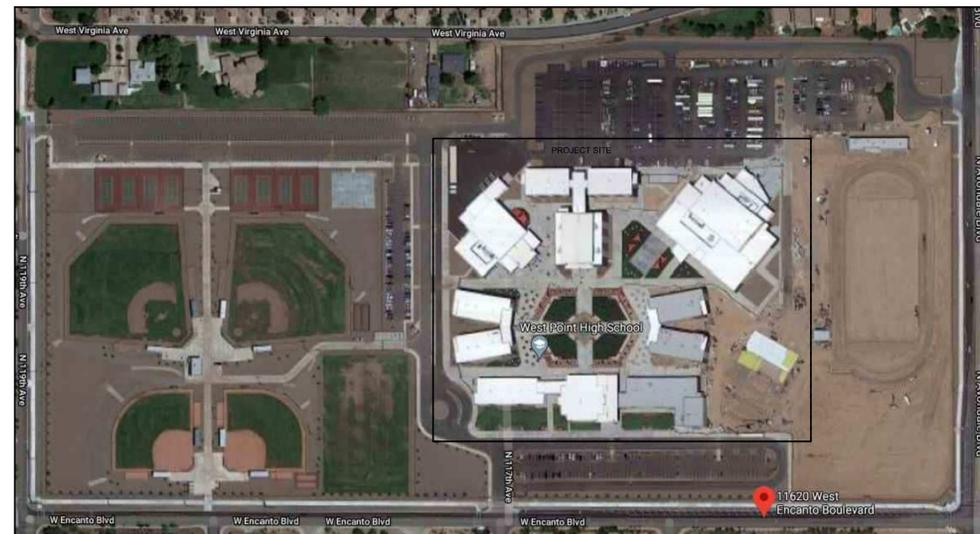


WEST POINT HIGH SCHOOL

CITY OF AVONDALE FIRE CODE EMERGENCY RADIO RESPONDER SYSTEM POLICY 510 COMPLIANCE

AVONDALE, AZ, 85392



1 PROJECT LOCATION
N.T.S.



OWNER	CONTRACTOR	PROJECT DESCRIPTION	SHEET LIST	ERRC DESIGN ENGINEER	ARCHITECT/ENGINEER
		<p>THE SCOPE OF WORK FOR THIS PROJECT INCLUDES:</p> <p>INITIAL TESTING AND EVALUATION OF THE BUILDING TO DETERMINE IF THE EMERGENCY PUBLIC SAFETY COMMUNICATION SYSTEM MEETS OR EXCEEDS THE REQUIREMENTS OF SECTION 510 WITHIN THE FIRE CODE OF THE AUTHORITY HAVING JURISDICTION.</p> <p>IF ANY PORTION OF THE BUILDING DOES NOT COMPLY, THESE DRAWINGS WILL INCLUDE THE DESIGN OF A BI-DIRECTIONAL AMPLIFIED ANTENNA SYSTEM TO ENHANCE THE EMERGENCY RADIO RESPONDER COMMUNICATION COVERAGE.</p> <p>ONCE SYSTEM IS INSTALLED THESE DRAWINGS WILL INCLUDE THE FINAL TEST RESULTS INDICATING THAT THE MINIMUM SIGNAL LEVELS HAVE BEEN MET.</p> <p>THESE PLANS SPECIFY AND DOCUMENT THE REQUIREMENTS OF THE ERRC SYSTEM AND ASSOCIATED TEST RESULTS. THESE DOCUMENTS HAVE BEEN PREPARED, CHECKED, SIGNED AND SEALED BY BRETT STEVEN LORENZEN, A PROFESSIONAL ELECTRICAL ENGINEER LICENSED IN THE STATE OF ARIZONA. THE SYSTEM IS FOUND TO BE COMPLIANT WITH THE REQUIREMENTS OF APPLICABLE FIRE CODE SECTION 510. SEE ACCOMPANIED CERTIFICATION OF COMPLIANCE.</p>	<p>E000 COVER SHEET E101 ERRC DISTRIBUTION PLAN E211 BUILDING 100 ERRC PLAN E231 BUILDING 300 & 800 FIRST FLOOR ERRC PLAN E232 BUILDING 300 & 800 SECOND FLOOR ERRC PLAN E241 BUILDING 400 ERRC PLAN - SOUTH E242 BUILDING 400 ERRC PLAN - NORTH E281 BUILDING 600 FIRST FLOOR ERRC PLAN E282 BUILDING 600 SECOND FLOOR ERRC PLAN E271 BUILDING 700 FIRST FLOOR ERRC PLAN E272 BUILDING 700 SECOND FLOOR ERRC PLAN E281 BUILDING 800 ERRC PLAN - NORTH EAST E282 BUILDING 800 ERRC PLAN - SOUTH WEST E301 BUILDING 1000 ERRC PLAN E311 BUILDING 1100 ERRC PLAN E411 RISER DIAGRAM E412 CUT-SHEETS E511 AVONDALE FIRE CODE SECTION 510 E512 SPECIFICATIONS SHEET 1 E513 SPECIFICATIONS SHEET 2</p>		

G. PENETRATIONS

- Coordinate sleeve selection and application with selection and application of fire-stopping specified in Division 07 section "Through-Penetration Firestop Systems."
- Roofs:
 - Coordinate all roof penetrations with Engineer, Owner, and as applicable, the roofing contractor providing a roof warranty.
 - Keep all raceway penetrations within mechanical equipment curbs wherever possible. Coordinate with Division 01.
 - Flash and counterflash all openings through roof, and/or provide pre-fabricated molded seals compatible with the roof construction installed, or as required by the Engineer, Owner, or roofing contractor. All roof penetrations shall be leaktight at the termination of the work and shall not void any new or existing roof warranties.

3. Walls and Floors:

- Steel Pipe Sleeves for Raceways and Cables: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends, and drip rings.
- Cast Iron Pipe Sleeves for Raceways and Cables: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052 [0.138] inch thickness and of length to suit application.

F. FIRESTOPPING

- Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to AHJ.
- Manufacturers:
 - Hilti
 - RectorSeal
 - Specified Technologies Inc
 - United States Gypsum Company
 - 3M corp.
- Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop system.
- Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications data for testing agency.

G. EQUIPMENT IDENTIFICATION

- Provide equipment identification nameplates:
 - Battery Cabinet
 - Amplification Cabinet
 - Antenna Address
 - Backbone Conduit
- Nameplates:
 - Engraved, contrasting color, three-layer, laminated plastic, indicating the name of the equipment, load, or circuit as designated on the drawings and in the specifications:
 - Self-adhering, with a permanent weatherproof adhesive.
- Nameplate Color:
 - Black background with white letters.
- Letter height:
 - 3/8-inch minimum.

H. ACCEPTANCE TESTING

- Perform acceptance test results as outlined in the

Phoenix Fire Code Section 510 using a radio frequency spectrum analyzer.

- Separate each building level into 80 equal sized areas.
 - Take at least one reading within each area.
 - Take at least one reading in all fully enclosed spaces.
 - Complete this for all building levels with or without installed ERRC System.
- Report test results to engineer for evaluation, documentation, and approval.
- Provide certificate of approval, engineered drawings, and test results to fire inspector upon system inspection

RACEWAYS

A. METALLIC CONDUIT AND TUBING

- Types:
 - Electrical Metallic Tubing, Couplings, and Fittings (EMT): ANSI C80.3, UL 797. Only steel products allowed. Reduced wall EMT is not allowed.
 - Flexible Metal Conduit (FMC): Zinc-coated steel or aluminum, UL 1. Reduced-wall FMC is not allowed.
 - Intermediate Metal Conduit (IMC): Hot-dip Galvanized Rigid Steel Conduit, ANSI C80.6, UL 1242.
 - Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket, UL 360; fittings: NEMA FB 1.
 - Hot-dip Galvanized Rigid Steel Conduit (GRS): ANSI C80.1, UL 6.
- Manufacturers:
 - Western Tube and Conduit
 - Wheatland Tube
 - Tyco International
 - Allied Tube and Conduit
 - Republic Raceway

RACEWAY INSTALLATION

A. GENERAL REQUIREMENTS

- Install raceways parallel and perpendicular to building lines.
- Install raceways to requirements of structure, other work on the project, and to clear all openings, depressions, pipes, ducts, reinforcing steel, and other immovable obstacles.
- Install raceways continuous between connections to outlets, boxes, and cabinets with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between connections. Use manufactured elbows for all 45- and 90-degree bends, unless approved by the Engineer in advance. Make other bends smooth and even and without flattening raceway or flaking galvanizing or enamel. Radii of bends shall be as long as possible and never shorter than the corresponding trade elbow.
- Securely fasten raceways in place with approved straps, hangers, and steel supports as required. Attach raceway supports to the building structure. Hang single raceways for feeders with supports spaced not more than 10 feet. Securely clamp vertical feeder raceways to structural steel members attached to structure. Install cable clamps for support of vertical feeders where required. Add raceway supports within 12 inches of all bends, on both sides of the bends.
- Do not support raceways from suspended ceiling components.
- Ream raceway ends, thoroughly clean raceways before installation, and keep clean after installation. Plug or cover openings and boxes as required to keep raceways clean during construction and fish all raceways clear of obstructions before pulling conductor wires.
- Provide raceways of ample size for pulling of wire, not smaller than code requirements and not less than 3/4-inch in size, unless indicated otherwise on Drawings.
- Protect all raceway installations against damage during construction. Repair all raceways damaged or moved

out of line after roughing-in to meet Engineer's approval without additional cost to the Owner.

- Align and install true and plumb all raceway terminations at panelboards, switchboards, motor control equipment, and junction boxes.
- Install approved expansion/deflection fittings where raceways pass through (if embedded) or across (if exposed) expansion joints.
- Install a pull wire in each empty raceway that is left for installation of conductors or cables under other divisions or contracts. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 24 inches of slack at each end of pull wire.

- Make all joints and connections in a manner that will ensure mechanical strength.

B. ABOVE GROUND RACEWAY USE:

- Install EMT conduit using compression fittings where conductor may be exposed or susceptible to potential harm.
- Utilize fittings matching the conduit type and manufacturer.

CONDUCTORS AND CABLES

A. GENERAL REQUIREMENTS

- Product of which cut-sheets are provided within these drawings shall be utilized on the project. For products which cut-sheets are not provided follow the specifications listed here.

