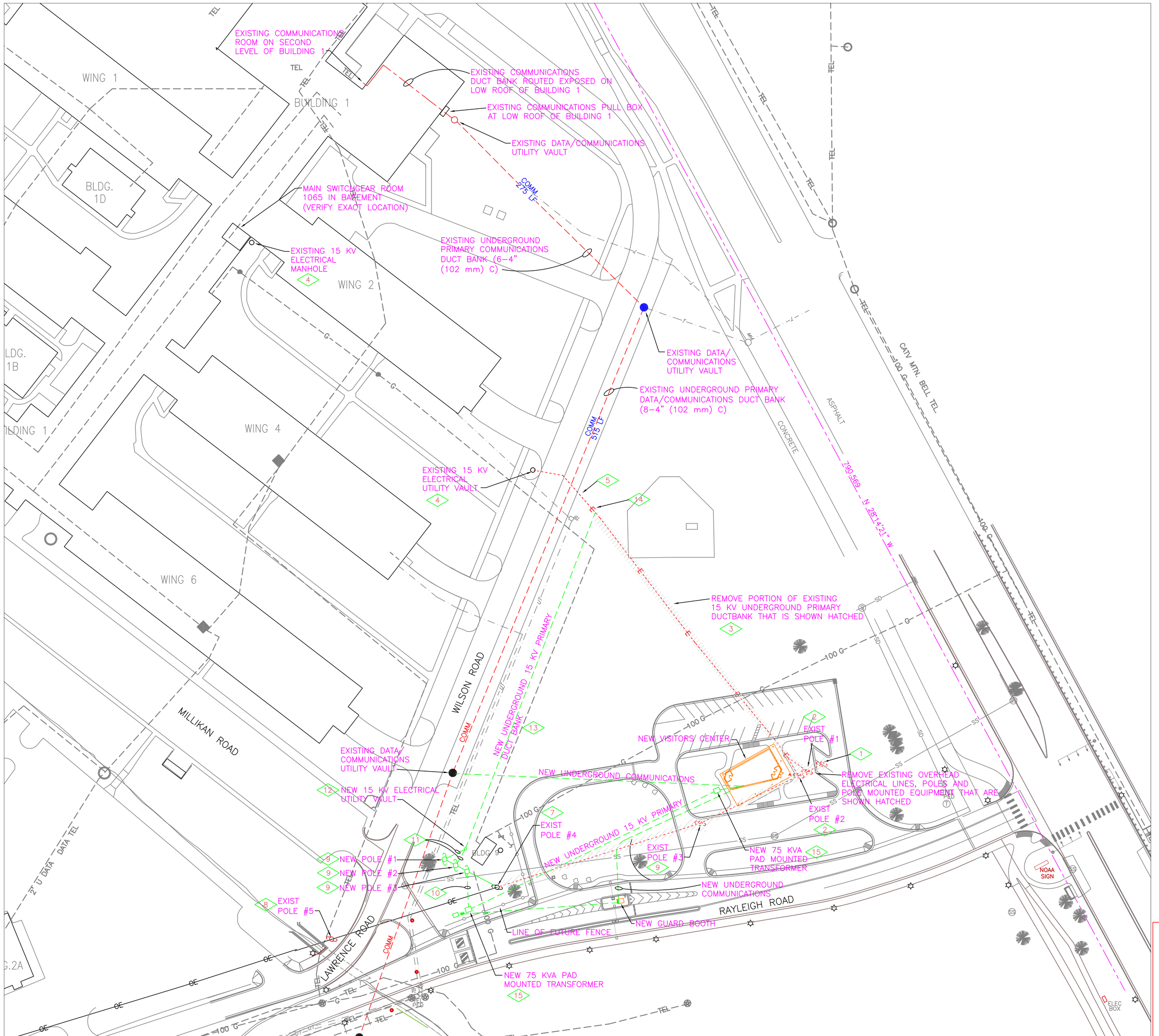


1 SITE ELECTRICAL AND COMMUNICATIONS UTILITY PLAN

1"=60' (1"=18.3 M)

0 60 FT 120 FT

0 18.3 M 36.6 M

GENERAL NOTES THIS SHEET

1. LOCATIONS AND BUILDING DIMENSIONS ARE ONLY AS ACCURATE AS COULD BE DETERMINED FROM FIELD SURVEYS AND REVIEW OF EXISTING DRAWINGS. FIELD VERIFY ALL CONDITIONS, DIMENSIONS AND LOCATIONS SHOWN.
2. ALL WORK SHOWN IS NEW AND SHALL BE PROVIDED UNDER THIS CONTRACT UNLESS OTHERWISE NOTED.
3. OBTAIN APPROVAL FROM THE COTR FOR PROPOSED CONDUIT ROUTING AND EQUIPMENT LOCATIONS PRIOR TO ANY WORK BEING PERFORMED. FIELD COORDINATE EQUIPMENT LOCATIONS.
4. PROVIDE ALL CUTTING, PATCHING AND CORE DRILLING NECESSARY TO THE PERFORMANCE OF THE WORK.
5. ALL UNDERGROUND CONDUITS SHALL BE CONCRETE ENCASED IN ACCORDANCE WITH SPECIFICATON SECTION 16012.
6. SEE SHEET E009 FOR ADDITIONAL DESCRIPTION AND CLARIFICATION OF 15 KV ELECTRICAL DISTRIBUTION WORK.
7. SEE SHEET E011 FOR ADDITIONAL DESCRIPTION AND CLARIFICATION OF DATA/COMMUNICATIONS DISTRIBUTION WORK.
8. COORDINATE LOCATION OF NEW POWER POLES AND PAD MOUNTED TRANSFORMER WITH EXISTING UTILITIES. VERIFY LOCATIONS WITH OWNER. NEW PAD MOUNTED EQUIPMENT MUST BE LOCATED NORTH AND WEST OF FUTURE FENCE.

DETAIL NOTES THIS SHEET

1. EXISTING DEAD END GUY POLE TO BE REMOVED.
2. EXISTING CLASS II SERVICE POLE WITH POLE ORIENTED GANG DISCONNECTS, FUSED CUTOUTS AND LIGHTNING ARRESTORS TO BE REMOVED.
3. EXISTING 2 SETS (3-250 KCMIL 15 KV)4" (102 mm) GRC IN CONCRETE DUCT BANK. CONCRETE DUCT BANK TO POLES SHALL BE REMOVED AS REQUIRED DURING CONSTRUCTION OF VISITOR'S CENTER.
4. EXISTING 15 KV MANHOLE TO REMAIN.
5. EXISTING 15 KV CONCRETE DUCT BANK TO REMAIN.
6. EXISTING SERVICE POLE AND TRANSFORMER TO BE REMOVED. CONTRACTOR SHALL VERIFY LIMITS OF UNDERGROUND FEEDER AND REMOVE AS REQUIRED FOR NEW CONSTRUCTION.
7. EXISTING INTERMEDIATE POLE TO REMAIN. CONTRACTOR SHALL RECONFIGURE POLE FOR DEAD END GUY POLE AND BUCK ARM FOR SLACK SPAN TO NEW POLES.
8. EXISTING INTERMEDIATE POLE TO REMAIN.
9. NEW 45 FT. (13.716 M(CLASS II SERVICE POLE CONFIGURED FOR SLACK SPAN CONNECTION. PROVIDE #6 BARE COPPER GROUND WIRE COIL AT BUTT OF POLE AND EXTEND UP POLE TO EQUIPMENT CROSS ARMS.
10. NEW 3" (76.2 mm) GALVANIZED RIGID CONDUIT (GRC) WITH O.Z./GEDNEY #CRC-300 COMPOUND TYPE CABLE TERMINATOR FOR 3#2 COPPER SHIELDED EPR 15 KV CONDUCTORS WITH CONCENTRIC NEUTRAL.
11. NEW 5" (127 mm) (GRC) WITH O.Z./GEDNEY #CRC-400 COMPOUND TYPE CABLE TERMINATOR FOR 3-500 KCMIL COPPER SHIELDED EPR 15 KV CONDUCTORS WITH CONCENTRIC NEUTRAL.
12. NEW 10 FT. LONG X 8 FT. WIDE X 6 FT. DEEP (3048mm L X 2438 mm W X 1829 mm D) CONCRETE MANHOLE.
13. NEW TWO (2) 5" (127 mm) GRC CONDUITS, EACH WITH 3-500 KCMIL COPPER SHIELDED EPR 15 KV CONDUCTORS WITH CONCENTRIC NEUTRAL, IN CONCRETE DUCT BANK BETWEEN MANHOLES.
14. TO AVOID TRENCHING ROAD, INTERCEPT EXISTING UNDERGROUND DUCT BANK ON SOUTHEAST SIDE OF ROAD. CAREFULLY REMOVE CONCRETE.
15. NEW 75 KVA PAD-MOUNTED TRANSFORMER, 13.8 KV-208Y/120V, 3 PH, 4 W SECONDARY WITH OIL IMMERSED PRIMARY FUSES AND LOAD BREAK ELBOWS.

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

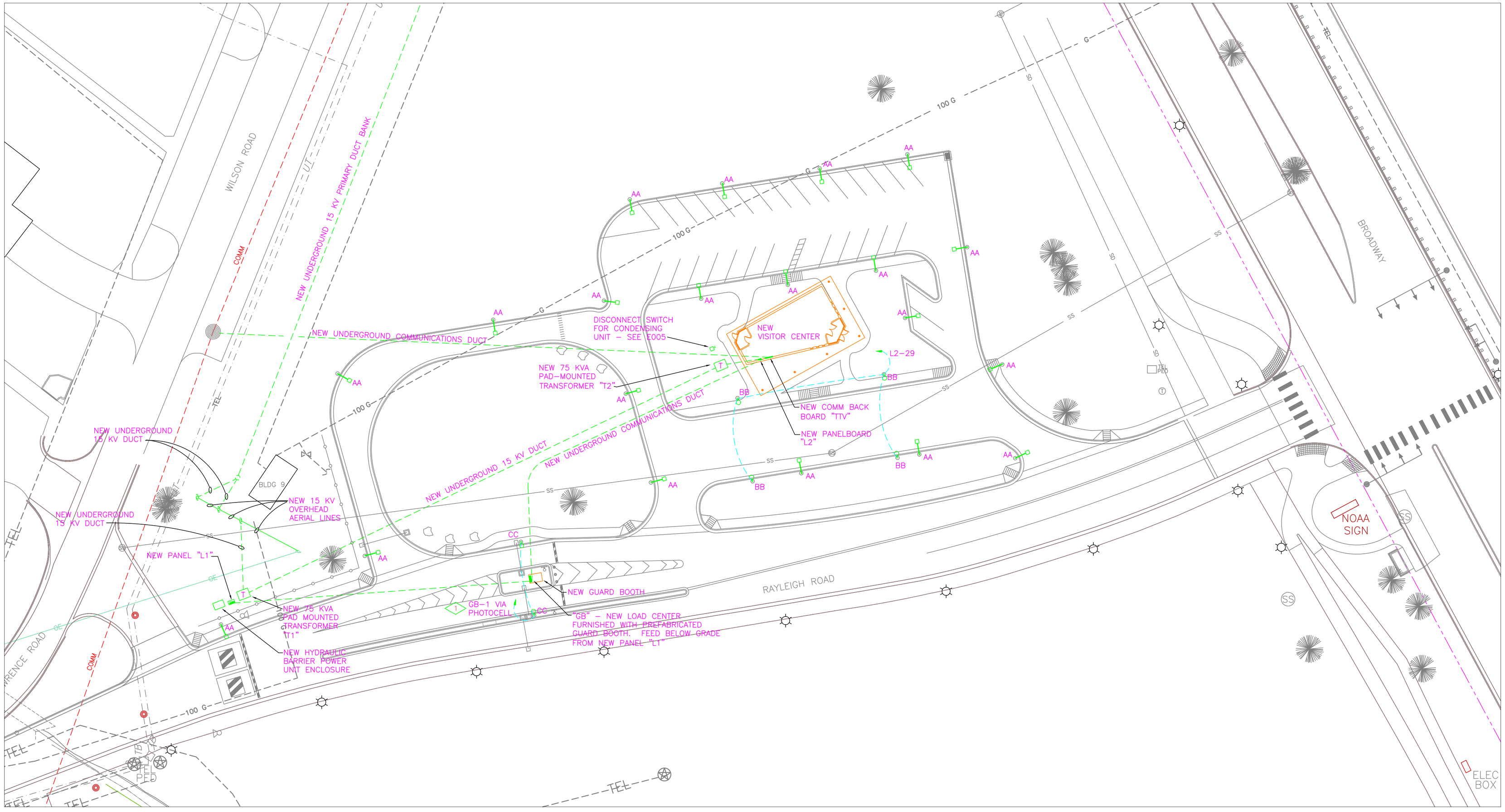
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

RAYLEIGH ROAD MODIFICATIONS

SITE ELECTRICAL AND COMMUNICATIONS UTILITY PLAN

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER	COST CENTER NUMBER
FILE NUMBER: P03031	SHEET NUMBER: E001 of 11	
ELECTRONIC FILE		



GENERAL NOTES THIS SHEET

1. LOCATIONS AND BUILDING DIMENSIONS ARE ONLY AS ACCURATE AS COULD BE DETERMINED FROM FIELD SURVEYS AND REVIEW OF EXISTING DRAWINGS. FIELD VERIFY ALL CONDITIONS, DIMENSIONS AND LOCATIONS SHOWN.
2. ALL WORK SHOWN IS NEW AND SHALL BE PROVIDED UNDER THIS CONTRACT UNLESS OTHERWISE NOTED.
3. OBTAIN APPROVAL FROM THE COTR FOR PROPOSED CONDUIT ROUTING AND EQUIPMENT LOCATIONS PRIOR TO ANY WORK BEING PERFORMED. FIELD COORDINATE EQUIPMENT LOCATIONS.
4. PROVIDE ALL CUTTING, PATCHING AND CORE DRILLING NECESSARY TO THE PERFORMANCE OF THE WORK.
5. ALL UNDERGROUND CONDUITS SHALL BE CONCRETE ENCASED IN ACCORDANCE WITH SPECIFICATON SECTION 16012.

