauge flush mount.
   7. Both front and rear doors shall be provide with key locks.
   8. Furnish and install ventilation fans as required to enable proper ventilation for the equipment.
   9. Furnish and install electrical plug strip mounted in cabinet to power 120 volt equipment in console.
   10. Furnish and install blank plates by manufacturer to provide closure on all unused rack sections.

2.7 DOOR MONITOR DEVICE

A. Where a door is to be monitored, but no detention door position switch is provided, furnish and install a door contact equal to Sentrol 2707A-L hermetically sealed reed switch.

B. Unit shall provide a three-foot flexible stainless steel cable. Surface mount sealed switch on the secure side of the door (non inmate side) and monitor position.

C. Reed switch shall provide a form C contact and handle up to .25 amps at 30 volts.

D. Reed switch shall function properly with a sense range of 0.18” minimum and 0.6” maximum.

2.8 CABLING AND WIRE

A. Acceptable manufacturers:

   1. Belden

2. Carol
3. West Penn Wire

B. Wire Size: Furnish and install sufficient wire gauge to limit voltage drop to 5%.

C. Listings: Wiring shall be listed for the installation. Wire indicated below is intended to provide electrical characteristic requirements.

D. Door Monitor Device Wiring: Furnish and install a two conductor #20 AWG cable to each device. Cable shall be equal to West Penn 222. Cable must be 'wet location rated' if routed under the floor slab.

E. Printer Wiring: Furnish and install 4 pair Category 6 cabling for digital communications. Cable must be 'wet location rated' if routed under the floor slab.

F. Operator Workstation: Furnish and install Category 6 cable equal to CommScope Uniprise cable Media 6, 6NF4+.

G. All low voltage Power wiring shall be 14 AWG THHN/THWN.

H. Graphic Panel Wiring: Wiring from the intercom controls to the graphic panel switches and LED's shall be equal to Clifford of Vermont model 25P24B1 CMR - 25 pair 24 AWG. Furnish and install intercom station, microphone, and #14 THWN power cabling to panels as required for proper operation.

I. Control Wiring: All control wiring within the relay cabinets shall be installed using good workmanship and standard shop wiring and control practices. Conductors shall be grouped and laced with nylon tie straps. Straps will be placed on each side of all bundle breakouts. Wiring will be supported at intervals not exceeding four inches and labeled at both ends. Each relay shall be labeled with its circuit number.

J. Line Voltage Wiring: Line Voltage Wiring that extends from electronic control relay terminal strips to the 120 VAC locks; receptacles, etc. shall meet Article 300 of the National Electric Code. All power conductors shall be a minimum 14 AWG THWN, 600 volt rated and shall be installed in raceways and equipment enclosures with other conductors within limitations defined by Article 300 of the National Electric Code.

K. Class 2 Circuit Wiring that extends from the electronic control relay terminal strips to the low voltage devices shall be Class 2 as defined by article 725 of the National Electric Code. All control conductors shall be a minimum of 20 AWG, jacketed, control cable. All control cable insulation shall be 600 volt rated.

L. Wire and cable feeding 120v and/or 24v locks and sliding devices shall be a minimum 14AWG THWN. Applicable to all new lock wiring added as part of this project.

M. **All control wiring shall use stranded copper conductors. All terminations shall be made on screw type terminals correctly sized and applied to the conductor provided**.

N. All wiring systems shall be labeled and color-coded with labeling and coding shown on shop drawings. White conductors shall be used only for neutral conductors, green only for

grounding conductors with exceptions of low voltage control wiring that meet the requirements of Article 725 of the National Electric Code.

O. All conductors within junction boxes pull boxes, and equipment enclosures shall be grouped and laced with nylon tie straps. Attach identification tabs in individual sets serving individual locks or groups. Conductor groups shall be identified on the tab with respect to room or area served.

P. Control system conductors shall not be spliced. All conductors shall be continuous between the control termination point and the controlled device.

2.9 FIBER OPTIC NETWORK

A. Provide fiber optic cable Light Interface Unit (LIU) as manufactured by Corning mounted at the top of each security equipment rack located on the plans.

B. Provide conventional OM3 50 UM Multi-mode fiber optic cable as manufactured by Corning for all PLC network and Intercom system communications. Refer to SE1.00 for additional information and routing details.

C. Provide fiber optic cable connectors for each fiber installed. Install connectors as manufactured by Corning Unicam in the style (ST/SC) to match the equipment being provided.

D. Provide fiber optic cable testing for all fiber strands being furnished in accordance with the applicable requirements of:
   A. ANSI/TIA/EIA – 568-C: "Commercial Building Telecommunications Cabling Standard"
   B. ANSI/TIA/EIA – 526-14B: "OPTICAL POWER LOSS MEASUREMENTS OF INSTALLED MULTIMODE FIBER CABLE PLANT"
   C. NFPA 70
   D. BICSI TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL

E. Utilize a high-resolution OTDR to characterize the power loss and power reflected along optical fibers. The OTDR must operate within the range of 850 ± 30 nm or 1300 ± 20 nm for multimode testing in accordance with ANSI/TIA/EIA-526-14-B.