B. POWER CONDUCTORS

- Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL standards 44 or 83 as applicable.
- Copper Conductor Manufacturer:
 - General Cable
 - Southwire
 - US Wire and Cable
 - American Wire and Cable
 - Cable USA
 - Okonite
 - Advance Wire and Cable
 - Encore Wire

B. POWER CONDUCTORS

- All communication wiring shall be coaxial cable of adequate gauge, shielded, and insulated, to clearly transmit the analog/digital signal.
- Copper Conductor Manufacturer:
 - Terrawave
 - Ventev

CONDUCTORS AND CABLES INSTALLATION

A. GENERAL REQUIREMENTS

- Communication wiring shall be installed in conduit fire-rated and/or plenum rated.
- Communication wiring shall be protected from harm.

ELECTRICAL BOXES AND CABINETS

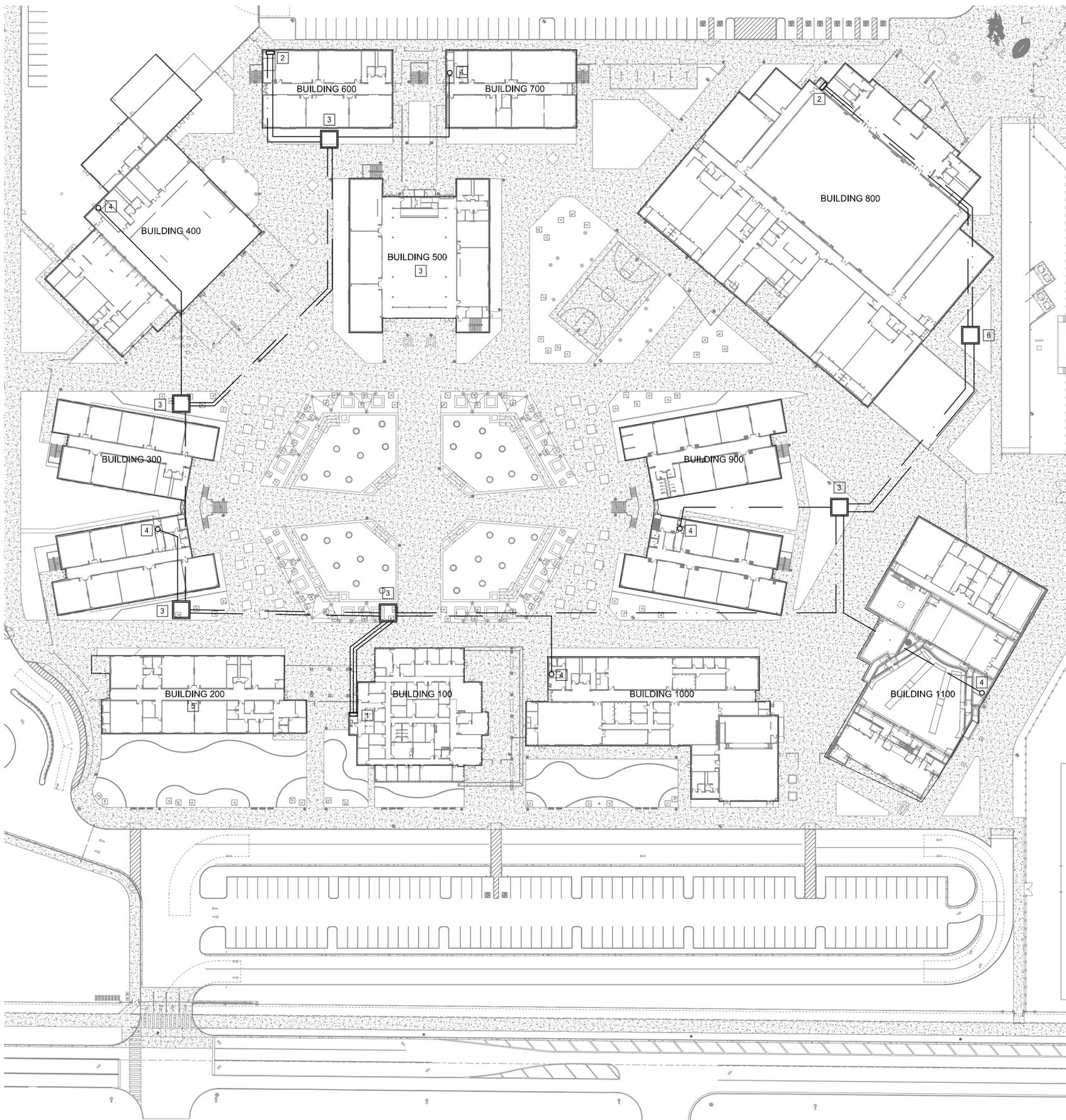
A. GENERAL REQUIREMENTS

- Provide junction boxes, pull boxes, cabinets, and wireways wherever necessary for proper installation of various electrical systems according to NFPA 70 and where indicated on the drawings.
- Size as required for the specific function or as required by NFPA 70, whichever is larger. Construction shall be of a NEMA design suitable for the environment installed.

- Manufacturers:
 - Appleton
 - Cooper
 - Erikson Electrical
 - Hoffman
 - Killark Electric
 - Raco,
 - Robroy Industries
 - Thomas and Betts
 - Steel City

B. OUTLET BOXES

- galvanized steel knockout boxes, suitable in design to the purpose they serve and the space they occupy.
- Size as required for the specific function or as required by NFPA 70, whichever is larger.
- Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension rings and/or masonry rings as required for flush mounting.
- Provide approved cast outlet boxes with hubs and weatherproof covers in all areas subject to damp, wet, or harsh conditions.
- Coordinate locations of outlet boxes prior to rough-in, consult architect for exact locations.
- Applications:
 - Light fixture
 - Switch
 - Receptacles



SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
 PASSED (GREEN) = > -85db
 CLOSE (YELLOW) = > -85db < > -85db
 FAIL (RED) = < -85db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.
- IN-GRADE SITE COMMUNICATION PULL-BOX

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERIES BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

1. MASTER EMERGENCY RADIO RESPONDER FIBER OPTIC CABINET WITH FIBER OPTIC COMMUNICATION TO REMOTE FIBER OPTIC DECODER CABINETS, DONOR ANTENNA INPUT, AND COAXIAL OUTPUT TO TWO-WAY COMMUNICATION ANTENNAS WITHIN BUILDING 100 AND NEARBY BUILDINGS.
2. EMERGENCY RADIO RESPONDER FIBER OPTIC DECODER, AMPLIFICATION CABINET, BATTERY BACK-UP CABINET, AND COAXIAL DISTRIBUTION TO BI-DIRECTIONAL 700MHZ ANTENNAS IN THIS BUILDING AND OTHERS NEARBY.
3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
4. PULL NEW COAXIAL COMMUNICATION CABLE FROM NEARBY BELOW GRADE PULL-BOX VIA EXISTING BELOW GRADE CONDUITS. CONTINUE WITHIN BUILDING ENVELOPE TO FIRST SPLITTER OR COMMUNICATION ANTENNA. SEE FLOOR PLANS ON SHEETS 211-321 FOR ADDITIONAL LOCATIONS WITHIN EACH BUILDING.
5. THIS BUILDING PASSED INITIAL TESTING. NO EMERGENCY RADIO RESPONDER COMMUNICATION SYSTEM IS REQUIRED WITHIN THIS BUILDING.
6. ROUGH LOCATION OF DONOR ANTENNA AT BUILDING 100 IN WEST POINT HIGH SCHOOL. ANTENNA SHALL BE ORIENTED IN THE DIRECTION SHOWN TOWARDS THE DONOR SITE.
7. ROUGH LOCATION OF THE EMERGENCY RADIO REBROADCAST SITE.

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**WEST POINT HIGH SCHOOL
 POLICY 510 - ERRC
 SYSTEM DESIGN & TESTING**

1 ERRC DISTRIBUTION PLAN
 1" = 40'-0"

2 ORIENTATION OF YAGI ANTENNA
 N.T.S.

DATE: 02/20/2020
 ISSUED FOR: DESIGN/PERMIT

SHEET NAME
 ERRC DISTRIBUTION PLAN AND ANTENNA ORIENTATION

SHEET NUMBER
E101

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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -95db < > -85db
FAIL (RED) = < -95db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 1-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
- 4. GENERAL LOCATION OF EXISTING FIRE ALARM CONTROL PANEL. PROVIDE COMMUNICATION CABLING FROM FIRE ALARM CONTROL PANEL TO BI-DIRECTIONAL AMPLIFICATION PANEL TO REPORT AND MONITOR THE FOLLOWING SYSTEM FAILURE SIGNALS:
 - 4.1. LOSS OF NORMAL AC POWER
 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC, AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN/PERMIT

SHEET NAME
BUILDING 100 ERRC PLAN

SHEET NUMBER

E211



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -95db < > -85db
FAIL (RED) = < -95db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
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- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
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- 2-WAY COAXIAL CABLE SPLITTER
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- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
- 4. GENERAL LOCATION OF EXISTING FIRE ALARM CONTROL PANEL. PROVIDE COMMUNICATION CABLING FROM FIRE ALARM CONTROL PANEL TO BI-DIRECTIONAL AMPLIFICATION PANEL TO REPORT AND MONITOR THE FOLLOWING SYSTEM FAILURE SIGNALS:
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 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC, AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