DETAIL NOTES THIS SHEET

1. PROVIDE PHOTOCELL ON ROOF OR NORTH SIDE OF GUARD BOOTH FOR CONTROL OF EXTERIOR LIGHTING CIRCUIT.

1 NEW VISITOR CENTER SITE ELECTRICAL PLAN

1" = 30' (1" = 9.1 M)

0 30 FT 60 FT

0 9.1 M 18.2 M

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

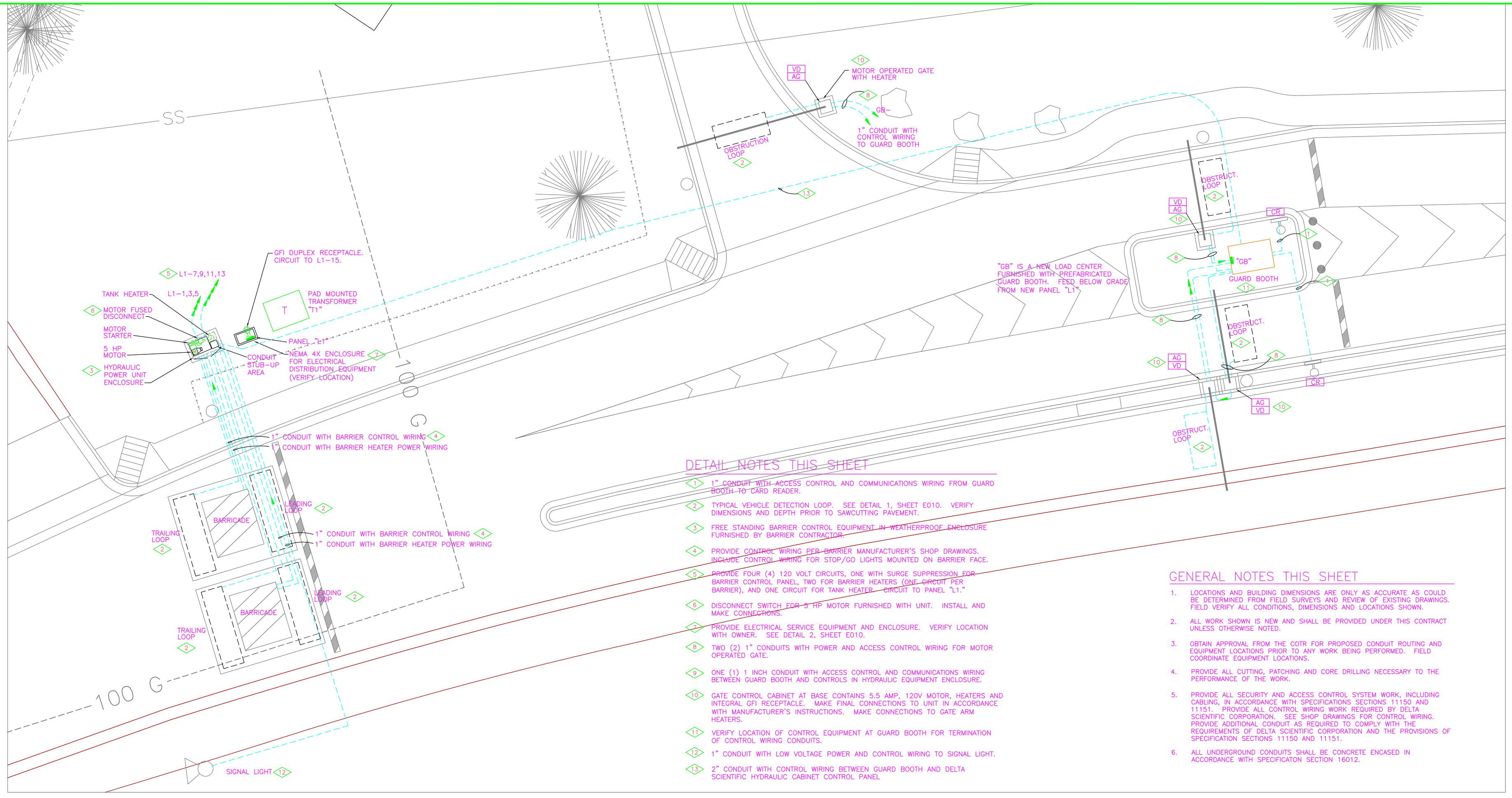
RAYLEIGH ROAD MODIFICATIONS

VISITOR CENTER SITE ELECTRICAL PLAN

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN:	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER:
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER:	COST CENTER NUMBER:
FILE NUMBER: P03031	SHEET NUMBER: E002 of 11	

ELECTRONIC FILE



DETAIL NOTES THIS SHEET

1. 1" CONDUIT WITH ACCESS CONTROL AND COMMUNICATIONS WIRING FROM GUARD BOOTH TO CARD READER.
2. TYPICAL VEHICLE DETECTION LOOP. SEE DETAIL 1, SHEET E010. VERIFY DIMENSIONS AND DEPTH PRIOR TO SAWCUTTING PAVEMENT.
3. FREE STANDING BARRIER CONTROL EQUIPMENT IN WEATHERPROOF ENCLOSURE FURNISHED BY BARRIER CONTRACTOR.
4. PROVIDE CONTROL WIRING PER BARRIER MANUFACTURER'S SHOP DRAWINGS. INCLUDE CONTROL WIRING FOR STOP/GO LIGHTS MOUNTED ON BARRIER FACE.
5. PROVIDE FOUR (4) 120 VOLT CIRCUITS, ONE WITH SURGE SUPPRESSION FOR BARRIER CONTROL PANEL, TWO FOR BARRIER HEATERS (ONE CIRCUIT PER BARRIER), AND ONE CIRCUIT FOR TANK HEATER. CIRCUIT TO PANEL "L1."
6. DISCONNECT SWITCH FOR 5 HP MOTOR FURNISHED WITH UNIT. INSTALL AND MAKE CONNECTIONS.
7. PROVIDE ELECTRICAL SERVICE EQUIPMENT AND ENCLOSURE. VERIFY LOCATION WITH OWNER. SEE DETAIL 2, SHEET E010.
8. TWO (2) 1" CONDUITS WITH POWER AND ACCESS CONTROL WIRING FOR MOTOR OPERATED GATE.
9. ONE (1) 1 INCH CONDUIT WITH ACCESS CONTROL AND COMMUNICATIONS WIRING BETWEEN GUARD BOOTH AND CONTROLS IN HYDRAULIC EQUIPMENT ENCLOSURE.
10. GATE CONTROL CABINET AT BASE CONTAINS 5.5 AMP, 120V MOTOR, HEATERS AND INTEGRAL GFI RECEPTACLE. MAKE FINAL CONNECTIONS TO UNIT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. MAKE CONNECTIONS TO GATE ARM HEATERS.
11. VERIFY LOCATION OF CONTROL EQUIPMENT AT GUARD BOOTH FOR TERMINATION OF CONTROL WIRING CONDUITS.
12. 1" CONDUIT WITH LOW VOLTAGE POWER AND CONTROL WIRING TO SIGNAL LIGHT.
13. 2" CONDUIT WITH CONTROL WIRING BETWEEN GUARD BOOTH AND DELTA SCIENTIFIC HYDRAULIC CABINET CONTROL PANEL

GENERAL NOTES THIS SHEET

1. LOCATIONS AND BUILDING DIMENSIONS ARE ONLY AS ACCURATE AS COULD BE DETERMINED FROM FIELD SURVEYS AND REVIEW OF EXISTING DRAWINGS. FIELD VERIFY ALL CONDITIONS, DIMENSIONS AND LOCATIONS SHOWN.
2. ALL WORK SHOWN IS NEW AND SHALL BE PROVIDED UNDER THIS CONTRACT UNLESS OTHERWISE NOTED.
3. OBTAIN APPROVAL FROM THE COTR FOR PROPOSED CONDUIT ROUTING AND EQUIPMENT LOCATIONS PRIOR TO ANY WORK BEING PERFORMED. FIELD COORDINATE EQUIPMENT LOCATIONS.
4. PROVIDE ALL CUTTING, PATCHING AND CORE DRILLING NECESSARY TO THE PERFORMANCE OF THE WORK.
5. PROVIDE ALL SECURITY AND ACCESS CONTROL SYSTEM WORK, INCLUDING CABLING, IN ACCORDANCE WITH SPECIFICATIONS SECTIONS 11150 AND 11151. PROVIDE ALL CONTROL WIRING WORK REQUIRED BY DELTA SCIENTIFIC CORPORATION. SEE SHOP DRAWINGS FOR CONTROL WIRING. PROVIDE ADDITIONAL CONDUIT AS REQUIRED TO COMPLY WITH THE REQUIREMENTS OF DELTA SCIENTIFIC CORPORATION AND THE PROVISIONS OF SPECIFICATION SECTIONS 11150 AND 11151.
6. ALL UNDERGROUND CONDUITS SHALL BE CONCRETE ENCASED IN ACCORDANCE WITH SPECIFICATON SECTION 16012.

1 NEW VISITOR CENTER SITE SECURITY EQUIPMENT POWER PLAN

1/8" = 1'-0" (1/8" = 304.8 mm)

