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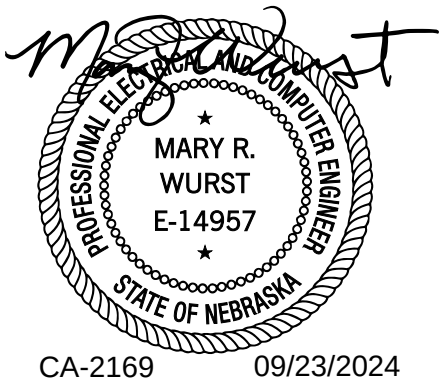

CA-2169 09/23/2024

SECTION 26 04 00

COMMON REQUIREMENTS FOR ELECTRICAL

PART 1 GENERAL

1.1 SUMMARY

A. This section describes the general requirements of these specifications and shall apply to all phases of the work specified, shown on the drawings, or required to provide for complete installation of all systems for this project.

B. This Section includes basic materials and methods to complement other Division 26 Sections.

C. This Section includes basic materials and methods to complement Sections 27 3243 - Emergency Responder Radio Enhancement System and 28 46 00 - Fire Detection and Alarm.

1.2 WARRANTIES

A. Warrant materials, workmanship and equipment against defects for a period of one year after the date of substantial completion.

B. Certain equipment shall be warranted beginning at the time of final acceptance or for longer periods of time as specified in those divisions of the Project Manual.

C. Repair or replace, at no additional cost to the Owner, any item which may become defective within the warranty period.

D. Any manufacturers' warranties concerning any item installed will run to the benefit of the Owner.

E. The Contractor agrees not to void or impair, or to allow Sub-Contractors to void or impair, any warranties regarding products or items installed as part of this project.

F. The repair of faulty workmanship shall be considered to be included in the contract.

1.3 ALTERNATES

A. Alternates, if required, shall be as described in the “Alternates” section of this Project Manual, as described on the proposal form, or as indicated on the drawings.

1.4 QUESTIONS OF INTERPRETATION DURING BIDDING PHASE

A. If questions arise during the bidding process regarding the meaning of any portion of the contract documents, the prospective bidder shall submit the questions to the Architect for clarification.

B. Any definitive interpretation or clarification of the contract documents will be published by addenda, properly issued to each person holding documents, prior to the bid date.

C. Verbal interpretation or explanation not issued in the form of an addendum shall not be considered part of the bidding documents.

D. When submitting questions for clarification, adequate time for issuance and delivery of addenda must be allowed.

E. The Architect shall be the sole judge regarding interpretations of conflicts within contract documents.

1.5 CONTRACT DOCUMENT DISCREPANCIES

A. If any ambiguities should appear in the contract documents, request clarification from the Architect before proceeding with the work.

B. If the Contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out the work in a manner satisfactory to the Architect.

C. Should a conflict occur within the contract documents, the Contractor is deemed to have estimated the more expensive way of doing the work unless a written clarification from the Architect was requested and obtained before submission of proposed methods or materials.

D. The Architect shall be the sole judge regarding interpretations of conflicts within contract documents.

1.6 DEFINITIONS

A. The following definitions shall apply throughout the contract documents:
1. Architect: Architect or Engineer
2. Code: Applicable national, state and local codes
3. Mechanical: Plumbing, HVAC, and Fire Protection work required by the Contract Documents
4. Electrical: Electrical and Fire Alarm work required by the Contract Documents
5. Contractor: Any Contractor performing work required by the Contract Documents
6. Indicated: Noted, scheduled or specified
7. Selected: Selected by the Architect.
8. Provide: Furnish, install, connect and tested complete and ready for use
9. Furnish: Supply and deliver to the site ready for installation
10. Install: Install complete, per Contract Documents and manufacturer's requirements.
11. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
12. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
13. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
14. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in

duct shafts.

15. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
16. Dry Locations: A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.
17. Damp Locations: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.
    a. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.
18. Wet Locations: Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

1.7 SYMBOLS

A. Items of equipment and materials are indicated on the drawings in accordance with the symbols on the plans.

1.8 ABBREVIATIONS

A. Refer to abbreviations list on the Drawings.

B. The following abbreviations apply throughout the Contract Documents:
1. ADA: Americans with Disabilities Act
2. ANSI: American National Standards Institute
3. ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers
4. ASME: American Society of Mechanical Engineers
5. ASTM Specification: Standard specifications of the American Society for Testing Materials
6. FM: Factory Mutual Engineering Corporation
7. IRI: Industrial Risk Insurers
8. NEC: National Electrical Code, latest edition
9. NEMA: National Electrical Manufacturers Association
10. NFPA: National Fire Protection Association
11. UL or Underwriters: Underwriters Laboratories, Inc.