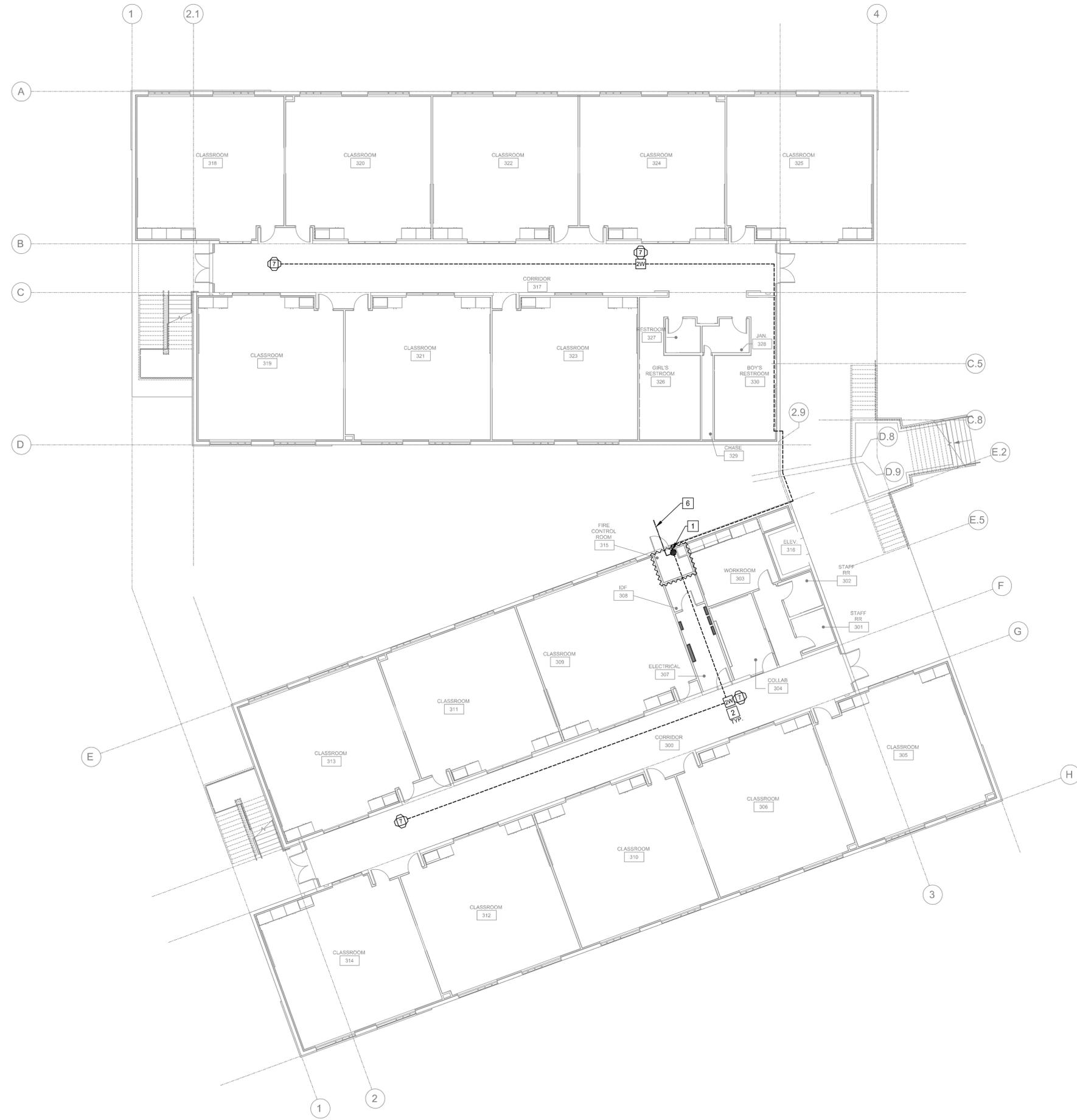
SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN PERMIT

SHEET NAME
BUILDING 300/900 ERRC PLAN - FIRST FLOOR

SHEET NUMBER

E231



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -85db < > -95db
FAIL (RED) = < -95db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
- 4. GENERAL LOCATION OF EXISTING FIRE ALARM CONTROL PANEL. PROVIDE COMMUNICATION CABLING FROM FIRE ALARM CONTROL PANEL TO BI-DIRECTIONAL AMPLIFICATION PANEL TO REPORT AND MONITOR THE FOLLOWING SYSTEM FAILURE SIGNALS:
 - 4.1. LOSS OF NORMAL AC POWER
 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

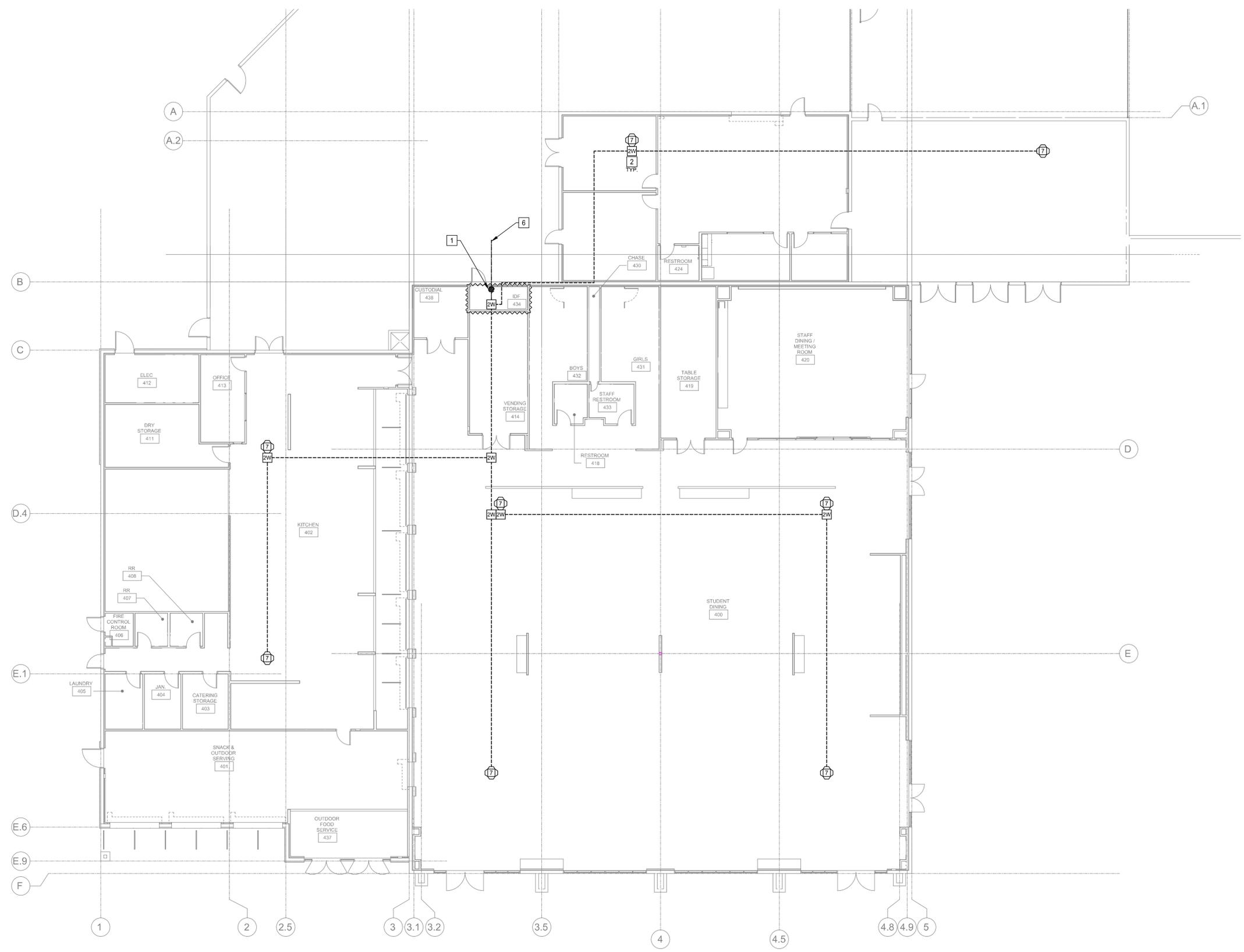
SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN/PERMIT

SHEET NAME
BUILDING 400 ERRC PLAN

SHEET NUMBER

E241



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -85db < > -85db
FAIL (RED) = < -85db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
- 4. GENERAL LOCATION OF EXISTING FIRE ALARM CONTROL PANEL. PROVIDE COMMUNICATION CABLING FROM FIRE ALARM CONTROL PANEL TO BI-DIRECTIONAL AMPLIFICATION PANEL TO REPORT AND MONITOR THE FOLLOWING SYSTEM FAILURE SIGNALS:
 - 4.1. LOSS OF NORMAL AC POWER
 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC, AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

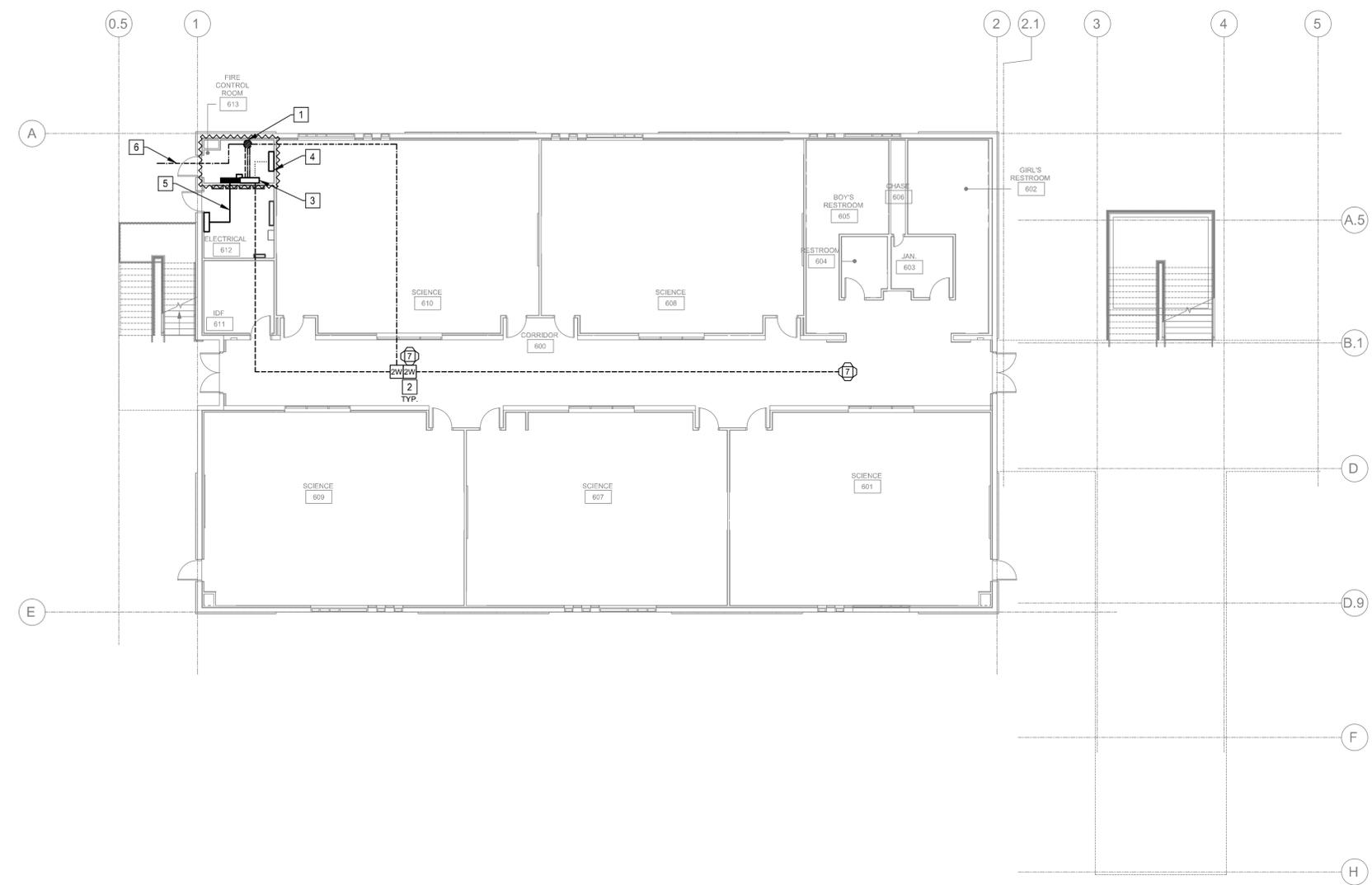
SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN PERMIT