0 8 FT 16 FT

0 2.44 M 4.88 M

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

RAYLEIGH ROAD MODIFICATIONS

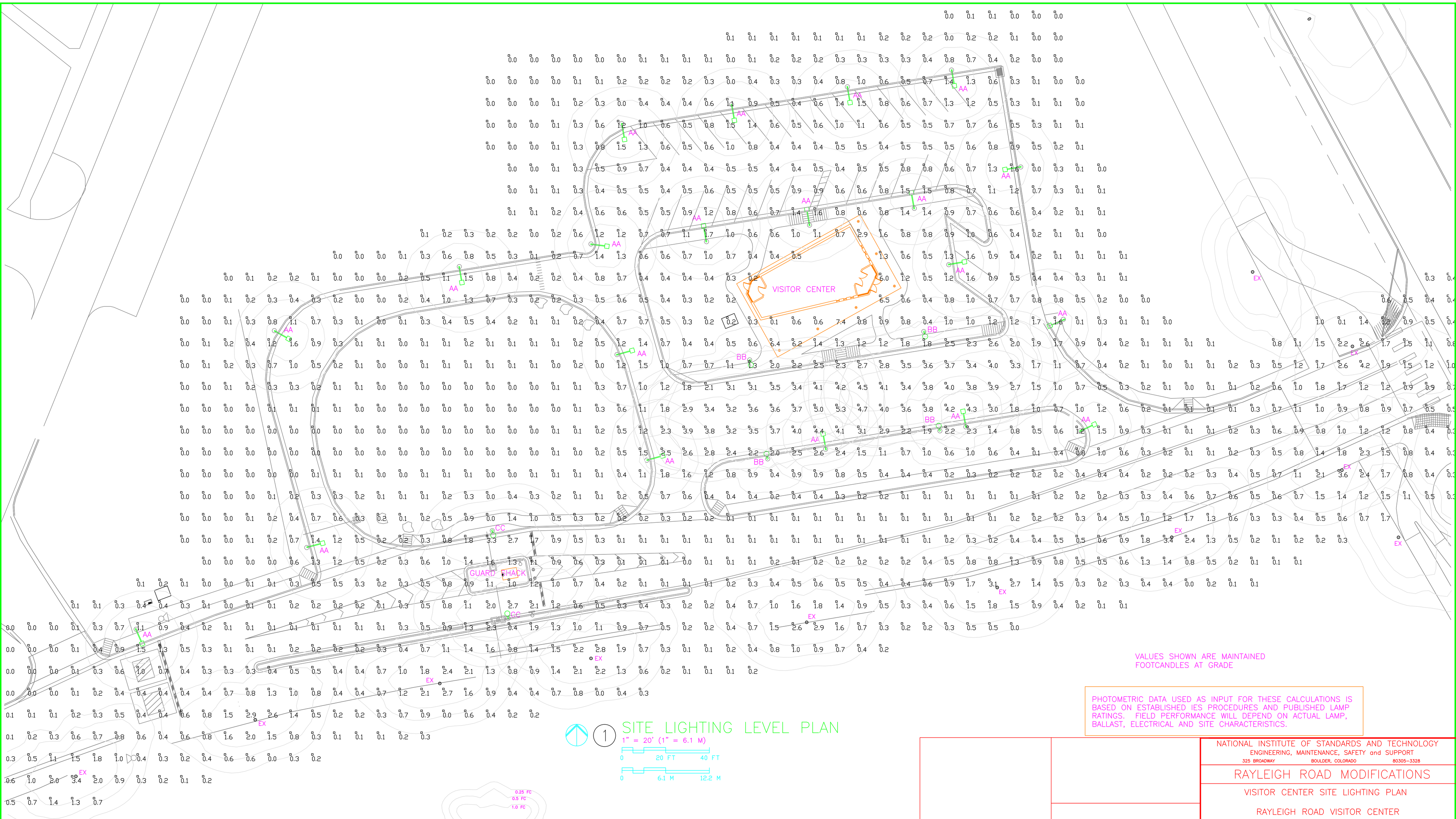
VISITOR CENTER SECURITY EQUIPMENT POWER PLAN

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER	COST CENTER NUMBER
ELECTRONIC FILE		

FILE NUMBER: P03031

SHEET NUMBER: E003 of 11



1 SITE LIGHTING LEVEL PLAN

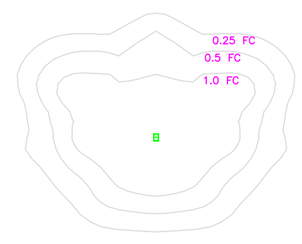
1" = 20' (1" = 6.1 M)

0 20 FT 40 FT

0 6.1 M 12.2 M

VALUES SHOWN ARE MAINTAINED FOOTCANDLES AT GRADE

PHOTOMETRIC DATA USED AS INPUT FOR THESE CALCULATIONS IS BASED ON ESTABLISHED IES PROCEDURES AND PUBLISHED LAMP RATINGS. FIELD PERFORMANCE WILL DEPEND ON ACTUAL LAMP, BALLAST, ELECTRICAL AND SITE CHARACTERISTICS.



TYPICAL LIGHT PATTERN TEMPLATE
MAINTAINED FOOTCANDLES AT GRADE

REVISION	DESCRIPTION	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

RAYLEIGH ROAD MODIFICATIONS

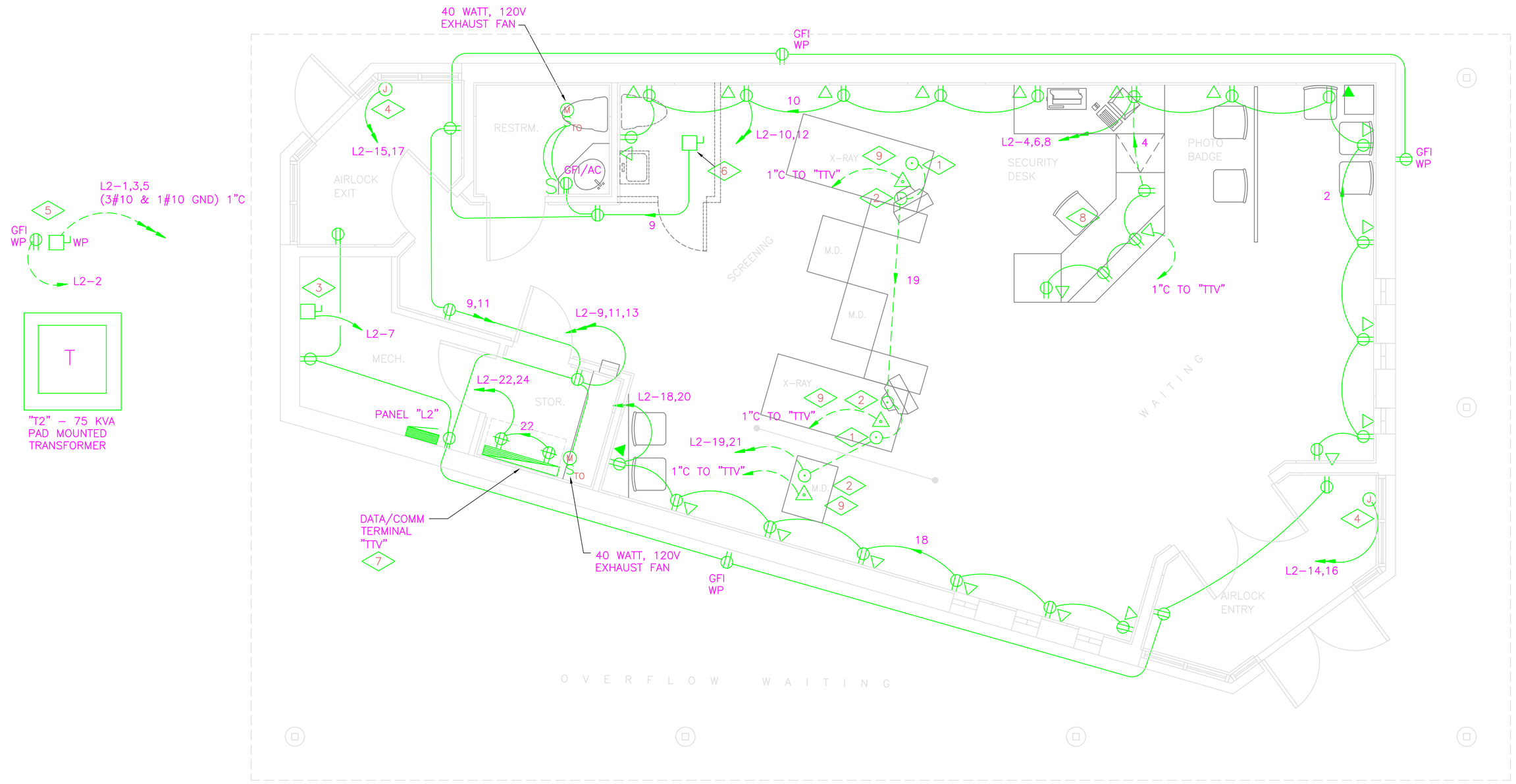
VISITOR CENTER SITE LIGHTING PLAN

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	

DATE	WORK ORDER NUMBER	COST CENTER NUMBER	FILE NUMBER	SHEET NUMBER
4/22/04			P03031	E004 of 11

ELECTRONIC FILE



1 POWER PLAN

1/4" = 1'-0" (1/4" = 304.8 mm)

0 4 FT 8 FT

0 1.22 M 2.44 M

GENERAL NOTES THIS SHEET

1. ALL EXTERIOR RECEPTACLES SHALL BE WEATHERPROOF AND SHALL BE GROUND-FAULT-CIRCUIT-INTERRUPTER PROTECTION.
2. VERIFY ELECTRICAL CHARACTERISTICS, REQUIREMENTS AND LOCATIONS OF ALL OWNER FURNISHED EQUIPMENT PRIOR TO ROUGH-IN, AND PROVIDE ANY ADDITIONAL DEVICES OR CIRCUITRY REQUIRED FOR COMPLETE INSTALLATION.
3. VERIFY ALL MECHANICAL EQUIPMENT REQUIREMENTS WITH MECHANICAL PLANS AND SCHEDULES. PROVIDE ALL OVERCURRENT PROTECTION PER MANUFACTURER'S RECOMMENDATIONS.
4. PROVIDE CONDUIT SEAL-OFFS IN ALL CONDUITS PENETRATING RATED WALLS.
5. FOR EACH DATA/COMMUNICATIONS OUTLET SHOWN, PROVIDE 1" CONDUIT WITH PULL WIRE TO ABOVE LAY-IN CEILING.

DETAIL NOTES THIS SHEET

1. PROVIDE POWER FOR AND MAKE FINAL CONNECTIONS TO X-RAY MACHINE. LOAD IS 0.8 KVA, 120V. VERIFY REQUIREMENTS WITH EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.
2. PROVIDE POWER FOR AND MAKE FINAL CONNECTIONS TO METAL DETECTOR. LOAD IS 30 VA, 120V. VERIFY REQUIREMENTS WITH EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.
3. PROVIDE DISCONNECT SWITCH AND POWER FOR AND MAKE FINAL CONNECTIONS TO 3/4 HP, 120V FURNACE. VERIFY REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
4. PROVIDE POWER FOR AND MAKE FINAL CONNECTIONS TO 2 KW, 208V CABINET HEATER. VERIFY REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
5. PROVIDE WEATHERPROOF FUSED DISCONNECT FOR AND MAKE FINAL CONNECTIONS TO CONDENSING UNIT. LOAD IS 23 MCA, 208V, 3 PH, WITH 35 MAX FUSE AMPS. PROVIDE 60A3P NEMA 3R, HEAVY DUTY DISCONNECT SWITCH WITH 30 FRN-R FUSES.
6. PROVIDE DISCONNECT SWITCH FOR 1.5 KW, 120V WATER HEATER, WHICH IS LOCATED ABOVE LAY-IN CEILING. VERIFY REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
7. PROVIDE 4 FT WIDE X 6 FT HIGH X 3/4" THICK BACKBOARD OF FIRE RETARDANT TREATED PLYWOOD FOR OWNER'S DATA/COMMUNICATION EQUIPMENT. PAINT WHITE.
8. COORDINATE LOCATION OF OUTLETS IN MILLWORK WITH ARCHITECT. ALL CONDUIT SHALL BE ROUTED CONCEALED IN MILLWORK.
9. FLUSH FLOOR OUTLETS WITH BRASS COVERS FOR METAL DETECTORS AND X-RAY MACHINES. VERIFY LOCATIONS PRIOR TO ROUGH-IN. IN-FLOOR BOXES SHALL BE RATED FOR INSTALLATION IN SLAB ON GRADE.

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
3									
2									
1									
0									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