1.9 CODES

A. The work shall be performed by persons skilled in the trade involved and shall be done in a manner consistent with normal industry standards.

B. The work shall conform to all applicable sections of currently adopted editions of the following codes, standards, and specifications:

1. International Building Code (IBC)
2. International Fire Code (IFC)
3. International Energy Conservation Code (IECC)
4. Safety and Health Regulations for Construction
5. Occupational Safety and Health Standards (OSHA), National Consensus Standards and Established Federal Standards
6. National Electrical Code (NEC)
7. National Electrical Safety Code (NESC)
8. National Fire Protection Association (NFPA)
9. Life Safety Code (NFPA 101)
10. Factory Mutual Global Engineering (FMG)
11. Underwriters' Laboratories, Inc. (UL)
12. National Electrical Manufacturers Association (NEMA)
13. Institute of Electrical and Electronics Engineers (IEEE)
14. Insulated Power Cable Engineers Association (IPCEA)
15. Telecommunications Industry Association (TIA)
16. Building Industry Consulting Service International (BICSI)
17. Applicable national, state and local codes

C. Where there is a conflict between the code and the Contract Documents, the code shall have precedence only when it is more stringent than the Contract Documents.
   1. Items that are allowed by the code but are less stringent than those specified shall not be substituted.

1.10 PERMITS

A. The Contractors shall familiarize themselves with requirements regarding permits, fees, etc., and shall comply with them.

B. Permits, licenses, inspections and arrangements required for the work shall be obtained by the Contractor at his expense.

C. Utilities shall be installed in accordance with the local rules and regulations.

1.11 MATERIALS AND EQUIPMENT MANUFACTURERS

A. Options in selecting materials and equipment are limited by requirements of the contract documents and governing regulations. They are not controlled by industry traditions or procedures experienced on previous construction projects.

B. Materials and equipment shall be provided in accordance with the following:
   1. Primary Design Products: Primary design products are those products around which the project was designed in terms of capacity, performance, physical size and quality.
   2. Primary design products are indicated by use of a single manufacturer's name, model number or similar data on drawings or schedules or within the specifications.
   3. Provide primary design products unless substitutions are made in accordance with the following paragraphs.

4. Acceptable Equivalent Substitutions: Acceptable equivalent substitutions are products of manufacturers other than those listed for the primary design products. Equivalent acceptable substitutions shall meet each of the following requirements:
    a. The product shall be manufactured by one of the acceptable manufacturers listed in the Project Manual, drawings, or addenda.
    b. The product shall meet or exceed the requirements of the contract documents in terms of quality, performance, suitability, appearance, and physical characteristics.
    c. The Contractor providing the substitution shall bear the total cost of changes due to substitutions. These costs may include additional compensation to the Architect for redesign and evaluation services, increased cost of work by the Owner or other Contractors, and similar considerations.
5. Performance Requirements: Where the contract documents list performance requirements or describe a product or assembly generically, provide products that comply with the specific requirements indicated and that are recommended by the manufacturer for the respective application.
6. Compliance with Standards, Codes and Regulations: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including the standards, codes and regulations.

C. Proposed substitutions will be judged on the basis of quality, performance, appearance and on the governing space limitations. The reputation of the manufacturer, delivery time requirements, and the availability of repair or replacement parts may also be considered.

D. The Architect shall be the sole and final judge as to the suitability of substitution items.

1.12 SUBMITTALS

A. Shop Drawings, Product Data and Samples:
1. Other sections in the Project Manual shall be adhered to if more stringent than the following paragraphs.
2. When required by other sections of this Project Manual, submit shop drawings, product data or samples to the Architect for review.
3. Submittals deemed unnecessary by the Architect shall be returned indicating “No Action Taken”.
4. A completed copy of the transmittal form included with the Project Manual shall accompany each submittal.
5. Submittals shall be numbered consecutively.
6. Unless otherwise noted, submit one copy electronically of shop drawings and product data for review. Review comments will be returned electronically. A hard copy of the electronic submittal will be returned if requested.
7. Where samples are required, submit one (1) sample of each required item.
8. Shop drawings are drawings, diagrams, schedules and other data specifically prepared for this project by the Contractor, Manufacturer, Supplier, or Distributor to illustrate some portion of the work. Shop Drawings shall also detail fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.

a. Shop drawings shall be drawn to accurate scale and of adequate size to illustrate required details.