SHEET NAME
BUILDING 600 ERRC PLAN
- FIRST FLOOR

SHEET NUMBER

E261



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -95db < > -85db
FAIL (RED) = < -95db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILING.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
- 4. GENERAL LOCATION OF EXISTING FIRE ALARM CONTROL PANEL. PROVIDE COMMUNICATION CABLING FROM FIRE ALARM CONTROL PANEL TO BI-DIRECTIONAL AMPLIFICATION PANEL TO REPORT AND MONITOR THE FOLLOWING SYSTEM FAILURE SIGNALS:
 - 4.1. LOSS OF NORMAL AC POWER
 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC, AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

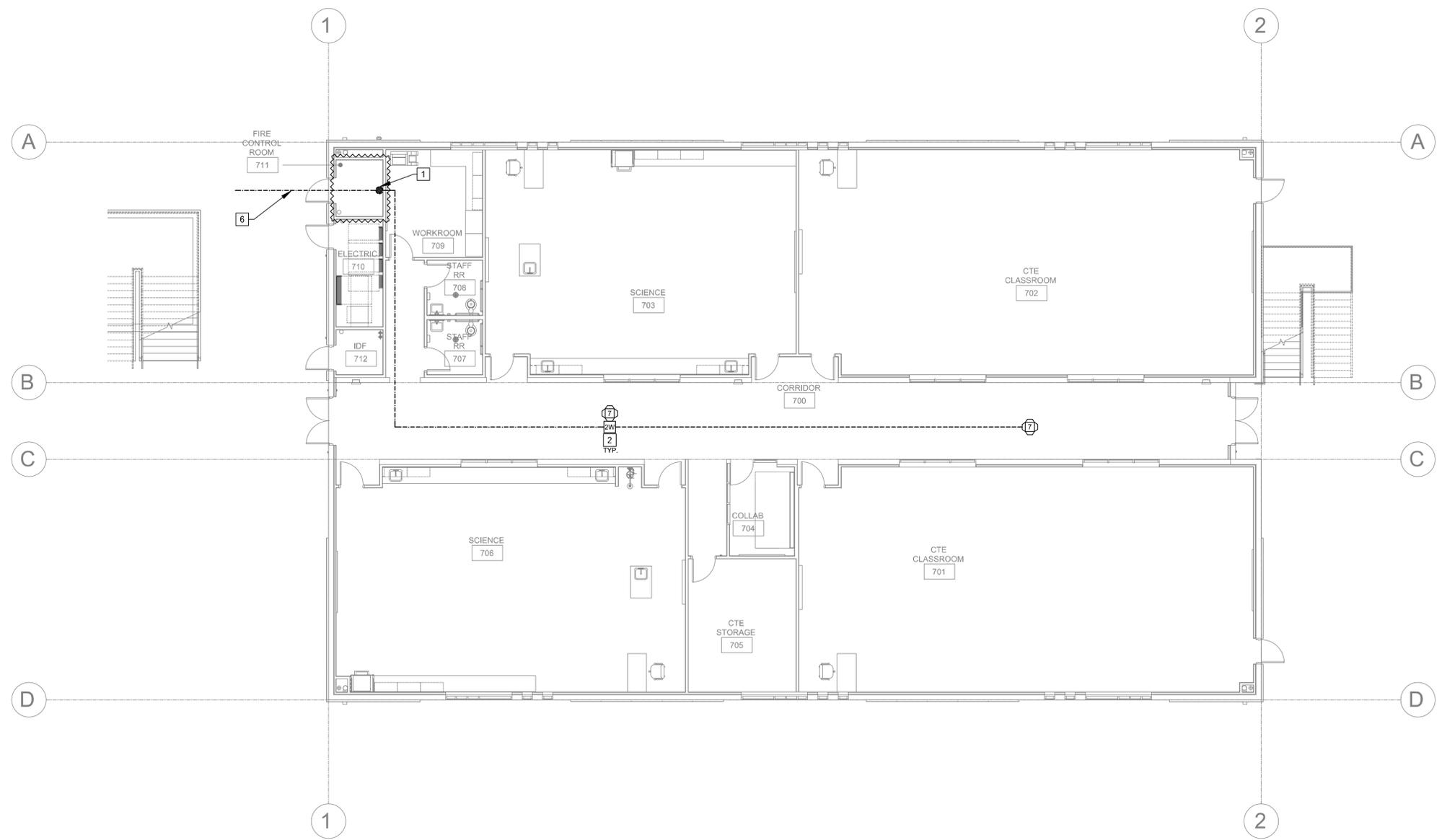
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SHEET NAME
BUILDING 700 ERRC PLAN - FIRST FLOOR

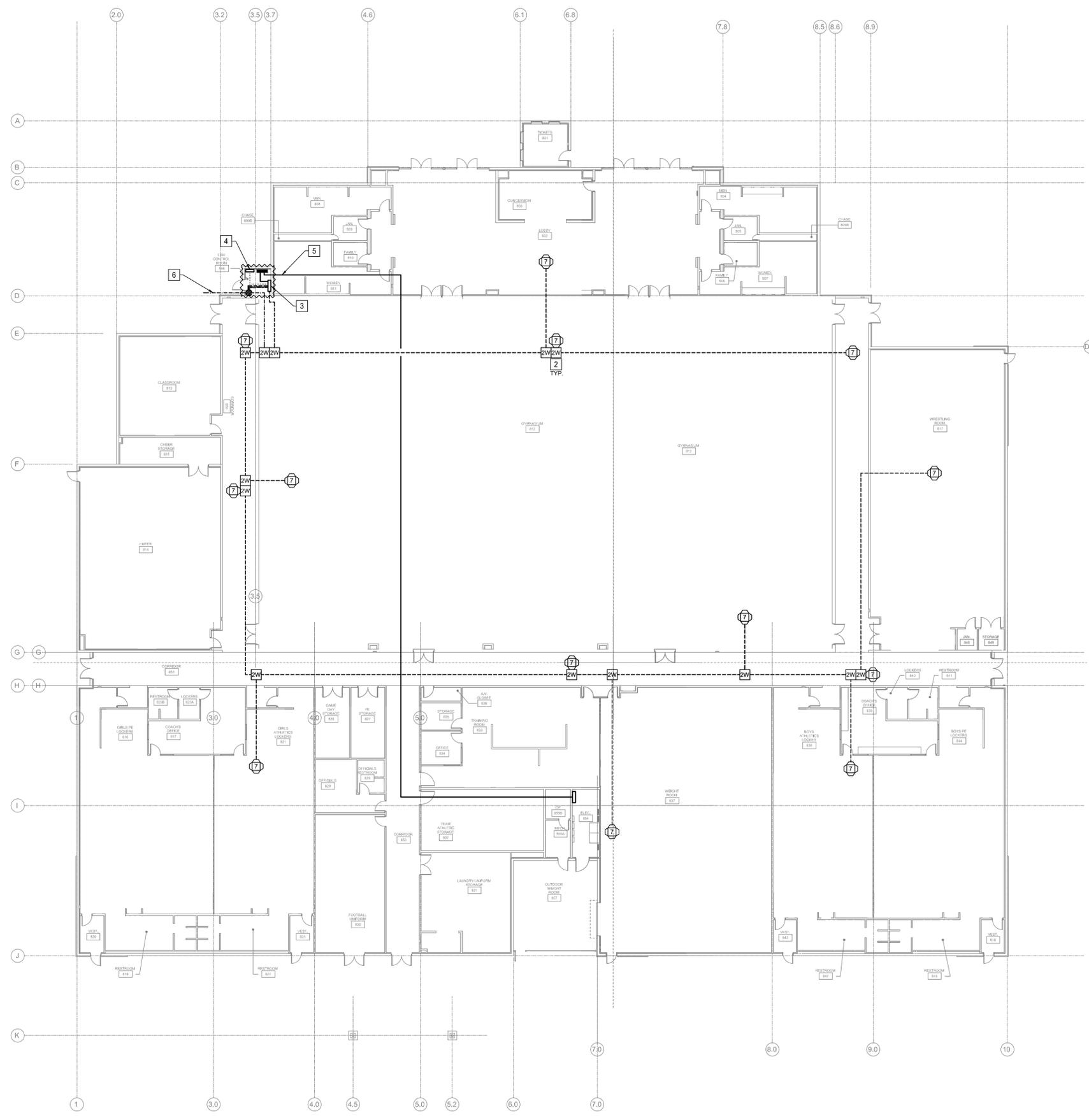
SHEET NUMBER

E272



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**



SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -85db < > -85db
FAIL (RED) = < -85db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
- 4. GENERAL LOCATION OF EXISTING FIRE ALARM CONTROL PANEL. PROVIDE COMMUNICATION CABLING FROM FIRE ALARM CONTROL PANEL TO BI-DIRECTIONAL AMPLIFICATION PANEL TO REPORT AND MONITOR THE FOLLOWING SYSTEM FAILURE SIGNALS:
 - 4.1. LOSS OF NORMAL AC POWER
 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

SUB-CONSULTANTS:

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SHEET NAME
BUILDING 800 ERRC PLAN

SHEET NUMBER

E281



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**WEST POINT HIGH SCHOOL
 POLICY 510 - ERRC
 SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
 PASSED (GREEN) = > -85db
 CLOSE (YELLOW) = -95db < > -85db
 FAIL (RED) = < -95db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
- MULTI-MODE FIBER OPTIC CABLE
- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 F.2 INSTALL PLENUM RATED CABLE ABOVE CEILING.
 F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
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 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
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 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.