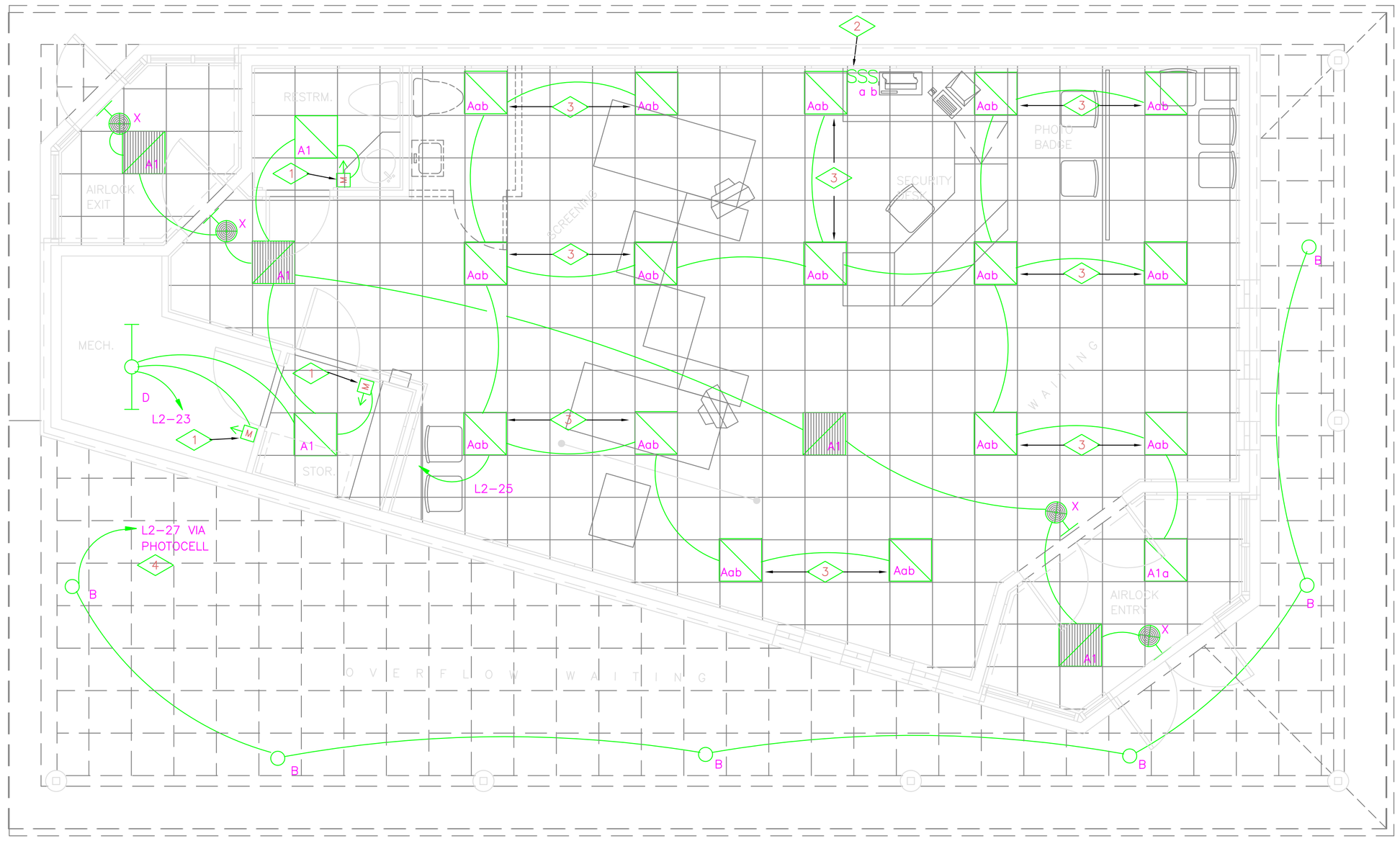
RAYLEIGH ROAD MODIFICATIONS

VISITOR CENTER POWER PLAN

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN:	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER:
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER:	COST CENTER NUMBER:
ELECTRONIC FILE:		FILE NUMBER: P03031

SHEET NUMBER: E005 of 11



1 LIGHTING PLAN

1/4" = 1'-0" (1/4" = 304.8 mm)

0 4 FT 8 FT

0 1.22 M 2.44 M

GENERAL NOTES THIS SHEET

1. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF LIGHT FIXTURES AND FOR ADDITIONAL CEILING INFORMATION.
2. FIXTURES SHOWN SHADED SHALL HAVE A 2-LAMP BALLAST CONNECTED TO THE NORMAL CIRCUIT THAT IS INDICATED IN PARENTHESIS AHEAD OF ANY SWITCHING AND SHALL BE EQUIPPED WITH EMERGENCY BALLAST/BATTERY UNIT TO OPERATE TWO LAMPS UPON FAILURE OF NORMAL POWER. EMERGENCY UNIT SHALL BE BODINE B30.
3. CONNECT EXIT LIGHTS TO NORMAL CIRCUIT FOR THE AREA AHEAD OF ANY LOCAL SWITCHING.
4. PROVIDE DUAL LEVEL SWITCHING FOR TYPE "A" FIXTURES. THE TWO LAMP BALLAST IN EACH FIXTURE SHALL CONTROL ONE LAMP IN EACH FIXTURE AND ONE LAMP IN THE ADJACENT FIXTURE.

DETAIL NOTES THIS SHEET

1. PROVIDE PASSIVE INFRARED MOTION DETECTOR FOR CONTROL OF LIGHT FIXTURES IN THIS ROOM. UNIT SHALL BE WATT STOPPER #WA-200 AUTOMATIC WALL SWITCH OR APPROVED EQUAL.
2. PROVIDE MANUAL SWITCH FOR FOUR TYPE "BB" POLE LIGHTS IN EXTERIOR TRUCK INSPECTION AREA.
3. PROVIDE DUAL-LEVEL SWITCHING FOR THIS PAIR OF TYPE "A" FIXTURES. THE TWO-LAMP BALLAST IN EACH FIXTURE SHALL CONTROL ONE LAMP IN EACH FIXTURE.
4. PROVIDE PHOTOCELL ON ROOF OR NORTH WALL OF VISITORS CENTER FOR CONTROL OF EXTERIOR SOFFIT LIGHTING CIRCUIT.

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

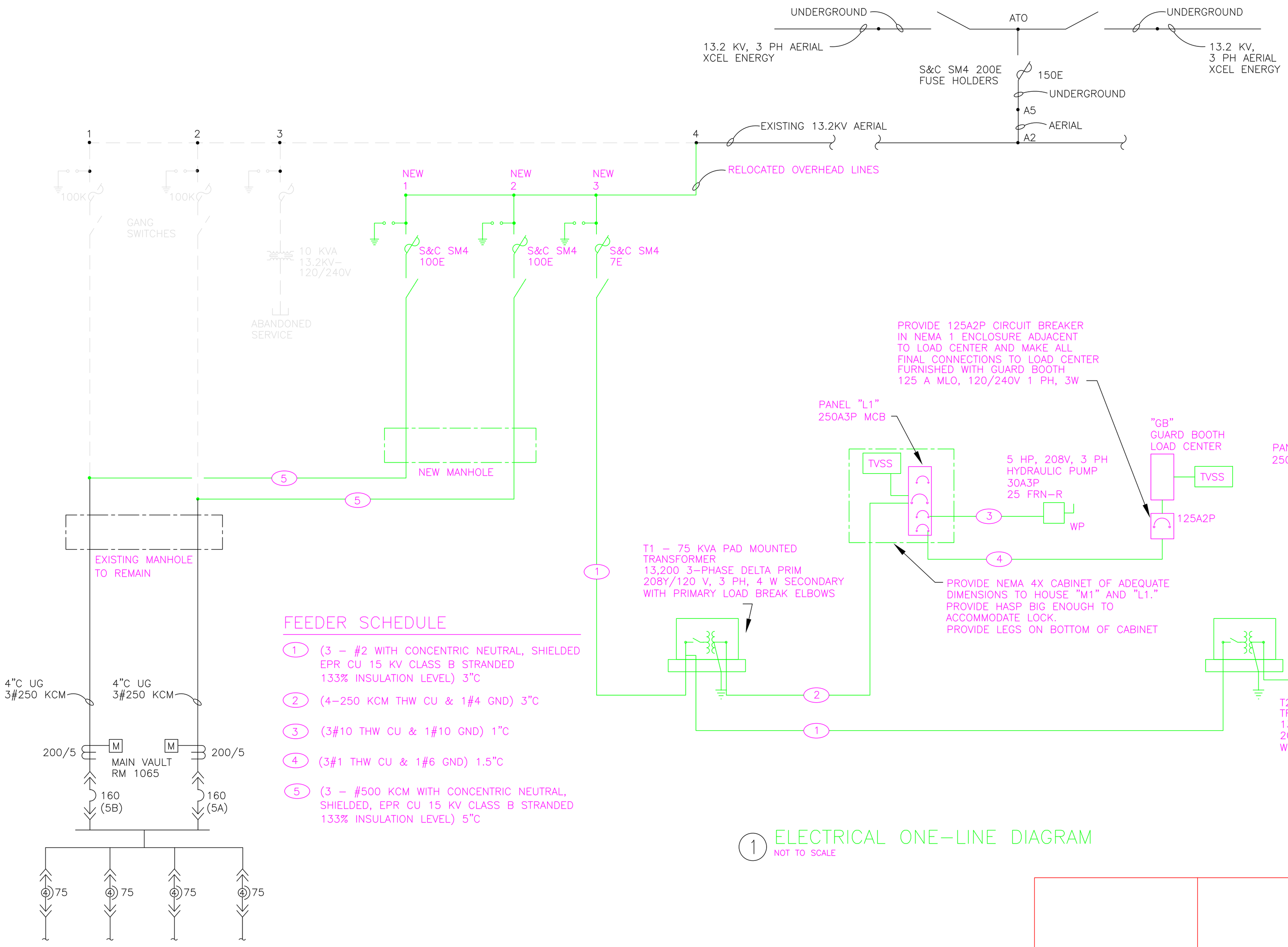
RAYLEIGH ROAD MODIFICATIONS

VISITOR CENTER POWER PLAN

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN:	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER:
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER:	COST CENTER NUMBER:
ELECTRONIC FILE:		FILE NUMBER: P03031

SHEET NUMBER: E006 OF 11



GENERAL NOTES THIS SHEET

1. EXISTING CONDITIONS SHOWN ARE ONLY AS ACCURATE AS COULD BE DETERMINED FROM FIELD SURVEYS AND REVIEW OF EXISTING DRAWINGS. FIELD VERIFY ALL CONDITIONS SHOWN.
2. EQUIPMENT SHOWN IN DASHED LIGHT LINES IS EXISTING TO BE REMOVED.
3. EQUIPMENT SHOWN IN CONTINUOUS LIGHT LINES IS EXISTING TO REMAIN.
4. EQUIPMENT SHOWN IN HEAVY LINES IS NEW.
5. PROVIDE A SEPARATE INSULATED EQUIPMENT GROUNDING CONDUCTOR IN EACH NEW FEEDER.

FEEDER SCHEDULE

1. (3 – #2 WITH CONCENTRIC NEUTRAL, SHIELDED EPR CU 15 KV CLASS B STRANDED 133% INSULATION LEVEL) 3"C
2. (4–250 KCM THW CU & 1#4 GND) 3"C
3. (3#10 THW CU & 1#10 GND) 1"C
4. (3#1 THW CU & 1#6 GND) 1.5"C
5. (3 – #500 KCM WITH CONCENTRIC NEUTRAL, SHIELDED, EPR CU 15 KV CLASS B STRANDED 133% INSULATION LEVEL) 5"C

1 ELECTRICAL ONE–LINE DIAGRAM

NOT TO SCALE

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305–3328

RAYLEIGH ROAD MODIFICATIONS

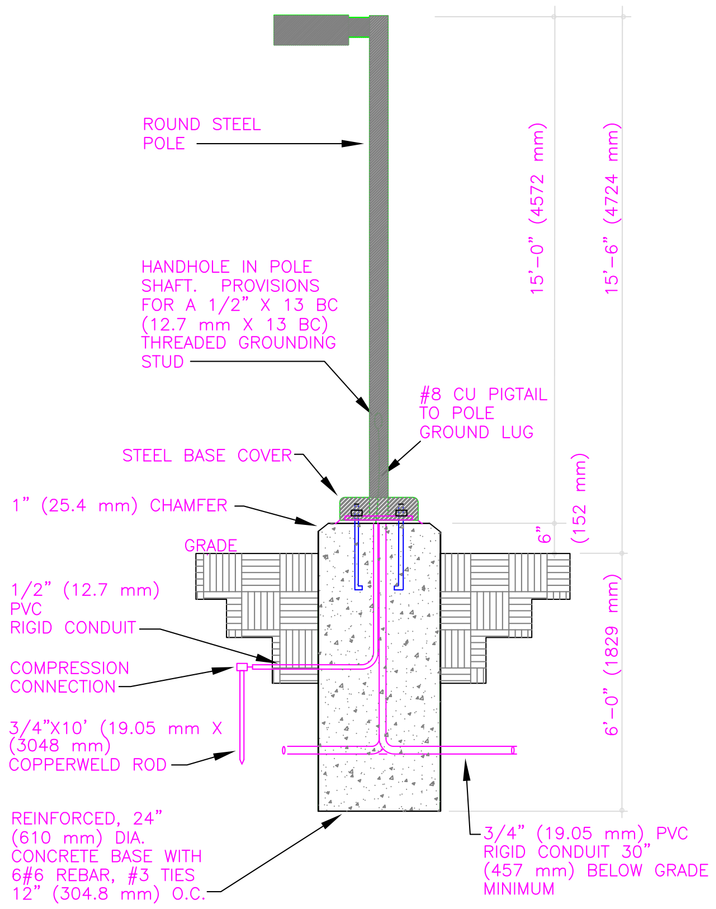
ELECTRICAL ONE–LINE DIAGRAM

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER	COST CENTER NUMBER
ELECTRONIC FILE		