F. Test for continuity and quality of all optic fibers installed. Any deficiencies found shall be corrected by the installer and the corrected fiber retested and documented. The final signature traces for each fiber as corrected shall be submitted for review prior to being placed into service and be included in the O&M manuals.

2.10 BACNET INTERFACE DEVICES

A. PLC equipment supplier is responsible for providing BACnet Interface device(s), interface relays, wiring and terminations as required to input all security system alarms to the existing BACnet network.. Allow for a minimum of 300 BACnet points from the PLC network. All points shall be read only. No control via BACnet is allowed. See division 25 for further details.

B. Provide BACnet interface devices for each piece of PLC so that the units are presented as a series of AV and BV BACnet objects. See 25 20 28.46.19 for the list of objects that must be supported. This list if the minimum acceptable.

C. Furnish and install BACnet Communication Interface Modules by FieldServer Technologies PS56-BAS-xxx as required.

D. Furnish and install ControlLogix to BACnet/IP 460ETCBS-N34-D as required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordination With Other Trades: The contractor shall coordinate the work of this section with that of other Divisions as required to ensure that the entire work of this Project will be carried out in an orderly, complete and coordinated fashion.

B. Field Wiring: The wiring that extends from the electronic control relay terminal strips to the locks, lights, etc. shall be class 1, 2, or 3 as defined by Article 725 of the National Electric Code. All conductors shall be 14 gauge or larger THHN or THWN; 600 volt rated, and shall be installed in raceways and equipment enclosures with other conductors, within limitations defined by Article 725 of the National Electric Code.
1. Installation: Dress wires and cables to provide a neat and orderly appearance within all enclosures, equipment racks, cabinets, and consoles by routing in snap-cover, plastic wiring duct. In locations where wiring duct is not feasible, organize by cable clamping, dressing and tie-wrapping.
2. Strain Relief: Relieve strain on all loose wire bundles using tie-wrap, supports fastened with machine screws or bolts. Do not use self-adhesive type supports.
3. Shrink Tubing: Neatly form cable ends and apply shrinkable tubing to shielded cables or where necessary to secure the insulation against fraying or raveling.
4. Edge Protection: Install edge protection materials on edges, holes, lips of ducts, or any other place where wires or cables cross sharp metallic edges.
5. Service Loops: Allow sufficient service loops where conductors leave cabinet or transition to door mounted electronics.
6. Splicing: Field wiring shall not be spliced. All wiring shall be continuous from the field device to the termination in the control panel.
7. Wire Termination: All wiring shall be terminated at both ends and labeled in accordance with the equipment wiring plans. Wire not energized or connected to active devices shall be labeled for future use.

C. Ground System: Connection to grounds for Transient Voltage Surge Suppressors shall be 1 ohms or less. All grounds shall be installed as required by the NEC. The ESC shall furnish and install all grounding components required by these documents to include any upgrades due to the existing grounding system being insufficient or nonexistent.

D. Ground Wire: Furnish and install a ground wire sized as required by the NEC in all conduits containing conductors carrying voltages above 30 Volts RMS.

E. Connect all PLC and PLC equipment enclosures and racks to the existing grounding system at each equipment room location.

F. Listing: All wiring and raceways shall be listed for the intended installation and installed in strict accordance with the National Electric Code as required by the conditions of where it is stalled. This includes but is not limited to ratings for riser, plenum, or wet installations.

G. All wiring/cabling shall be labeled with the system type and the device ID at each end. The numbering system used should match the equipment wiring plans and be similar to the following:
   1. C### camera coax.
   2. CP### camera power.
   3. IC### intercom.
   4. L### locking device.
   5. All fiber and fiber tubes should be labeled with the system ID and identified as to which building each fiber feeds.

   The label shall be generated by a Brady I.D. Plus Pro Printer or equal and utilize a Brady part# WML-511-292 label or equal. The label used should allow for the clear part of the label to overlap and protect the printed portion of the label from being exposed to damage and/or being rubbed off over time. Hand written labels are not acceptable. Prove one sample of the labeling to be used on the intercom system, watch tour and lock wiring.

H. Seismic: The entire system shall be installed to meet the seismic requirements for the area.

3.2 FABRICATION

A. All cables between racks for PLC inputs and outputs shall be provided with connectors for ease of trouble-shooting and service.

B. All field wiring shall be landed on appropriately labeled terminal strips.

C. All wiring shall be cabled or neatly bundled and secured to the housing with wire ties and internal wire ducts.

D. Wire nuts, crimp caps and other similar style wire connectors are not acceptable within the equipment racks. All connections within these racks must be done with screw style terminal connections.