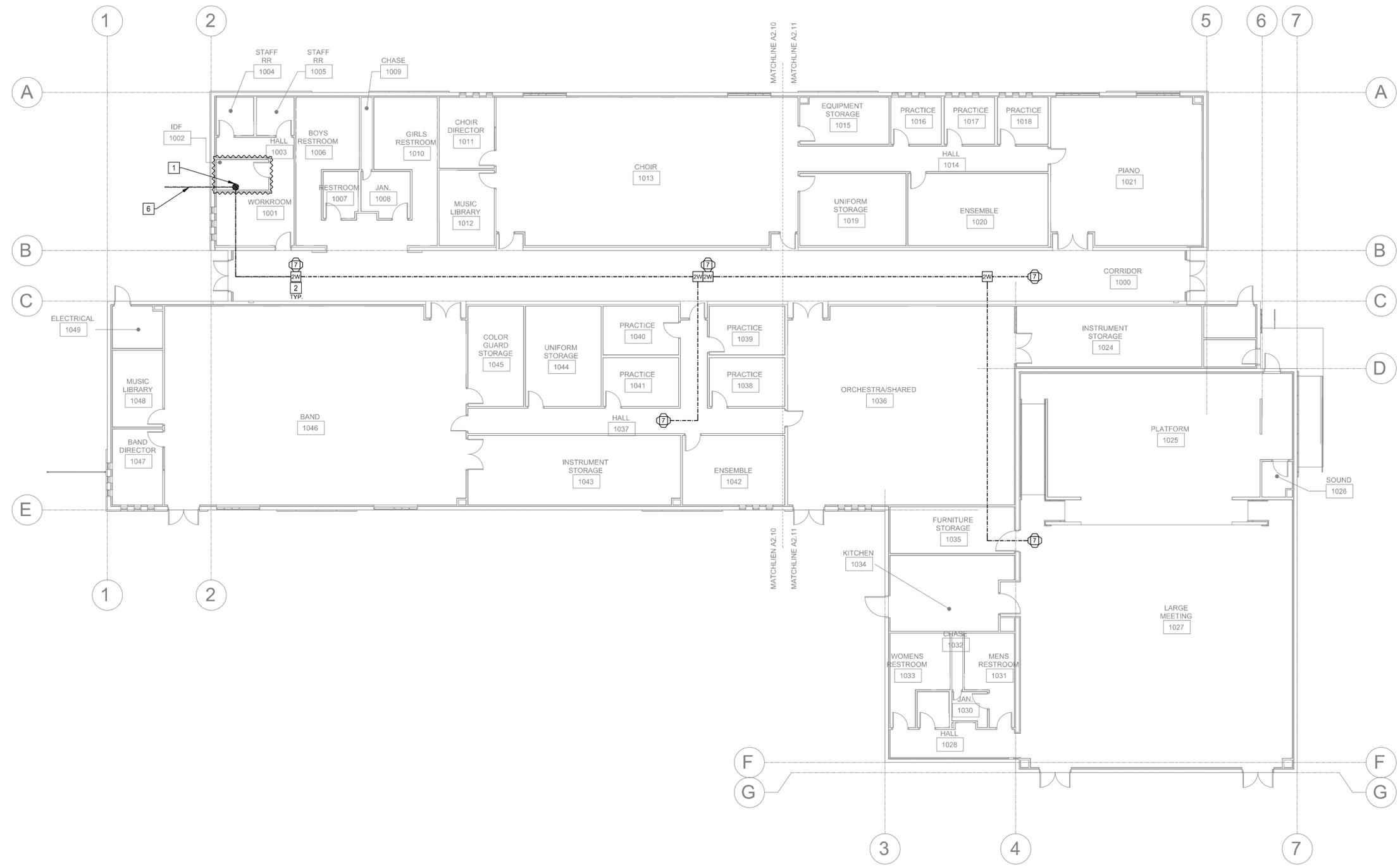
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SHEET NAME
 BUILDING 1000 ERRC PLAN

SHEET NUMBER

E301



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**

SYMBOL LEGEND

- SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
PASSED (GREEN) = > -85db
CLOSE (YELLOW) = -95db < > -85db
FAIL (RED) = < -95db FAIL
- TESTING ZONES
- 700MHZ BIDIRECTIONAL ANTENNA
- 3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET
- 1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
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- BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
- 700 MHZ 2-WAY AMPLIFIER CABINET
- 2-WAY COAXIAL CABLE SPLITTER
- VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
- VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
- 1-HOUR RATED SHAFT/ENCLOSURE
- DONOR ANTENNA
- 3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.

PLAN NOTES

- A. MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
- B. BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
- C. DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
- D. SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
- E. ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILINGS.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

KEYED NOTES

- 1. VERTICAL EMT CONDUIT WITHIN 2-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
- 2. TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
- 3. EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.
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 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
- 5. PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD IN THIS ROOM. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
- 6. PROVIDE FIBER OPTIC AND/OR 7/8" COAXIAL CABLE IN EXISTING BELOW-GRADE CONDUIT FROM ERRC EQUIPMENT TO SITE JUNCTION BOX OUTSIDE THIS BUILDING. SEE OVERALL DISTRIBUTION PLAN ON SHEET E101 FOR ADDITIONAL INFORMATION.
- 7. PROVIDE WALL MOUNTED PANEL ANTENNA AT THIS LOCATION.

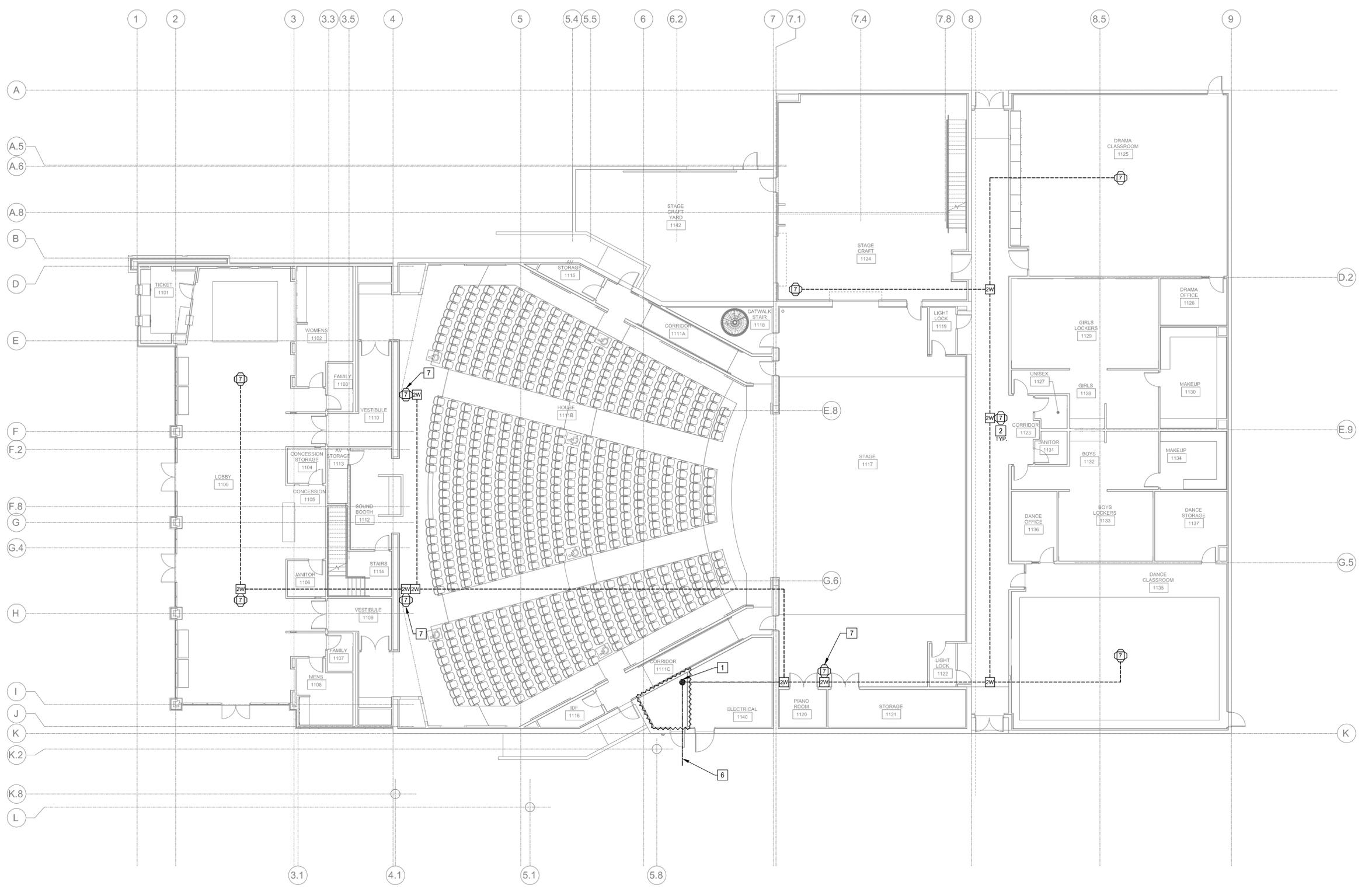
SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN/PERMIT