FILE NUMBER: P03031

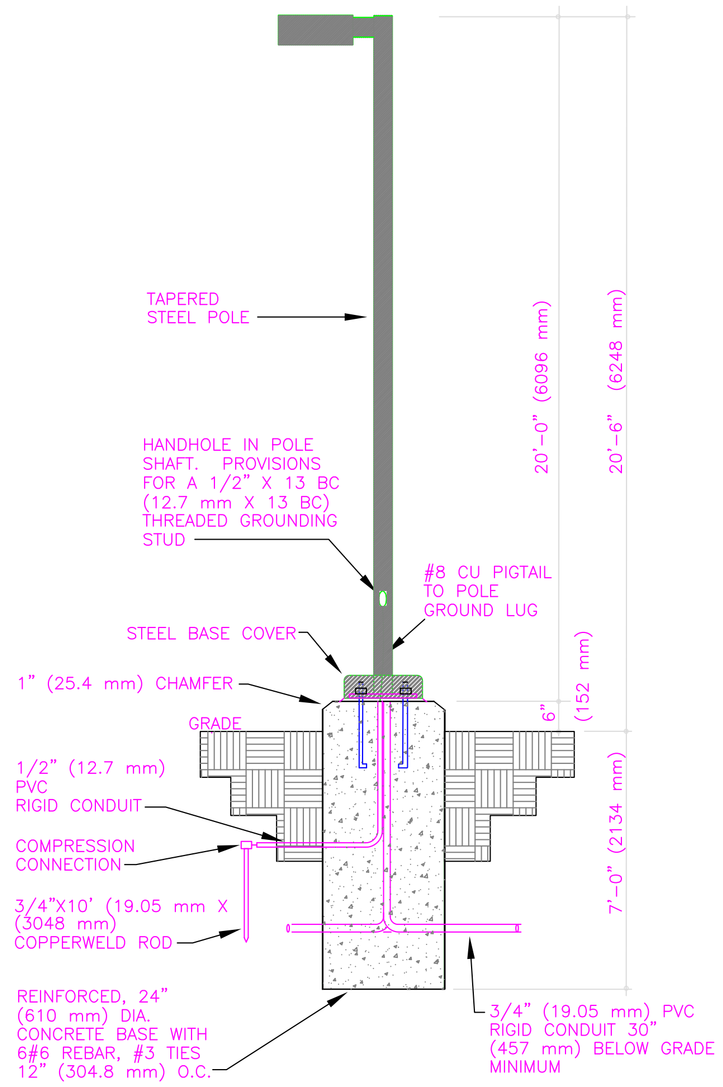
SHEET NUMBER: E007 of 11



3 ELEVATION – TYPE "CC" FIXTURE

NOT TO SCALE

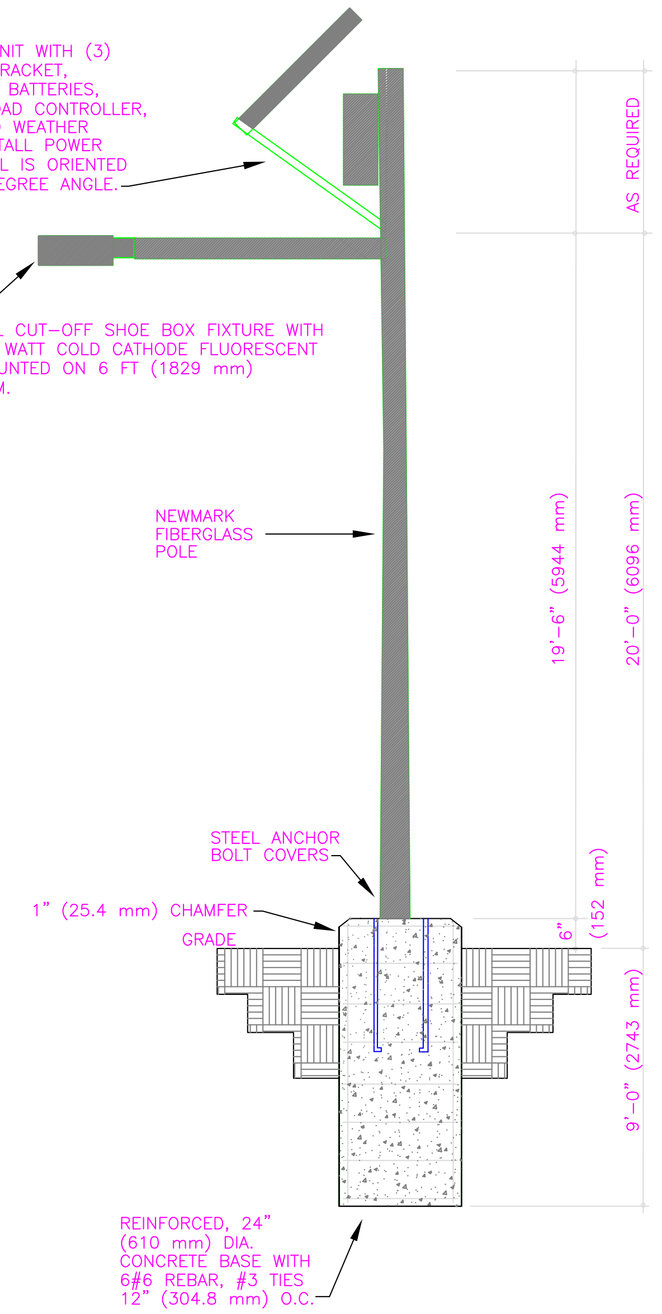
REINFORCED CONCRETE POLE BASES BY GENERAL CONTRACTOR. POLE/LUMINAIRE ASSEMBLY SHALL BE RATED FOR 90 MPH (144.8 KM/HR) CONTINUOUS WIND WITH 0.3 GUST FACTOR



2 ELEVATION – TYPE "BB" FIXTURE

NOT TO SCALE

REINFORCED CONCRETE POLE BASES BY GENERAL CONTRACTOR. POLE/LUMINAIRE ASSEMBLY SHALL BE RATED FOR 90 MPH (144.8 KM/HR) CONTINUOUS WIND WITH 0.3 GUST FACTOR



1 ELEVATION – TYPE "AA" FIXTURE

NOT TO SCALE

REINFORCED CONCRETE POLE BASES BY GENERAL CONTRACTOR. POLE /LUMINAIRE/BATTERY/SOLAR PANEL ASSEMBLY SHALL BE RATED FOR 90 MPH (144.8 KM/HR) CONTINUOUS WIND WITH 0.3 GUST FACTOR

FIXTURE SCHEDULE

KEY	LAMP	DESCRIPTION	MOUNTING	MANUFACTURER	CATALOG NUMBER	VOLT
A	2-F40BX	2'X2' (610 mm X 610 mm) TROFFER WITH 3X4 CELL SPECULAR PARABOLIC LOUVER – WIRE WITH ADJACENT FIXTURE FOR DUAL LEVEL SWITCHING	RECESSED GRID CEILING	COLUMBIA	HC22-240TTG-LS34-DUAL LEVEL SWITCHED	120
A1	2-F40BX	2'X2' (610 mm X 610 mm) TROFFER WITH 3X4 CELL SPECULAR PARABOLIC LOUVER	RECESSED GRID CEILING	COLUMBIA	HC22-240TTG-LS34	120
B	PL-T 26W	7" (178 mm) DIA FLUORESCENT DOWNLIGHT WITH COLD TEMPERATURE BALLAST, DAMP LOCATION LABEL AND FRESNEL LENS	RECESSED GYPBOARD SOFFIT	LITHONIA	LGVF-26TRT-7RW-T73	120
X	LED FURNISHED WITH UNIT	EXIT SIGN WITH ALUMINUM HOUSING AND SELF-CONTAINED BATTERY BACK-UP WITH SELF-DIAGNOSTICS	VARIES	DUAL-LITE	SESGWEI	120
AA	42CCFL	SOLAR POWERED, COLD CATHODE FLUORESCENT FIXTURE WITH CUT-OFF OPTICS, SOLAR PANELS MOUNTED ON POLE WITH BATTERY PACK AND ELECTRONICS (PROVIDE COMPLETE PACKAGE, INCLUDING TAPERED FIBERGLASS POLE)	POLE MOUNTED SEE DETAIL	SOLAR OUTDOOR LIGHTING, INC. (SOL)	SEE POLE DETAIL FOR CATALOG NUMBERS	
BB	250MH	ROUND, POLE MOUNTED FIXTURE WITH TYPE 3 OPTICS AND HOUSE SIDE SHIELD	POLE SEE DETAIL	KIM LIGHTING	CC21-3-250MH-208V-HS 20 FT (6096 mm) TAPERED ROUND STEEL POLE	208
CC	100MH	ROUND, POLE MOUNTED FIXTURE WITH TYPE 2 OPTICS	POLE SEE DETAIL	KIM LIGHTING	CC17-2-100MH-208V-HS 15 FT (4572 mm) STRAIGHT ROUND STEEL POLE	208

ABBREVIATIONS

ABBREVIATIONS	
A	AMPERE
ABV	ABOVE
AC	ABOVE COUNTER
ADA	AMERICANS WITH DISABILITIES ACT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINAL GRADE
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
AMP	AMPERE
ARCH	ARCHITECT
AWG	AMERICAN WIRE GAUGE
BLDG	BUILDING
BKR	BREAKER
C	CONDUIT
CAT	CATALOG
CCT	CIRCUIT
CLG	CEILING
COTR	CONTRACTING OFFICER'S TECHNICAL REPRESENTATIVE
CT	CURRENT TRANSFORMER
CU	COPPER
D	DEEP
DIA	DIAMETER
DISC	DISCONNECT
DN	DOWN
DOWNLT	DOWNLIGHT
E	EAST
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EM	EMERGENCY
EMT	ELECTRIC METALLIC TUBING
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
EXIST	EXISTING
FA	FIRE ALARM
FC	FOOTCANDLE
FIXT	FIXTURE
FLA	FULL LOAD AMPERE
FLUOR	FLUORESCENT
G	GROUND
GC	GENERAL CONTRACTOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
H	HIGH
HVAC	HEATING/VENTILATING/ AIR CONDITIONING
HWH	HOT WATER HEATER
Ilt	LET THROUGH CURRENT (IN SYMMETRICAL AMPERES)
Isc	SHORT CIRCUIT CURRENT (IN SYMMETRICAL AMPERES)
J-BOX	JUNCTION BOX
KVA	KILOVOLT-AMPERE
KW	KILOWATT
LT	LIGHT
LTG	LIGHTING
LUM	LUMEN
MC	MECHANICAL CONTRACTOR
MCA	MINIMUM CIRCUIT AMPACITY
MCB	MAIN CIRCUIT BREAKER
MECH	MECHANICAL
MFA	MAXIMUM FUSE AMPERES
MISC	MISCELLANEOUS
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MNT	MOUNT
MFR	MANUFACTURER
N	NORTH
NO	NUMBER
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
P	POLE
PH	PHASE
PM	PLUGMOLD
PNL	PANEL
PVC	POLYVINYL CHLORIDE CONDUIT
REC	RECESSED
RECEPT	RECEPTACLE
RLA	RUNNING LOAD AMPERE
RM	ROOM
RGS	RIGID STEEL CONDUIT
S	SOUTH
SEC	SECURITY
SHT	SHEET
SPEC	SPECIFICATION
SQ	SQUARE
SS	SS
STD	STANDARD
SYST	SYSTEM
TELE	TELEPHONE
TERM	TERMINAL
TRANS	TRANSFORMER
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
UL	UNDERWRITERS LABORATORIES
U.O.N.	UNLESS OTHERWISE NOTED
V	VOLT
W	WEST, WIRE, OR WIDTH (CONTEXT DEPENDENT)
W/	WITH
W/O	WITHOUT
WM	WIREMOLD
WP	WEATHERPROOF

ELECTRICAL LEGEND

- DUPLEX RECEPTACLE; WALL
- DOUBLE DUPLEX RECEPTACLE; WALL
- SPECIAL PURPOSE RECEPTACLE; WALL
- DUPLEX RECEPTACLE; FLOOR
- DATA OUTLET; FLOOR
- DATA OUTLET; WALL
- TELEPHONE OUTLET; WALL
- CIRCUIT BREAKER PANELBOARD
- MOTOR
- TRANSFORMER
- CONTACTOR
- DISCONNECT SWITCH
- JUNCTION BOX
- METER
- MULTI-OUTLET, 2-COMPARTMENT RACEWAY SYSTEM, RECESSED IN WALL
- TELEPHONE BOARD
- RECESSED LIGHT FIXTURE
- SURFACE LIGHT FIXTURE
- FLUORESCENT STRIP LIGHT
- WALL MOUNTED LIGHT FIXTURE
- RECESSED DOWNLIGHT
- EXIT SIGN, ARROWS AS INDICATED
- TWIN HEAD BATTERY LIGHT
- POLE MOUNTED LIGHT
- POLE MOUNTED LIGHT
- S_{TO} THERMAL OVERLOAD SWITCH
- S SINGLE POLE SWITCH
- S_3 THREE-WAY SWITCH
- S_K KEY OPERATED SWITCH
- a LOWER CASE TEXT INDICATES SWITCHING
- PASSIVE INFRARED MOTION DETECTOR
- CIRCUIT HOMERUN (ARROWS INDICATE NO. OF CIRCUITS)
- CIRCUIT RUN; CONCEALED IN WALLS OR CEILING
- CIRCUIT RUN; UNDERGROUND OR IN FLOOR
- CIRCUIT RUN; EXPOSED
- CONDUIT UP
- CONDUIT DOWN
- FUSED DISCONNECT; DIAGRAMMATIC
- GROUND CONNECTION; DIAGRAMMATIC
- CIRCUIT BREAKER; DIAGRAMMATIC
- CURRENT TRANSFORMER; DIAGRAMMATIC
- INDICATES MECHANICAL EQUIPMENT
- INDICATES DETAIL NOTE
- CABLE TRAY
- FEEDER/WIRING IDENTIFIER SYMBOL
- PUSHBUTTON CONTROLLER
- AG AUTOMATIC GATE
- CR CARD READER
- EP EMERGENCY PHONE
- VD VEHICLE DETECTOR

frankie friend & Associates, Inc.