9. Product data are illustrations, standard schedules, performance charts, instruction brochures, diagrams and other information furnished by the Contractor, Manufacturer, Supplier, or Distributor to illustrate a material, product or system for some portion of the work.
10. Samples are physical examples furnished by the Contractor, Manufacturer, Supplier, or Distributor to illustrate materials, equipment or workmanship and to establish the standards by which the work will be performed.
11. Each submittal shall clearly indicate proposed items, capacities, characteristics and details in conformance with contract documents. Equipment items shall be marked with the same item number as used on drawings or schedules. Capacities, dimensions and special features required shall be certified by the manufacturer.
12. Submittals shall indicate manufacturer's delivery time for the item after review by the Architect.
13. When required by other sections of this Project Manual, the Contractor shall submit a Specification Compliance Review consisting of a paragraph-by-paragraph review of the specifications and addenda with the following marked for each paragraph. Markings may be made in the margins of the original specification or addenda. Unless a deviation or exception is specifically noted in the Specification Compliance Review, it is assumed that the equipment, product, or material is in complete compliance with the contract documents. Submit Specification Compliance Review with shop drawings and product data.
    a. “C”: Comply with no exceptions.
    b. “D”: Comply with minor deviations. For each deviation, provide the reasons for the deviation and how the intent of the specification can be satisfied.
    c. “E”: Exception. Equipment, product, or material does not comply. For each exception, provide reasons for the exception, and suggest possible alternatives for the Owner’s consideration.
    d. “N/A”: The paragraph does not apply to the proposed equipment, product, or material.
14. The Architect shall review or take other appropriate action upon the Contractor's submittals such as shop drawings, product data and samples, but only to determine conformance with the design concept of the work and the information given in the contract documents.
15. Contractor shall not be relieved of responsibility for any deviation from the requirements of the contract documents by the Architect's review of shop drawings, product data or samples.
16. Contractor shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect's review of those drawings.
17. No portion of the work requiring submission of a shop drawing, product data or sample shall be commenced until the submittal has been reviewed by the Architect. Such portions of the work shall be in accordance with reviewed submittals.
18. The successful Contractor/Supplier may, at their option, obtain DXF or AutoCad DWG electronic drawing files for use in preparation of shop drawings.

a. This information is available from Alvine Engineering upon written request.
b. A non-refundable handling charge of $10.00 per drawing file requested will be required at the time of receipt of the electronic files.
c. The use of these drawing files is intended solely for the preparation of drawings as required by these contract documents.
d. Any other use is strictly prohibited by copyright laws.
e. The user of these electronic drawing files assumes full responsibility for their accuracy and scale.

B. Operation and Maintenance Manuals:
1. Prepare three (3) operation and maintenance manuals for the equipment furnished. Manuals shall be submitted to the Architect for review and distribution to the Owner not less than 30 days prior to substantial completion of the project. Manuals not meeting the following requirements may be rejected by the Architect.
2. Each manual shall be assembled in a three-ring binder with hard cover and plastic finish. Binders shall not exceed a 3-inch thickness. Where more than one binder is required, the manuals shall be separated into a logical grouping, i.e., “Mechanical”, “Electrical”, “Maintenance”, “Operation”, “Parts”, Shop Drawings”, etc. Each binder shall have the following information clearly printed on its front cover:
a. Project name and address.
b. Portion of the work covered by each volume (if more than one volume in the set). Where more than one volume is required, label each volume as “Volume _____ of _____”.
c. Name, address and telephone number of Contractor and Sub-Contractors including night or emergency number.
3. Manual shall include, but shall not be limited to, the following:
a. A Complete Index. Contractor may submit the index to the Architect for review prior to submittal of complete manuals if desired.
b. Names, Addresses and Telephone Numbers. This list shall include the manufacturer and local representative who stocks or furnishes repair parts for all items of equipment and shall be typed on a single page in front of the binder.
c. Startup, Operation and Shutdown Procedures. Provide a written description of procedures for startup, operation and shutdown of each electrical item or system. This description shall include switches to operate, buttons to push, etc., in proper sequence, and the location of switches, starters, and pushbuttons. Description shall include item references or labels used in the contract documents unless otherwise instructed in advance by the Owner.
d. Equipment Accessory Schedule. Upon completion of the work, furnish the Owner with a complete equipment accessory schedule listing each piece of equipment and the related size, type, number required and the manufacturer of renewable items.
e. Manufacturer's Operation and Maintenance Manuals and Parts Lists.
f. Emergency Procedures. Provide a written description of emergency operating procedures or a list of service organizations (including addresses and telephone numbers) capable of rendering emergency