SHEET NAME
BUILDING 1100 ERRC PLAN

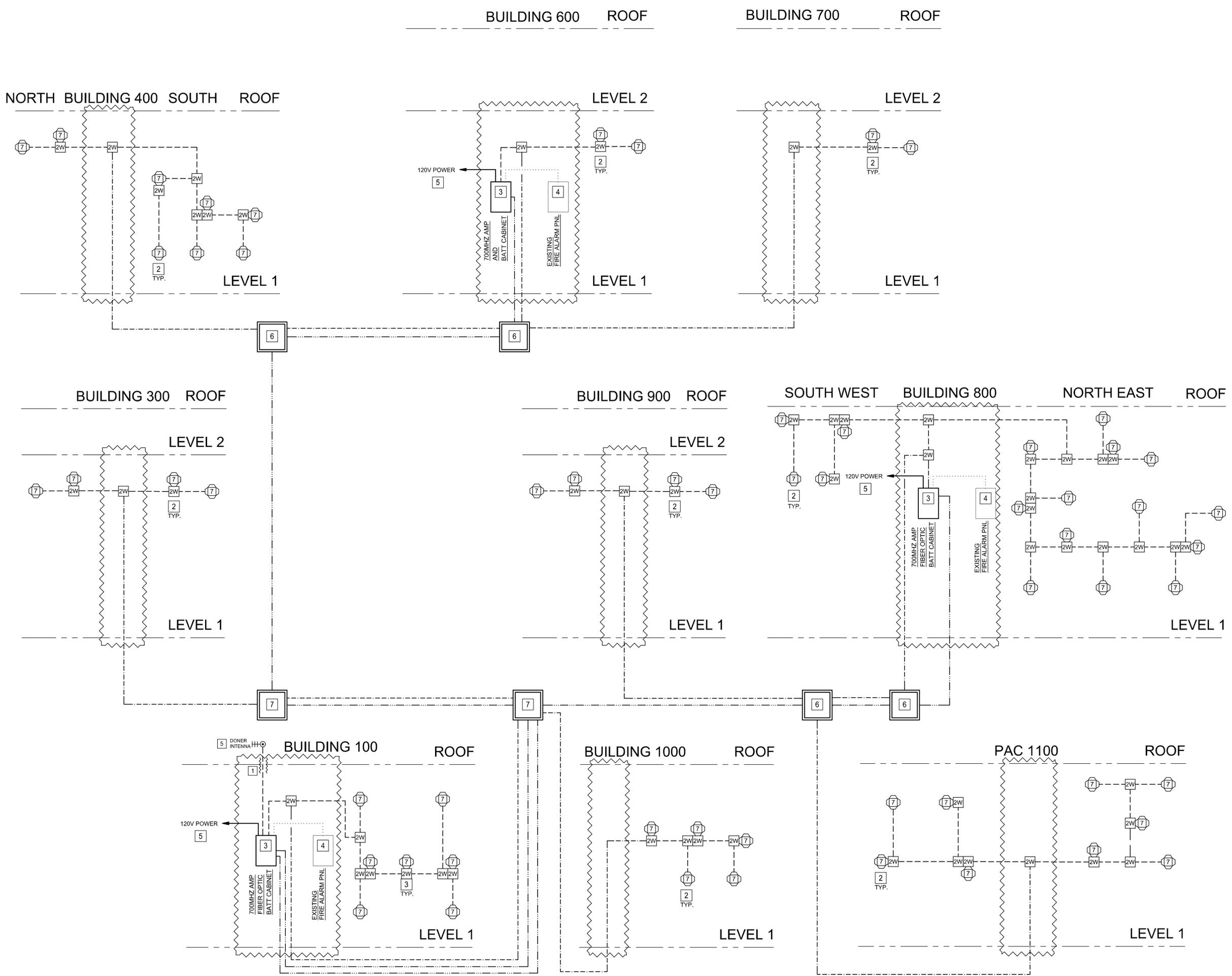
SHEET NUMBER

E311



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**WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING**



SYMBOL LEGEND

	SIGNAL STRENGTH TEST LOCATION (READING IN DECIBEL)
	PASSED (GREEN) = > -85db
	CLOSE (YELLOW) = -85db < > -85db
	FAIL (RED) = < -85db FAIL
TESTING ZONES	
	700MHZ BIDIRECTIONAL ANTENNA
	3/4" EMT WITH LMR-600 1/2" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET.
	1-1/4" EMT WITH 7/8" COAXIAL CABLE WITH FOAM DIELECTRIC POLYETHYLENE JACKET, UNLESS NOTED OTHERWISE.
	MULTI-MODE FIBER OPTIC CABLE
	BATTERY CABINET - 120V INPUT, 24HR, 48-VOLT OUTPUT
	700 MHZ 2-WAY AMPLIFIER CABINET
	2-WAY COAXIAL CABLE SPLITTER
	VERTICAL 3/4" EMT CONDUIT WITH COAXIAL CABLE
	VERTICAL 3/4" EMT CONDUIT TO DONOR ANTENNA (ON-ROOF)
	1-HOUR RATED SHAFT/ENCLOSURE
	DONOR ANTENNA
	3/4" EMT WITH COMMUNICATION WIRING TO FIRE ALARM CABINET BY OTHERS.
	IN-GRADE SITE COMMUNICATION PULL-BOX

- PLAN NOTES**
- MAXIMUM BEND RADIUS OF CONDUCTOR IS 3"
 - BATTERY BACK-UP SHALL BE A MINIMUM OF 24 HOURS AT 100% SYSTEM POWER DRAW.
 - DISTRIBUTION EQUIPMENT SHALL BE WITHIN ROOM OR ENCLOSURE WITH 1-HOUR FIRE RATING.
 - SYSTEM DONOR ANTENNA AND BACKBONE CABLING SHALL EXTEND VERTICALLY THROUGH FACILITY WITHIN EMT CONDUIT IN A FIRE-RATED SHAFT MATCHING THE FIRE RATING OF THE BUILDING.
 - ALL HORIZONTAL CABLING OF SYSTEM SHALL MEET SYSTEM SURVIVABILITY RATING LEVEL 0 OR 1 BY COMPLYING WITH THE FOLLOWING:
 - F.1 BUILDING SHALL BE FULLY-SPRINKLERED
 - F.2 INSTALL PLENUM RATED CABLE ABOVE CEILING.
 - F.3 INSTALL EXPOSED CABLE WITHIN EMT CONDUIT.

- KEYED NOTES**
- VERTICAL EMT CONDUIT WITHIN 1-HOUR RATED ENCLOSURE TO SYSTEM DONOR ANTENNA MOUNTED ON ROOF.
 - TYPICAL BI-DIRECTIONAL EMERGENCY RADIO RESPONDER COMMUNICATION ANTENNA.
 - EMERGENCY RADIO RESPONDER FIBER OPTIC DECODER, AMPLIFICATION CABINET, BATTERY BACK-UP CABINET, AND COAXIAL DISTRIBUTION TO BI-DIRECTIONAL 700MHZ ANTENNAS IN THIS BUILDING AND OTHERS NEARBY.
 - EXISTING FIRE ALARM CONTROL PANEL.. PROVIDE COMMUNICATION CABLING TO BI-DIRECTIONAL AMPLIFICATION PANEL FOR REPORTING AND MONITORING OF THE FOLLOWING SYSTEM FAILURE SIGNALS:
 - 4.1. LOSS OF NORMAL AC POWER
 - 4.2. SYSTEM BATTERY CHARGER FAILURE
 - 4.3. MALFUNCTION OF DONOR ANTENNA
 - 4.4. FAILURE OF ACTIVE RF-EMITTING DEVICES
 - 4.5. LOW-BATTERY CAPACITY AT 70%
 - 4.6. FAILURE OF CRITICAL SYSTEM COMPONENTS
 - 4.7. FAILURE OF MONITORING COMMUNICATIONS LINK
 - PROVIDE 120V POWER CONNECTION TO E.R.R.C EQUIPMENT FROM EXISTING ELECTRICAL PANELBOARD INDICATED ON FLOOR PLANS. COORDINATE CIRCUIT NUMBER WITH ELECTRICAL ENGINEER OF RECORD.
 - EXISTING IN-GRADE COMMUNICATION PULL-BOX ON CAMPUS. CONTINUE FIBER OPTIC THROUGH EXISTING CONDUITS FROM BUILDING 100 MASTER FIBER OPTIC PANEL TO ADDITIONAL FIBER OPTIC REMOTE PANEL LOCATIONS. SPLICE COAXIAL CABLE AS NEEDED TO EXTEND TO 700MHZ AMPLIFICATION CABINETS IN NEARBY BUILDINGS. SEE SHEET E101 FOR DISTRIBUTION PATHWAYS AND LOCATIONS.

SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN/PERMIT

SHEET NAME
RISER DIAGRAM AND BATTERY CALCULATIONS

SHEET NUMBER
E411

G-Wave Hybrid BDA Master 1:4

INCLUDED OPTIONS	Description
O26F	Standard NFPA Compliant Remote Monitoring via 26-Pin Connector
S1	External +24 to +26.5 VDC Back Up RED Enclosure
D	Canon type Circular AC Connector (No AC/DC Protections)
ODSC	Oscillation Detect/Display & Shut Down of all Amplifiers
ACSP	AC Surge protection and DC Line conditioning
VA	Local Visual Alarms

Electrical Specifications

- *Down-Link (Base to Mobile) Frequency Range [MHz] : 769 - 775
- *Up-Link (Mobile to Base) Frequency Range [MHz] : 799 - 805
- *Attenuation Downlink @ +/- 2 MHz form Passband [dBc] : 25 (Min.)
- *Gain (Minimum attenuation) [dB] : 80 (Min.), 85 (Typ.)
- *Gain Flatness [dB] : +/- 1.5 (Typ.)
- *Noise Figure (System) [dB] : 5.0 (Max.), 4.5 (Typ.)
- *Manual Attenuation Range [dB] : 0 - 30 in 2-dB steps
- *Output Power ALC Set [dBm] : +27 to +41
- *Output Composite Power [dBm] : Uplink : +27 (Typ.)
Downlink : +33 (Typ.)
- *3rd Order Output Intercept Point [dBm] @ 2 tones + 27 dBm each : Uplink : +48 (Typ.)
Downlink : +52 (Typ.)
- *3rd Order Output Intercept Point [dBm] @ 2 tones + 30 dBm each : Uplink : +48 (Typ.)
Downlink : +52 (Typ.)
- *Power Supply : 110V/0.59A to 220V/0.30A (Autorangeing) 50 to 60 Hz
- *Input/Output Fiber Optic Connector : SC/APC
- *Propagation Delay [uSec] : < 0.3
- *Input/Output Impedance : 50 ohm
- *VSWR IN/OUT : < 1.5:1
- *Net Weight (Estimated) : < 27 kg/60 lb
- *PAINT: FLAT EPOXY RED

OPERATING TEMPERATURE RANGE: -30°C TO +55°C

G-Way Solutions, LLC
FORUM-PS7N-2733-80-N

SKU # XXX-XXX
DC Current Draw @ +24VDC: 2.17A
FCC ID: Q8KPS7W3790N

G-Wave PS700 FIBER REMOTE

INCLUDED OPTIONS	Description
O26	Standard NFPA Compliant Local Alarming via 26-Pin Connector
RED	RED Enclosure
S1	External +24 to +26.5 VDC Back Up
D	Canon type AC Connector (No AC/DC Protections)
ACSP	AC Surge protection and DC Line conditioning
ODSC	Oscillation Detect/Display & Shut Down of all Amplifiers
VA	Local Visual Alarms