REVISION	DESCRIPTION	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

RAYLEIGH ROAD MODIFICATIONS

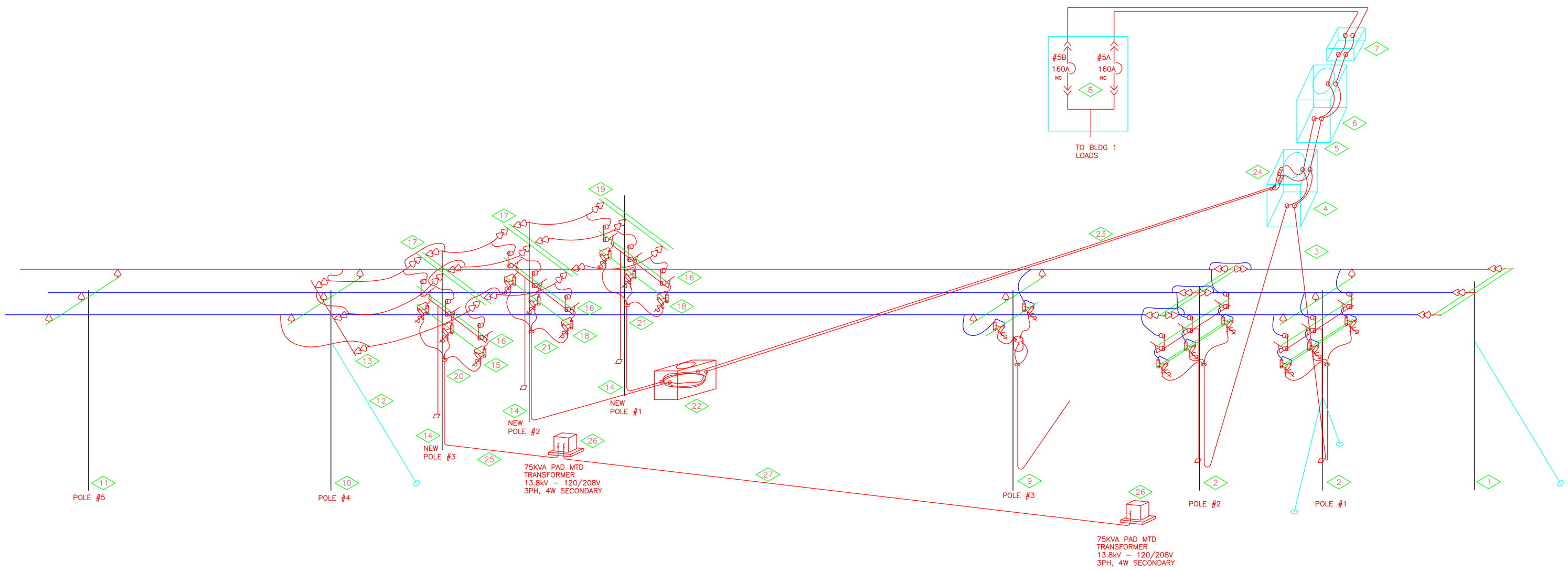
ELECTRICAL SCHEDULES AND DETAILS

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	

DATE	WORK ORDER NUMBER	COST CENTER NUMBER	FILE NUMBER	SHEET NUMBER
5/14/04			P03031	E008 of 11

ELECTRONIC FILE



1 15 KV DISTRIBUTION DIAGRAM
NO SCALE

DETAIL NOTES THIS SHEET

1. EXISTING DEAD END GUY POLE TO BE REMOVED.
2. EXISTING CLASS II SERVICE POLE WITH POLE ORIENTED GANG DISCONNECTS, FUSED CUTOUTS AND LIGHTNING ARRESTORS TO BE REMOVED.
3. EXISTING (3–250 KCMIL 15 KV)4" (102 mm) GRC IN CONCRETE DUCT BANK. FEEDERS SHALL BE ISOLATED ONE AT A TIME BETWEEN SERVICE POLE AND BUILDING 1 MAIN DISTRIBUTION SWITCHGEAR MAIN BREAKER FOR SPLICING AT MANHOLE TO NEW UNDERGROUND FEEDERS. AFTER BOTH FEEDERS TO BUILDING 1 HAVE BEEN SPLICED TO NEW UNDERGROUND FEEDERS, CONDUCTORS FROM POLE SHALL BE REMOVED. CONCRETE DUCT BANK TO POLES SHALL BE REMOVED AS REQUIRED DURING CONSTRUCTION OF VISITOR'S CENTER.
4. EXISTING MANHOLE TO REMAIN. CONTRACTOR SHALL CUT EXISTING 15 KV CONDUCTORS AT SOUTH END OF MANHOLE TO ALLOW MAXIMUM CONDUCTOR LENGTH FOR NEW IN–LINE SPLICE. CONTRACTOR SHALL INSTALL O.Z./GEDNEY TYPE CSBI BLANK SEALING BUSHINGS IN ABANDONED 4" (102 mm) CONDUITS IN SOUTH WALL OF MANHOLE.
5. EXISTING 15 KV CONCRETE DUCT BANK TO REMAIN.
6. EXISTING MANHOLE TO REMAIN.
7. EXISTING PULL BOX IN ROOM 1065 TO REMAIN.
8. EXISTING 160 AMP MAIN DISTRIBUTION SWITCHBOARD TO REMAIN. MAIN DRAWOUT BREAKERS ARE NORMALLY CLOSED AND SHARE DISTRIBUTION LOAD EQUALLY. CONTRACTOR SHALL COORDINATE OPERATION OF BREAKERS TO ISOLATE INCOMING FEEDERS ONE AT A TIME FOR SPLICING AND HYPOT TESTING. HYPOT TEST SHALL REQUIRE INCOMING FEEDERS TO BE DISCONNECTED FROM SWITCHGEAR. CONTRACTOR SHALL RECONNECT CONDUCTORS TO SWITCHGEAR ONLY AFTER SUCCESSFUL HYPOT TEST.
9. EXISTING SERVICE POLE AND TRANSFORMER TO BE REMOVED. CONTRACTOR SHALL VERIFY LIMITS OF UNDERGROUND FEEDER AND REMOVE AS REQUIRED FOR NEW CONSTRUCTION.
10. EXISTING INTERMEDIATE POLE TO REMAIN. CONTRACTOR SHALL RECONFIGURE POLE FOR DEAD END GUY POLE AND BUCK ARM FOR SLACK SPAN TO NEW POLES.
11. EXISTING INTERMEDIATE POLE TO REMAIN.
12. NEW DEAD END GUY. CONTRACTOR SHALL INSTALL EQUIPMENT AND ANCHOR IN ACCORDANCE WITH APPLICABLE LOCAL AND INDUSTRY STANDARDS, LOCAL WIND LOADING AND SOIL CONDITIONS.
13. NEW BUCK ARM WITH 15 KV SLACK SPAN INSULATORS. CONTRACTOR SHALL ATTACH T–TAPS TO EXISTING CONDUCTORS ONLY AFTER NEW OVERHEAD AND UNDERGROUND WORK HAS BEEN COMPLETED AND ONE NEW FEEDER HAS BEEN CONNECTED TO SWITCHGEAR IN BUILDING 1.
14. NEW 45 FT. (13.716 M) CLASS II SERVICE POLE CONFIGURED FOR SLACK SPAN CONNECTION. PROVIDE #6 BARE COPPER GROUND WIRE COIL AT BUTT OF POLE AND EXTEND UP POLE TO EQUIPMENT CROSS ARMS.
15. CROSS ARM WITH 3 HUBBELL/CHANCE #C71FN212LBM COMBINATION LIGHTNING ARRESTORS AND HOOK STICK OPERATED FUSED CUTOUTS AND S&C 7E SM4 FUSES. PROVIDE AND INSTALL 17.5 KV RAYCHEM #TFTO4122EG ELASTOMERIC OUTDOOR CABLE TERMINATION FOR SINGLE CORE CABLES.
16. PROVIDE S&C OMNI–RUPTOR 14.4 KV VERTICAL MOUNTED ON FIBERGLASS–REINFORCED PULTRUDED STRUCTURAL TUBE WITH POLYURETHANE COATING. SWITCH SHALL BE ISOLATED FROM MOUNTING FRAME BY S&C CYPOXY INSULATORS. SWITCH OPERATING MECHANISM SHALL BE FACTORY ADJUSTED FOR CLOSE THREE–PHASE SWITCHING SIMULTANEITY BY VERTICAL OPERATING SHAFT.
17. SLACK SPAN CROSSARM ASSEMBLY WITH 15 KV ISOLATORS.
18. CROSS ARM WITH 3 HUBBELL/CHANCE #C71FN212LBM COMBINATION LIGHTNING ARRESTORS AND HOOK STICK FUSED CUTOUTS AND S&C 100K SM4 FUSES. PROVIDE 36 KV RAYCHEM #TFTO–6152 ELASTOMERIC OUTDOOR CABLE TERMINATION FOR SINGLE CORE CABLES.
19. DEAD END SLACK SPAN CROSS ARM ASSEMBLY WITH 15 KV ISOLATORS.
20. 3" (76 mm) GALVANIZED RIGID CONDUIT (GRC) WITH O.Z./GEDNEY #CRC–300 COMPOUND TYPE CABLE TERMINATOR FOR 3#2 COPPER SHIELDED EPR 15 KV CONDUCTORS.
21. 5" (127 mm) (GRC) WITH O.Z./GEDNEY #CRC–500 COMPOUND TYPE CABLE TERMINATOR FOR 3–500 KCMIL COPPER SHIELDED EPR 15 KV CONDUCTORS WITH CONCENTRIC NEUTRAL.
22. 10 FT. LONG X 8 FT. WIDE X 6 FT. DEEP (3048 mm X 2438 mm X 1829 mm) CONCRETE MANHOLE. CONTRACTOR SHALL PROVIDE VERTICAL CABLE RACKS ON ALL FOUR SIDES OF MANHOLE AND SHALL PROVIDE ONE COMPLETE LOOP OF CONDUCTOR INSIDE MANHOLE BEFORE EXITING AT OPPOSITE END. CONDUCTORS SHALL BE SUPPORTED ON CABLE RACKS WITH SUITABLE TIE WRAPS. CONTRACTOR SHALL INSTALL O.Z./GEDNEY CSBI–500P–1 CONDUIT SEALING BUSHING IN EACH CONDUIT ENTERING AND EXITING MANHOLE. CONTRACTOR SHALL SEAL CONDUIT ENTRY AND EXIT PENETRATIONS WATER TIGHT.
23. CONTRACTOR SHALL INSTALL TWO (2) 5" (127 mm) GRC CONDUITS IN CONCRETE DUCT BANK BETWEEN MANHOLES.
24. RAYCHEM #HVS1523S 15 KV IN–LINE SPLICE AND BURNDY #YS34–T COMPRESSION SPLICE FOR 500 KCMIL EPR COPPER SHIELDED CONDUCTORS. SPLICE KITS SHALL BE SECURED TO MANHOLE SUPPORT RACK. PROVIDE O.Z./GEDNEY CSBI–500P–1 CONDUIT SEALS FOR CONDUITS ENTERING MANHOLE. SEAL CONDUIT ENTRY PENETRATIONS WATER TIGHT.
25. CONTRACTOR SHALL INSTALL 3" (76 mm) GRS BURIED CONDUIT FROM POLE TO 75 KVA TRANSFORMER.
26. NEW 75 KVA PAD–MOUNTED TRANSFORMER, 13.8 KV–208Y/120V, 3 PH, 4 W SECONDARY WITH OIL IMMERSED PRIMARY FUSES AND LOAD BREAK ELBOWS.
27. CONTRACTOR SHALL INSTALL 3" (76 mm) GRS BURIED CONDUIT BETWEEN 75 KVA TRANSFORMERS.