3.3 SEPARATION

A. Cabling and conduit shall be installed in strict compliance with the National Electric Code and TIA 569.

B. Communication, Class 2, and Class 3 wires and cables shall be separated by at least 2 inches from conductors of any electric light, electric power, Class 1, non-power-limited fire alarm, or medium power network-powered broadband communications circuits.
   1. Separation can be less if communication, Class 2, and Class 3 circuits are completely enclosed in metallic pathways that are properly grounded and bonded per ANSI/TIA-607-B. Walls of the pathway must have a minimum thickness of .04 inches if made of steel or .06 inches if made of aluminum.
   2. Separation can be less if any electric light, electric power, Class 1, non-power-limited fire alarm, or medium power network-powered broadband communications circuits are completely enclosed in metallic pathways that are properly grounded and bonded per

ANSI/TIA-607-B. Walls of the pathway must have a minimum thickness of .04 inches if made of steel or .06 inches if made of aluminum.

3.4 FIELD QUALITY CONTROL

A. All functions specified shall be individually activated and the result documented. Utilize preprinted test sheets with space for comments and indicate “pass” or “fail” for each. These test reports shall be copied and submitted to the engineer prior to final inspection. See example form below.

B. All functions shall be demonstrated for the owner and Architects representative.

PLC VERIFICATION AND CHECK-OUT FORM

✓ = OK

Job #
Job Name:
Panel #

FIELD TEST CODE:		**REPAIR CODE:**	
A - No status change	M - Poor audio	1-SSI	Software Test By:_____ Date_____
B - Won't show secure	N - No audio	2-ELECTRICIAN	
C - No power to door	O - Out of focus	3-IRONWORKER	Hardware Test By:_____ Date_____
D - Door won't open	P - No picture	4-CARPENTER	
E - Door won't close	Q - Call button sticks	5-OWNER/REP	System Test By:_____ Date_____
F - Door needs alignment	R - No reset station	6 -ENG	
G - Wrong door opens	S - No dome light	7 -	Design Engineering By:_____ Date_____
H - Adjust DPS	T - Reversed	8 -	
I - Adjust roller bolt	U - Software problem	9 -	Wiring By:_____ Date_____
J - File strike plate	V - Not installed	10 -	
K - Adjust lock	W -	11 -	Field Test By:_____ Date_____
L - No latch back	X -	12 -	

							ON-SITE				
ICON ID#	**ICON TYPE**	**C/U CAM. NO.**	**DOOR INTLK. WITH**	**CELL GRP. REL.**	**SOFT-WARE TEST**	**HARD-WARE TEST**	**FIELD TEST CODE**	**REPAIR CODE**	**RE-CHECK "X"**	**FIELD CHECK OUT NOTES**	**PROBLEM RESOLVED (BY/DATE)**

3.5 SOFTWARE

A. For each PLC, furnish to the owner uniquely identified:
   1. One (1) separate back-up CD or flash memory device for each PLC with the ladder logic file (programmer’s notated file) and the source code. Each disk will be labeled with the project name, programs, PLC, programmer, and revision date.
   2. One (1) copy of the source code of the application software on CD and/or other digital media.

B. Furnish a single Adobe Acrobat PDF file detailing all passwords for each PLC. This file shall also identify the following by system and panel:
   1. The file name of each program required for restoration of each failed PLC.
   2. The passwords required for each PLC as well as required programs.
   3. The name of the programmers for each custom program.
   4. The date of the last program change.

C. Furnish documents listed in 3.5 A-B at project completion. Furnish a new set with all revisions after the completion of 280500, 1.9-C.

3.6 SPARES

A. Furnish one (1) PLC central processor of each type installed.

B. Furnish one (1) Ethernet switch of each type installed.

C. Furnish one (1) power supply of each type installed.

D. Furnish one (1) group of programmed memory media for each program installed.

E. Furnish one (1) spare input module of each type installed in the facility.

F. Furnish one (1) spare output module of each type installed in the facility.

G. Furnish one (1) Node communication board of each type installed.

H. Furnish one (1) Door locking relay board of each type installed.

I. Furnish one (1) Sentrol monitor switch 2707A-L of each type installed on project.

J. Furnish one CPU program flash memory card for each PLC CPU installed. Most current program shall be loaded on each card per CPU.

K. Spare parts shall be packaged in appropriate protective packing material.

L. Box spare parts for easy storage and clearly identify the contents of each box on four sides of each container.

3.7 EXECUTION

A. See responsibility matrix for the execution responsibilities for the equipment supplier, controls and electrical subcontractor.

B. Equipment supplier is responsible for supplying and installing the BACnet interface device.

C. Electrical is responsible for power and any control wiring if the device does not have a single point of connection

D. Division 25 is only responsible for communicating with the UPS BACnet interface device using BACnet objects and services to access this data.

END OF SECTION 284619