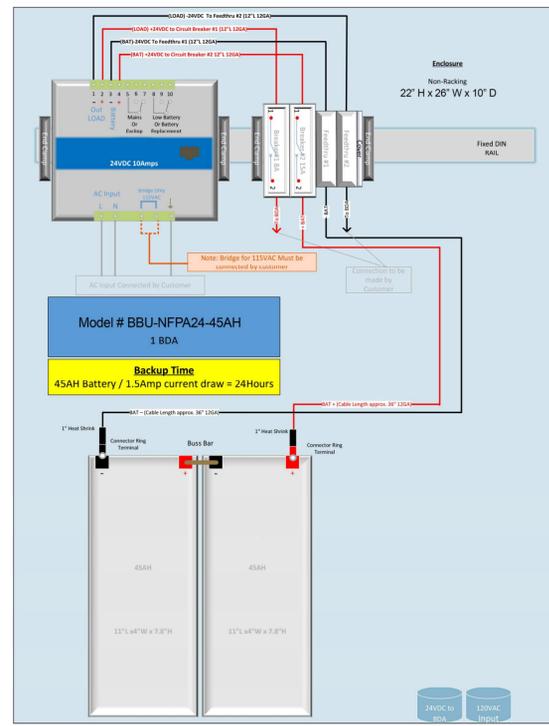
Electrical Specifications

- *Down-Link (Base to Mobile) Frequency Range [MHz] : 769 - 775
- *Up-Link (Mobile to Base) Frequency Range [MHz] : 799 - 805
- *Gain (Minimum attenuation) [dB] : Downlink : 55 (Min.), 60 (Typ.)
Uplink : 45 (Min.), 50 (Typ.)
- *Gain Flatness [dB] : +/- 1.5 (Typ.)
- *Noise Figure (System) [dB] : 6.0 (Max.), 5.5 (Typ.)
- *Manual Attenuation Range [dB] : 0 - 30 in 2-dB steps
- *Output Power ALC Set [dBm] : Uplink : +5 to +1
- *Output Composite Power [dBm] : Downlink : +33 (Typ.)
Uplink : +30 (Typ.)
- *3rd Order Output Intercept Point [dBm] @ 2 tones + 0 dBm each : Downlink : +52 (Typ.)
Uplink : +30 (Typ.)
- *3rd Order Output Intercept Point [dBm] @ 2 tones + 30 dBm each : Downlink : +52 (Typ.)
Uplink : +30 (Typ.)
- *Power Supply : 110V/0.47A to 220V/0.23A (Autorangeing) 50 to 60 Hz
- *Propagation Delay [uSec] : < 0.3
- *Input/Output Impedance : 50 ohm
- *Input/Output Fiber Optic Connector : SC/APC
- *VSWR IN/OUT : < 1.5:1
- *Net Weight (Estimated) : < 18.9 kg/42 lb
- *PAINT: FLAT EPOXY GRAY

OPERATING TEMPERATURE RANGE: -30°C TO +55°C

G-Way Solutions, LLC
FORUM-PS7N-533-55-N

SKU #XXX-XXX
DC Current Draw @ +24VDC: 1.72A
FCC ID: Q8KPS7W3790N



INNOVATIVE COMMUNICATION SOLUTIONS

Full Band Directional Antenna

Model #: TDJ-700/2500YG
SKU# 98011011

Applications

- LTE/CDMA/800/GSM/3G/WLAN/Wimax
- Wireless communications and data transmission system - Repeater
- Indoor and outdoor directional coverage

Features

- Broad band, Stable performance
- Low VSWR, High gain
- Support the popular communications system currently
- Sealed with radome, Strong protection ability
- Supplied with down-lit bracket kit

Specifications

Model	TDJ-700/2500YG
Freq Range-MHz	658- 800- 1700- 2700
Beamwidth	65° 60° 50°
F/B Ratio-dB	≥15 ≥20 ≥20
Gain-dBi	7.5 8.5 10
VSWR	≤1.5
Impedance-Ω	50
Polarization	Vertical
Max Power-W	100
Connector	N female or customized
Dimensions-mm	293 X 210 X 65
Weight-Kg	0.92
Mast Diameter-mm	φ40 to 50

Installation Sketch

1. Mast (user-provide);
2. 1.5m mounting kit;
3. connector;
4. antenna

Note: When installing, you should make the side with a little hole face down to prevent the radome from raining.

38 LEUNING STREET | SOUTH HACKENSACK, NJ | USA 07606
TEL: (201) 343-6388 | FAX: (201) 343-6390 | E-MAIL: INFO@GWAVERF.COM
WWW.GWAVERF.COM

SECONDARY POWER SOURCE CALCULATIONS

System Voltage	24	Volts		
Loads	80W	Amps (A)		
G-Wave Hybrid BDA Master/Remote	1.50			
Required Amp Hours (Ah)	Hours	(TPxHours)		
12 Hours	12	18		
24 Hours	24	36		
36 Hours	36	54		
48 Hours	48	72		
Provided Secondary Source	Capacity (Ah)	Required (Ah)	Spare (Ah)	Hours
G-Wave BBU-NFPA24-45AH Battery Box	45	36	9	30

APPROVED PHOENIX FIRE DEPARTMENT EMERGENCY RESPONDER RADIO COVERAGE (ERRC) SIGN

NOTES:

1. THE SIGN FACE SHALL BE 8" X 4" AND FABRICATED FROM .080 ALUMINUM SHEET WITH X RADIUS CORNERS.
2. LETTERS 1/4" X 1/8" STROKE, FONT STYLE USED IS HANDL GOTHIC BT CAPITAL FONTS.
3. THE SIGN FACE SHALL HAVE A WHITE 3M DIAMOND GRADE REFLECTIVE SHEETING (DP-4080 SERIES OR EQUIVALENT) APPLIED AS A BACKGROUND TO THE ALUMINUM PLATES.
4. LETTERING / GRAPHICS SHALL BE DONE ONE OF THE FOLLOWING WAYS:
 - A. 3M SCOTCHLITE ACRYLIC TRANSPARENT, ELECTRONIC CUTTABLE FILM (RED 1072 SERIES) INVERSE CUT TO ALLOW WHITE REFLECTIVE BACKGROUND TO SHOW THROUGH.
 - B. SCREEN PRINTED USING 3M 880 OR 880-00 SERIES TRAFFIC SIGN RED TRANSLUCENT INK.
 BOTH PROCESSES (A OR B) WILL ACCOMPLISH A RED FIELD WITH WHITE COPY.
5. ALL SIGN IMAGING SHALL BE IN COMPLIANCE WITH THE REFLECTIVE SHEETING MANUFACTURERS MATCH COMPONENT SYSTEM.

RFS Technical Data Sheet

VSWR Performance	Standard	1 dB (VSWR)	24 (1.135)	3500	8.33	2.34	1.27
Other Options:	Phase balanced and phase matched cables and assemblies are available upon request.			4000	8.86	2.14	1.18
				4500	10.1	1.87	1.05
				5000	10.2	1.71	1.04

RFS The Clear Choice® LCGFS-SUJNL Rev: D / 18.Oct.2019 Print Date: 22.10.2019

Technical Data Sheet LCGFS-SUJNL

78" CELLFLEX® Lite Low-Loss Foam-Dielectric Coaxial Cable

Product Description

CELLFLEX® Lite 78" low loss flexible cable

Technical Specifications

Parameter	Value
Impedance	50 Ω
Attenuation	0.15 dB/100ft @ 1GHz
Velocity of Propagation	0.99c
Phase Shift	1.57 rad/100ft @ 1GHz
Reflection Coefficient	< -20 dB
Return Loss	> 16 dB
Shielding Effectiveness	> 100 dB
Temperature Range	-40°C to +85°C
Storage Temperature	-55°C to +125°C
Operating Temperature	-40°C to +85°C
Flammability	UL94V-0

OPTIMIZED

Lighting | Engineering | Design

842 EAST ISABELLA AVE. MESA, AZ 85004
WWW.OPTIMIZED-LED.COM | 602-499-6224

PROJECT: USM201003
ECON: BRITT LORNGREN
britt.lorngren@optimized.com
AZ 03471 (AZ-03581) CO 03587
AZ-FIRM: 21458

STAMP: This drawing is the professional intellectual property of Optimized LED and protected by Copyright Usage of this drawing shall be restricted for use as a project example and shall not be reproduced, recreated, or utilized for any other purpose without express written consent of Optimized LED.

WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING

DATE: 02/20/2020
ISSUED FOR: DESIGN/PERMIT

SHEET NAME
CUT-SHEETS

SHEET NUMBER
E412

FIRE CODE SECTION 510
EMERGENCY RESPONDER RADIO COVERAGE

510.1 Emergency responder radio coverage in new buildings. New buildings shall have approved radio coverage for emergency responders within the building based on the existing coverage levels of the public safety communication systems utilized by the jurisdiction measured at the exterior of the building. This section shall not require improvement of the existing public safety communication systems.

Exceptions:

1. Where approved by the building official and the fire code official, a wired communication system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained in lieu of an approved radio coverage system.
2. Where it is determined by the fire code official that the radio coverage system is not needed.
3. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the fire code official shall have the authority to accept an automatically activated emergency responder radio coverage system.

510.2 Emergency responder radio coverage in existing buildings. Existing buildings shall be provided with approved radio coverage for emergency responders as required in Chapter 11.

510.3 Permit required. A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment is required as specified in Section 105.7.5. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

510.4 Technical requirements. Systems, components and equipment required to provide the emergency responder radio coverage system shall comply with Sections 510.4.1 through 510.4.2.8.

510.4.1 Emergency responder communication enhancement system signal strength. The building shall be considered to have acceptable emergency responder radio coverage where signal strength measurements in 95 percent of all areas on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.

510.4.1.1 Minimum signal strength into the building. The minimum inbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The inbound signal level shall be sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 or an equivalent Signal-to-Interference Plus-Noise Ratio (SINR) applicable to the technology for either analog or digital signals.

510.4.1.2 Minimum signal strength out of the building. The minimum outbound signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire

code official. The outbound signal level shall be sufficient to provide not less than a DAQ of 3.0 or an equivalent SINR applicable to the technology for either analog or digital signals.

510.4.1.3 System performance. Signal strength shall be sufficient to meet the requirements of the applications being utilized by public safety for emergency operations through the coverage area as specified by the fire code official in Section 510.4.2.2.

510.4.2 System design. The emergency responder radio coverage system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1221.

510.4.2.1 Amplification systems and components. Buildings and structures that cannot support the required level of radio coverage shall be equipped with systems and components to enhance the public safety radio signals and achieve the required level of radio coverage specified in Sections 510.4.1 through 510.4.1.3. Public safety communications enhancement systems utilizing radio-frequency-emitting devices and cabling shall be approved by the fire code official. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.

510.4.2.2 Technical criteria. The fire code official shall maintain a document providing the specific technical information and requirements for the emergency responder communications coverage system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in micro-seconds, the applications being used and other supporting technical information necessary for system design.

510.4.2.3 Standby power. Emergency responder radio coverage systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the emergency responder radio coverage system at a 100-percent system capacity for a duration of not less than 24 hours.

510.4.2.4 Signal booster requirements. If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a National Electrical Manufacturer's Association NEMA 4-type waterproof cabinet.
2. Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher rated cabinet.
3. Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.
4. Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.
5. Bi-Directional Amplifiers (BDAs) used in

emergency responder radio coverage systems shall have oscillation prevention circuitry.

6. The installation of amplification systems or systems that operate on or provide the means to cause interference on any emergency responder radio coverage networks shall be coordinated and approved by the fire code official.

510.4.2.5 System monitoring. The emergency responder radio enhancement system shall be monitored by a listed fire alarm control unit, or where approved by the fire code official, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals shall include the following:

1. Loss of normal AC power supply.
2. System battery charger(s) failure.
3. Malfunction of the donor antenna(s).
4. Failure of active RF-emitting device(s).
5. Low-battery capacity at 70-percent reduction of operating capacity.
6. Failure of critical system components.
7. The communications link between the fire alarm system and the emergency responder radio enhancement system.