GENERAL NOTES THIS SHEET

1. 15 KV WORK SHALL BE SEQUENCED SO AS TO MINIMIZE DURATION OF OUTAGES. OUTAGES SHALL BE SCHEDULED WITH OWNER A MINIMUM OF 7 DAYS IN ADVANCE. NEW OVERHEAD AND UNDERGROUND DUCT BANK FEEDERS SHALL BE INSTALLED TO EXISTING MANHOLE, SPLICED, HYPOT TESTED AND PUT INTO SERVICE PRIOR TO REMOVAL OF EXISTING OVERHEAD DISTRIBUTION FROM POLE #4 EAST TO POLE #1.
2. UNDERGROUND SERVICE WORK TO HYDRAULIC GATE, GUARD–HOUSE AND VISITOR'S CENTER SHALL BE SEQUENCED AS CONSTRUCTION ALLOWS.
3. POLES, POLE LINE HARDWARE, EQUIPMENT, CONDUCTORS AND TRANSFORMERS REMOVED DURING DEMOLITION SHALL REMAIN THE PROPERTY OF THE OWNER AND SHALL BE STORED AS DIRECTED BY THE OWNER.
4. ALL HIGH VOLTAGE WORK SHALL BE PERFORMED BY ELECTRICAL CONTRACTING FIRMS WITH A MINIMUM OF FIVE YEARS EXPERIENCE IN HIGH VOLTAGE DISTRIBUTION. ALL CABLE SPLICERS SHALL HAVE A MINIMUM OF FIVE YEARS EXPERIENCE IN SPLICING AND TERMINATING CABLES OF THE TYPE AND RATING TO BE USED.

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305–3328

RAYLEIGH ROAD MODIFICATIONS

ELECTRICAL 15 KV DISTRIBUTION DIAGRAM

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN:	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER:
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	

DATE	WORK ORDER NUMBER	COST CENTER NUMBER	FILE NUMBER	SHEET NUMBER
5/14/04			P03031	E009 of 11

ELECTRONIC FILE

PANEL: L1 RATING: 250 AMP MCB, 208Y/120 VOLT, 3 PH, 4 W
AIC: 10,000 SURFACE NEMA 3R

DESCRIPTION	REC	VA	BKR	#	#	BKR	VA	REC	DESCRIPTION
5 HP HYDR PUMP		2004	30/3	1	2	100/3			TVSS
/		2004	/	3	4	/			/
/		2004	/	5	6	/			/
BARRIER HEATER		2000	30	7	8	20			SPARE
BARRIER HEATER		2000	30	9	10	20			SPARE
TANK HEATER		1200	20	11	12	20			SPARE
CONTROL PANEL		500	20	13	14				SPACE
GFI RECEPT	1	180	20	15	16				SPACE
SPARE			20	17	18				SPACE
SPARE			20	19	20				SPACE
SPARE			20	21	22				SPACE
SPARE			20	23	24				SPACE
SPACE				25	26				SPACE
SPACE				27	28	125/2	5000		GUARD BOOTH PNL
SPACE				29	30	/	5000		/

LOAD	CONNECTED KVA	NEC DEMAND FACTOR (%)	DEMAND KVA
LIGHTING	1.00	125	1.25
RECEPT (UNDER 10 KW)	0.90	100	0.90
RECEPT (OVER 10 KW)	0.00	50	0.00
LARGEST MOTOR	6.01	125	7.52
OTHER MOTORS	3.00	100	3.00
MISCELLANEOUS	7.20	100	7.20
		TOTAL KVA	19.87
		TOTAL AMP	55.18

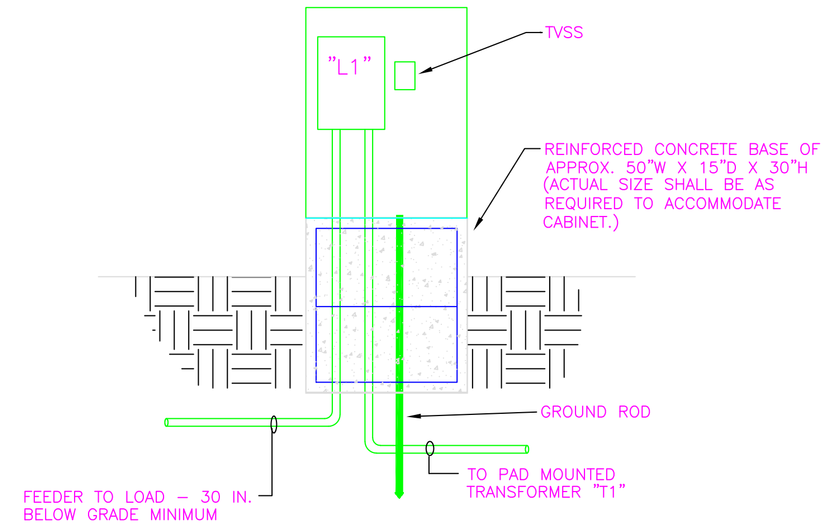
CONNECTED LOAD PER PHASE	KVA	PHASE BALANCE	
A:	4.50	A/B	103.9%
B:	9.18	B/C	11.9%
C:	8.20	C/A	82.1%

PANEL: L2 RATING: 250 AMP MCB, 208Y/120 VOLT, 3 PH, 4 W
AIC: 10,000 SURFACE

DESCRIPTION	REC	VA	BKR	#	#	BKR	VA	REC	DESCRIPTION
CONDENSING UNIT		2760	40/3	1	2	20/2	180	1	EXTER GFI AT CU
/		2760	/	3	4	20	720	4	RECEPTACLE
/		2760	/	5	6	20	720	4	RECEPTACLE
FURNACE		1620	20	7	8	20	900	5	RECEPTACLE
WATER HEATER		1300	20	9	10	20	540	3	RECEPTACLE
MAINTENANCE REC	7	1260	20	11	12	20	540	3	RECEPTACLE
MAINT REC/EXH FA	6	1120	20	13	14	15/2	1000		ENTRY CAB HEATER
EXIT CAB HEATER		1000	15/2	15	16	/	1000		/
/		1000	/	17	18	20	540	3	REC - ARCADE
SCANNER/METAL DE		830	20	19	20	20	540	3	RECEPTACLE
SCANNER/2 METAL		860	20	21	22	20	720	4	RECEPTACLE
INTERIOR LTG		800	20	23	24	20	360	2	TTV" RECEPTACLE
INTERIOR LTG		800	20	25	26	20	360	2	TTV" RECEPTACLE
EXTER SOFFIT LTS		300	20	27	28	20			SPARE
SECURITY POLE LT		1300	20	29	30	20			SPARE
SPARE			20	31	32				SPACE
SPARE			20	33	34				SPACE
SPARE			20	35	36				SPACE
SPARE			20	37	100/3				TVSS
SPARE			20	39	/				/
SPARE			20	41	/				/

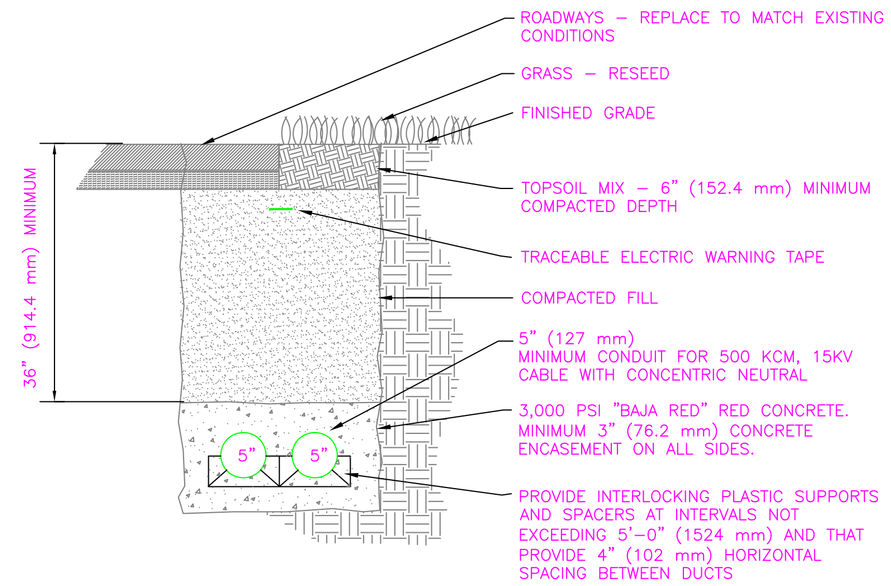
LOAD	CONNECTED KVA	NEC DEMAND FACTOR (%)	DEMAND KVA
LIGHTING	3.20	125	4.00
RECEPT (UNDER 10 KW)	8.06	100	8.06
RECEPT (OVER 10 KW)	0.00	50	0.00
LARGEST MOTOR	8.28	125	10.35
OTHER MOTORS	1.66	100	1.66
MISCELLANEOUS	6.99	100	6.99
		TOTAL KVA	31.06
		TOTAL AMP	86.28

CONNECTED LOAD PER PHASE	KVA	PHASE BALANCE	
A:	10.11	A/B	9.9%
B:	9.20	B/C	0.9%
C:	9.28	C/A	8.9%



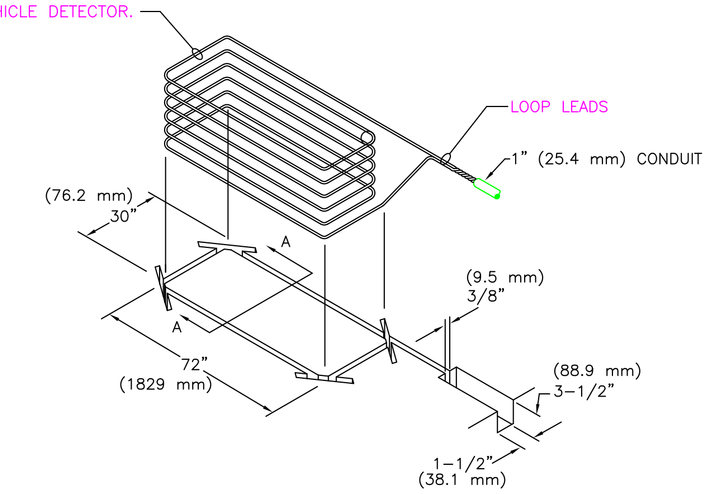
2 PANEL MOUNTING DETAIL
NOT TO SCALE

NOTE: COORDINATE LOCATION OF MOUNTING STRUCTURE WITH ARCHITECT PRIOR TO CONSTRUCTION.

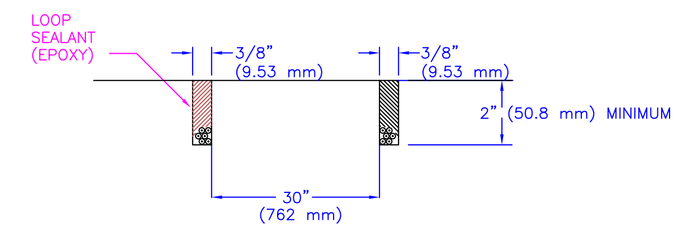


3 HIGH VOLTAGE ELECTRICAL DUCT BANK
NOT TO SCALE

ONE #14 AWG THWN STRANDED COPPER LOOP DETECTOR WIRE MANUFACTURED IN ACCORDANCE WITH IMSA SPECIFICATION NO. 51-5, LATEST REVISION; POLYVINYL CHLORIDE INSULATED, NYLON JACKETED, LOOSELY ENCASED IN A POLYVINYL CHLORIDE TUBE, 600V, BSCC CORPORATION PART NO. 931401C OR APPROVED EQUAL. VERIFY NUMBER OF TURNS IN LOOPS WITH MANUFACTURER OF VEHICLE DETECTOR.



CAUTION: DO NOT FRACTURE WIRE INSULATION. LOOPS SHORTED TO GROUND WILL CAUSE DETECTOR MALFUNCTION. WHEN PLACING WIRE IN THE SLOT, DO NOT USE SCREWDRIVER OR OTHER SHARP TOOLS. VERIFY ALL DIMENSIONS AND DEPTHS WITH MANUFACTURER OF VEHICLE DETECTOR. SAWCUTTING IS REQUIRED AT LOCATIONS WHERE PAVEMENT IS ALREADY POURED.



SECTION AA
WITH WIRE PLACEMENT

1 TYPICAL VEHICLE DETECTOR LOOP
NOT TO SCALE

frankie friend & Associates, Inc.

REVISION	DESCRIPTION	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

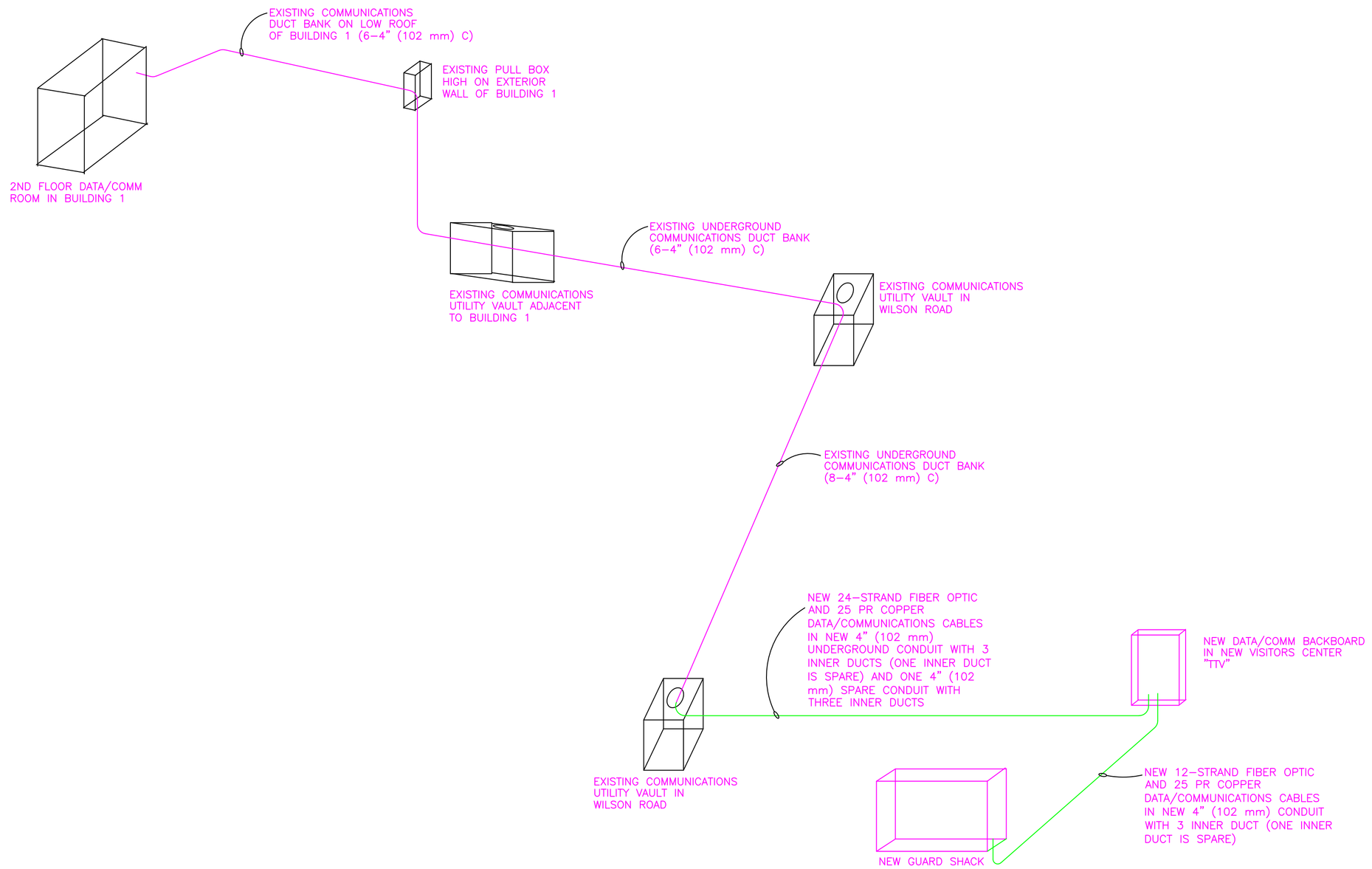
RAYLEIGH ROAD MODIFICATIONS

ELECTRICAL DETAILS

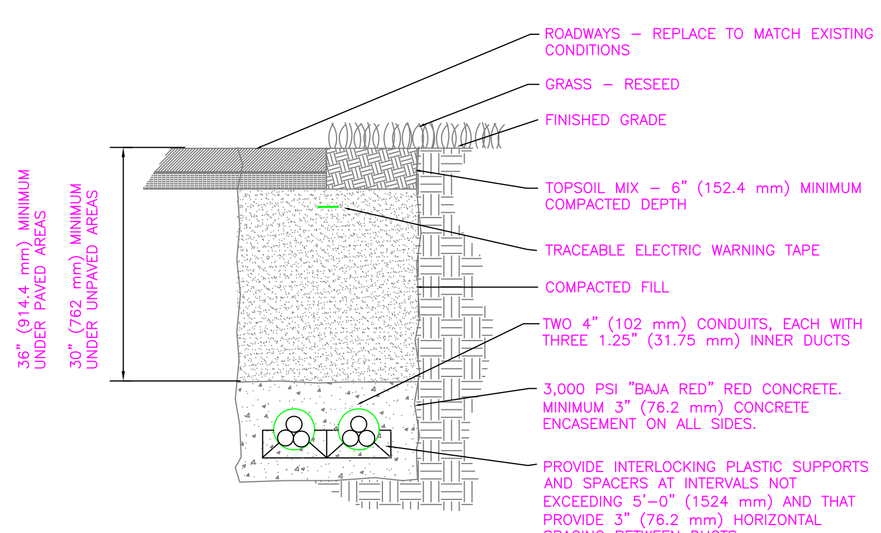
RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER	COST CENTER NUMBER
ELECTRONIC FILE		

FILE NUMBER: P03031
SHEET NUMBER: E010 of 11



1 DATA/COMMUNICATIONS ONE-LINE DIAGRAM
NO SCALE



2 DATA/COMMUNICATIONS DUCT BANK
NOT TO SCALE

GENERAL NOTES THIS SHEET

1. SCOPE OF WORK:

   PROVIDE THREE NEW INNER DUCTS IN ONE EXISTING 4" (102 mm) CONDUIT IN EXISTING COMMUNICATIONS DUCT BANK FROM DUCT ORIGINATION AT SECOND LEVEL, BUILDING 1 DATA COMMUNICATIONS ROOM TO SOUTHWEST MANHOLE ON WILSON ROAD.

   PROVIDE TWO NEW 4" (102mm) CONDUITS, EACH WITH THREE INNER DUCTS, FROM SOUTHWEST MANHOLE ON WILSON ROAD TO NEW VISITORS CENTER.

   PROVIDE ONE NEW 4" (102 mm) CONDUIT WITH THREE INNER DUCTS FROM NEW VISITORS CENTER TO NEW GUARD BOOTH.

   PROVIDE ONE NEW 24-FIBER FIBER OPTIC CABLE FROM EXISTING SECOND FLOOR DATA COMMUNICATIONS ROOM AT BUILDING 1 TO NEW TELEPHONE BACKBOARD AT NEW VISITORS CENTER. ROUTE IN ONE OF THE THREE NEW INNER DUCTS.

   PROVIDE ONE NEW 24 AWG, 25-PAIR COPPER TELEPHONE CABLE FROM EXISTING SECOND FLOOR DATA COMMUNICATIONS ROOM AT BUILDING 1 TO NEW TELEPHONE BACKBOARD AT NEW VISITORS CENTER. ROUTE IN THE SECOND OF THE THREE NEW INNER DUCTS.

   PROVIDE ONE NEW 12-FIBER FIBER OPTIC CABLE FROM NEW TELEPHONE TERMINAL AT NEW VISITORS CENTER TO NEW GUARD BOOTH. ROUTE IN ONE OF THE THREE INNER DUCTS.

   PROVIDE ONE NEW 24 AWG, 25 PAIR COPPER TELEPHONE CABLE FROM NEW TELEPHONE TERMINAL AT NEW VISITORS CENTER TO NEW GUARD BOOTH. ROUTE IN THE SECOND OF THE THREE NEW INNER DUCTS.

2. NEW INNER DUCT SHALL BE CARLON CORRUGATED, 1.25" (31.75 mm) DIAMETER HIGH DENSITY POLYETHYLENE (HDPE) CONDUIT. PULL THROUGH EXISTING AND NEW CONDUITS. PROVIDE PULL WIRE IN UNUSED INNER DUCT. AT MANHOLES, A SECTION OF INNER DUCT WHICH HAS AN INSIDE DIAMETER GREATER THAN THE OUTSIDE DIAMETER OF THE INNER DUCT IN THE CONDUIT SHALL BE SLID OVER THE INNER DUCT COMING FROM THE ENTRY AND EXIT INNER DUCTS BEFORE THE PULL-LINE IS INSTALLED. THE SECTION OF LARGER INNER DUCT MUST BE LONG ENOUGH TO REACH FROM THE ENTRY TO THE EXIT INNER DUCTS WHILE PASSING AROUND THE PERIPHERY OF THE MANHOLE WHERE IT WILL BE RACKED, PLUS AN ADDITIONAL 9 FEET (3 METERS) ON EACH END WHICH WILL BE INSIDE THE DUCT BANK AFTER RACKING.

   AFTER PLACEMENT, ALL INNER DUCT MUST BE CAPPED OR PLUGGED TO PREVENT MOISTURE OR FOREIGN MATTER FROM ENTERING UNTIL THE CABLE INSTALLATION STARTS.

3. NEW 24-FIBER FIBER OPTIC CABLE SHALL BE 62.5 MICRON, MULTI-MODE CORNING CABLE SYSTEMS "ALTOS ALL-DIELECTRIC" #24KW4-T4130A20 OR EQUIVALENT BY BERK-TEK OR .

4. NEW 12-FIBER FIBER OPTIC CABLE SHALL BE 62.5 MICRON, MULTI-MODE CORNING CABLE SYSTEMS "ALTOS ALL-DIELECTRIC" #12KW4-T4130A20 OR EQUIVALENT BY BERK-TEK OR .

5. NEW 24 AWG, 25-PAIR COPPER TELEPHONE CABLE SHALL BE SUPERIOR ESSEX "SEALPIC-FSF" (RUS PE-89) #09-097-02 OR APPROVED EQUAL BY GENERAL CABLE OR BELDEN.

6. PROVIDE PULL TAPE IN ALL EMPTY INNER DUCTS.

7. INSTALL AND TEST ALL CONDUIT, INNER DUCT AND CABLE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.

8. AT EXISTING SECOND FLOOR DATA/COMMUNICATIONS ROOM IN BUILDING 1, AT TELEPHONE BACKBOARD IN NEW VISITORS CENTER AND AT NEW GUARD BOOTH, PROVIDE SUFFICIENT COILED LENGTH OF NEW FIBER OPTIC AND TELEPHONE CABLES TO ALLOW TERMINATIONS BY OWNER. COORDINATE LENGTH REQUIRED WITH OWNER.

9. WHERE EXISTING 4" (102 mm) CONDUIT IN EXISTING DUCT BANKS ARE USED FOR NEW INNER DUCT AND CABLES, COORDINATE WHICH EXISTING EMPTY CONDUIT TO USE WITH OWNER.

10. EXISTING CONDITIONS SHOWN ARE ONLY AS ACCURATE AS COULD BE DETERMINED FROM FIELD SURVEYS AND REVIEW OF EXISTING DRAWINGS. FIELD VERIFY ALL CONDITIONS SHOWN.

REVISION	DESCRIPTON	BY	ENGR.	SAFETY	FIRE	MAINT.	CHECKER	USER	SUPV.
4									
3									
2									
1									

frankie friend & Associates, Inc.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
ENGINEERING, MAINTENANCE, SAFETY and SUPPORT
325 BROADWAY BOULDER, COLORADO 80305-3328

RAYLEIGH ROAD MODIFICATIONS

DATA/COMMUNICATIONS ONE-LINE DIAGRAM

RAYLEIGH ROAD VISITOR CENTER

DRAFTSMAN: CAC	CLIENT: EMSS	APPROVED BY EMSS DIVISION CHIEF: S. SALBER
DESIGN ENGINEER: MEF	ENGINEER TECHNICIAN	SUBMITTED BY ENGINEERING SUPERVISOR: B. FAKTOR
NIST SAFETY: S. RINGEN	CHECKER: T. CLEMANN	DESIGN LEADER
OPERATIONS: J. BOYD	CONSTRUCTION LEADER: R. FARBER	
DATE: 5/14/04	WORK ORDER NUMBER	COST CENTER NUMBER
ELECTRONIC FILE		

FILE NUMBER: P03031

SHEET NUMBER: E011 of 11