510.4.2.6 Additional frequencies and change of frequencies. The emergency responder radio coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority.

510.4.2.7 Design documents. The fire code official shall have the authority to require "as-built" design documents and specifications for emergency responder communications coverage systems. The documents shall be in a format acceptable to the fire code official.

510.4.2.8 Radio communication antenna density. Systems shall be engineered to minimize the near field effect. Radio enhancement system designs shall include sufficient antenna density to address reduced gain conditions.

Exceptions:

1. Class A narrow band signal booster devices with independent AGC/ALC circuits per channel.
2. Systems where all portable devices within the same band use active power control features.

510.5 Installation requirements. The installation of the public safety radio coverage system shall be in accordance with NFPA 1221 and Sections 510.5.1 through 510.5.4.

510.5.1 Approval prior to installation. Amplification systems capable of operating on frequencies licensed to any public safety agency by the FCC or other radio licensing authority shall not be installed without prior coordination and approval of the fire code official.

510.5.2 Minimum qualifications of personnel. The minimum qualifications of the system designer and lead installation personnel shall include both of the following:

1. A valid FCC-issued general radio operator's license.
2. Certification of in-building system

training issued by an approved organization, or approved school or certificate issued by the manufacturer of the equipment being installed.

3. These qualifications shall not be required where demonstration of adequate skills and experience satisfactory to the fire code official is provided.

510.5.3 Acceptance test procedure. Where an emergency responder radio coverage system is required, and upon completion of installation, the building owner shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows:

1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system or equipment approved by the fire code official.
3. Failure of not more than one test area shall not result in failure of the test.
4. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 95-percent coverage requirement.
5. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be permitted.
6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and subsequent annual inspections.
8. Systems incorporating Class B signal-booster devices or Class B broadband fiber remote devices shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from the

indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.

510.5.4 FCC compliance. The emergency responder radio coverage system installation and components shall also comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

510.6 Maintenance. The emergency responder radio coverage system shall be maintained operational at all times in accordance with Sections 510.6.1 through 510.6.4.

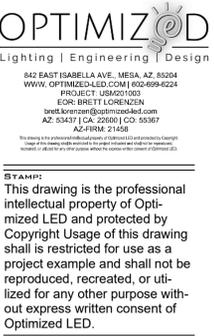
510.6.1 Testing and proof of compliance. The owner of the building or owner's authorized agent shall have the emergency responder radio coverage system shall be inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

1. In-building coverage test as described in Section 510.5.3.
2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.
3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.
4. Other active components shall be checked to verify operation within the manufacturer's specifications.
5. At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.3, shall be submitted to the fire code official.

510.6.2 Additional frequencies. The building owner shall modify or expand the emergency responder radio coverage system at his or her expense in the event frequency changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority. Prior approval of a public safety radio coverage system on previous frequencies does not exempt this section.

510.6.3 Field testing. Agency personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.

510.6.4 Nonpublic safety system. Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the emergency responder communications coverage system, the nonpublic safety amplification system shall be corrected or removed.



WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING

SUB-CONSULTANTS:

DATE: 02/20/2020
ISSUED FOR: DESIGN/PERMIT

SHEET NAME
FIRE CODE
SECTION 510

SHEET NUMBER

E511

GENERAL INSTRUCTIONS

A. GENERAL REQUIREMENTS

1. Become thoroughly familiar with all of its contents as to requirements that affect this section.
2. Work required under this section includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonable inferred to be necessary to facilitate the function of the system and design intent.
3. The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both
4. In the event of discrepancies between specifications and drawings, notify the engineer and request clarification prior to proceeding with the work involved.
5. Limitations to drawings:
 - a. Drawings are graphic representations of the work upon which the contract is based.
 - b. Drawings show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements
 - c. Contractor shall use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system
 - d. Exact location of any component shall be confirmed and/or dimensioned by architect prior to rough-in

B. DEFINITIONS

1. Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations."
2. Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."
3. Provide: "to furnish and install."
4. Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division.
5. Engineer: Where referenced in this Division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.
6. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.
7. Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle, or switch with termination at an electrical panelboard. Note: Where MC cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box located in an accessible ceiling space as close as possible to the first load.
8. The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, certified, or all three, by an NRTL, and acceptable to the AHJ over this project.

C. MATERIAL AND WORKMANSHIP

1. Provide new material, equipment, and apparatus under

this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects

2. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers.
3. All workmanship shall be of the finest possible by experienced mechanics of the proper trade.
4. Provide all hoists, scaffolds, staging, runways, tools, machinery, and equipment required for the performance of the electrical work. Store and maintain material and equipment in clean condition, and protected from weather, moisture, and physical damage.
5. At a minimum, general work practices for electrical construction shall be in accordance with NECA 1 (latest edition), "Standard Practices for Good Workmanship in Electrical Construction".

D. MANUFACTURERS

1. In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.
2. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.
3. Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

E. COORDINATION

1. Coordinate all work with other divisions and trades so that various components of the systems are installed at the proper time, fit the available space, and allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.
2. Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required.
3. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or delay the work of other trades.
4. Figured dimensions shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building, as variations may occur.
5. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.
6. Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed.
7. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim.
8. Make all offsets required to clear equipment, beams, and other structural members, and to facilitate concealing raceways in the manner anticipated in the design.

F. ORDINANCES AND CODES

1. Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction.
2. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following:
 - a. National Fire Protection Association (NFPA)
 - b. Underwriters Laboratories (UL)
 - c. Occupational Safety and Health Administration (OSHA)
 - d. American National Standards Institute (ANSI)
 - e. American Society of Testing Materials (ASTM)
 - f. Rules and regulations of public utilities and municipal departments affected by connection of services.

g. Other national standards and codes where applicable.

3. Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence.
4. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.
5. Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution.
6. Contractor will be held responsible for any violation of the law.
7. Procure and pay for permits and licenses required for the accomplishment of the work herein described.
8. Where required, obtain, pay for, and furnish certificates of inspection to Owner.
9. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety of the public.

G. PROTECTION OF EQUIPMENT AND MATERIALS

1. Store and protect from damage equipment and materials delivered to job site.
2. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces.
3. For other materials and equipment, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage.
4. Equipment and material damaged by construction activities shall be rejected, and Contractor shall furnish new equipment and material of a like kind at his own expense.
5. Keep premises broom clean of foreign material created during work performed under this contract.
6. Conduit, equipment, etc. shall have a neat and clean appearance at the termination of the work.
7. Plug or cap open ends of conduits while stored and installed during construction when not in use to prevent the entrance of debris into the systems.

H. ELECTRONIC DRAWING FILES

1. Electronic drawing files are the intellectual property of the design professional and are covered under United States Copyright laws.
2. Requests for electronic drawing files will be considered on a case by case basis.
3. Optimized-LED retains the rights to charge for additional usage of the company's intellectual property outside of the original contractual agreement.
4. Request shall be made in writing to utilize electronic drawing files for any reason. Email is considered an acceptable form or written request.

I. RECORD DRAWINGS (AS-BUILT DRAWINGS)

1. During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system.
2. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings.

J. OPERATION AND MAINTENANCE INSTRUCTIONS

1. During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project.

2. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer.

3. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents.

4. Submit a copy of literature bound in approved binders with index and tabs separating equipment types to the Owner, at the termination of the work.

5. Include Record Drawings as described above.

K. TRAINING

1. At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project.
2. Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole.
3. Operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention
4. Review of data included in the operation and maintenance manuals.

L. WARRANTIES

1. Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion unless specific items are noted to carry a longer warranty in these construction documents or manufacturer's standard warranty exceeds 12 months.
2. Remedy all defects occurring within the warranty period(s) as stated in the General Conditions and Division 01.
3. Warranties shall include labor and material, including travel expenses.
4. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.
5. Perform the remedial work promptly, upon written notice from the Engineer or Owner.
6. Also warrant the following additional items:
 - a. All raceways are free from obstructions, holes, crushing, or breaks of any nature.
 - b. All raceway seals are effective.
 - c. The entire electrical system is free from all short circuits and unwanted open circuits and grounds.
7. At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status.
8. Each warranty instrument shall be addressed to the Owner and state the commencement date and term.

GENERAL MATERIALS AND INSTALLATION

A. BUILDING OPERATION

1. Comply with the schedule of operations as outlined in the architectural portions of this specification.
2. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and/or tenant.
3. Coordinate interruption of building operation with the

Owner and/or tenant a minimum of seven (7) days in advance of work.

B. COINCIDENTAL DAMAGE

1. Repair accidental damage with materials which generally match existing construction.
2. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect.
3. Repair work shall be thoroughly first class.

C. CUTTING AND PATCHING

1. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division.
2. Do not cut or disturb structural members without prior approval from the Architect.
3. Cut holes as small as possible.
4. Patch walls, floors, and other portions of the facility as required by work under this division.
5. Patching shall match the original material and construction including fire ratings, if applicable.
6. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

E. SUPPORT SYSTEMS

1. Steel Slotted Support Systems (Slotted Channel): Comply with MFMA-3, factory-fabricated components for field assembly; 12-gauge, 1-5/8-inch by 1-5/8-inch.
2. Finishes:
 - a. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3.
 - b. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane or polyester coating applied according to MFMA-3.
 - c. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-3.
 - d. Stainless Steel: Type 304, per ASTM A240.
3. Aluminum Slotted Support Systems (Slotted Channel):
 - a. Comply with MFMA-3, Type 6063-T6, per ASTM B221; factory-fabricated components for field assembly; 12-gauge, 1-5/8-inch by 1-5/8-inch.
4. Manufacturers:
 - a. Cooper B-Line
 - b. ERICO International
 - c. Hilti, Power-Strut
 - d. Thomas and Betts
 - e. Unistrut.
5. Field Fabrication:
 - a. Where field cutting of standard lengths of channel are required, make cuts straight and perpendicular to manufactured surfaces.
 - b. For field-cut or damaged surfaces of coated channels, dress cut ends, damaged surfaces, or both, with an abrasive material (e.g., file, grinding stone, or similar) and cleanser to remove oils, rust, sharp edges, and shards.
 - c. For channel with a factory-applied coating, re-finish cut edges with a coating compatible with the factory finish and as recommended by the manufacturer (e.g., manufacturer's touch-up paint or zinc-rich cold-galvanizing compound, as applicable).



WEST POINT HIGH SCHOOL
POLICY 510 - ERRC
SYSTEM DESIGN & TESTING

SUB-CONSULTANTS:

DATE: 02/20/2020 ISSUED FOR: DESIGN/PERMIT

SHEET NAME SPECIFICATIONS 1

SHEET NUMBER

E512