services to the various parts of the system.

g. One copy of shop drawings and product data, clearly marked for each item furnished using the designation label specified or indicated on Drawings.

h. Manufacturers' warranty information.

i. Normal Maintenance Schedule. Include a listing of work to be performed at various time intervals; i.e., 30, 90, 180 days and yearly.

1.13 OPERATING TRAINING

A. Complete operating instructions for each system and item of equipment shall be provided to the Owner's designated personnel.

B. Operation and Maintenance Manuals must be reviewed and accepted by the Architect and provided to the Owner prior to operating training.

C. Training shall be scheduled at the convenience of the Owner. A minimum of 4 hours of training shall be provided.

D. Training shall include instructions on the following:
1. Startup and shutdown procedures
2. Periodic maintenance
3. Emergency operation
4. Safety

E. In addition to the instructions required above, wherever possible perform the operations being described in order to fully illustrate system operation.

F. At the completion of training, turn over to the Owner required keys and special tools for installed equipment. Each key or tool shall be labeled with its use.

1.14 INSTRUCTIONAL DVDS

A. Upon completion of the project and before final payment is made, furnish the Owner with DVDs containing instructions for the operation and maintenance of the following equipment or systems:
1. ____.

B. DVDs shall meet the following criteria:
1. DVDs shall be standard format or other format as directed by the Owner.
2. Each DVD shall be delivered complete with an individual storage case.
3. Both the DVD and the storage case shall be clearly labeled with the title and date of production and the names, addresses and phone numbers of the Contractor and all people responsible for the production of the tapes.
4. DVDs shall be clearly titled at the beginning of the tape and on the cassette itself. Titles shall include a list of the equipment covered within the DVD. The list shall be in order of presentation.
5. The presentation shall be rehearsed.
6. The DVDs shall contain professional quality audio and video with adequate lighting of subject.

7. The operation and maintenance instructions for each item of equipment shall be preceded by a title.
8. The DVDs shall contain instructions for operation and maintenance under both normal and emergency conditions.
9. The DVDs may incorporate any manufacturer video pertaining to the care, operation and/or maintenance of the item of equipment being presented.
10. Any manufacturer's DVD shall be professional quality.
11. Operation and maintenance instructions for an item of equipment shall include demonstrations at the location of the equipment after installation and labeling is completed. Operation or maintenance need not be performed for the demonstration but should be clearly demonstrated in the minimum detail covered in the Operation and Maintenance Manual for that item of equipment. The angle and field of vision shall be optimum for instructional purposes and shall approximate the view of the individual performing the operation or maintenance being demonstrated. The field of vision shall not begin so narrow that the orientation of the viewer is lost.

C. The production of DVDs shall not interfere with the work of other trades or with the work of the Owner's personnel. Coordination with other trades and with the Owner shall be the responsibility of the Contractor.

D. Instructional DVDs may be produced in conjunction with the operating instructions required above.

1.15 QUALITY ASSURANCE

A. Conform to the requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories Inc. or testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.16 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment.
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

C. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning

before closing in the building.

D. Coordinate electrical service connections to components furnished by utility companies.
   1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
   2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

E. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.

F. Coordinate electrical testing of electrical, mechanical, or architectural items so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

G. Provide offsets and elevation changes in conduit and cable tray as required to complete the Layout and Coordination Process.

1.17 STRUCTURAL COORDINATION

A. In cases where the Contractor determines that superimposed loads such as suspended or floor mounted electrical system or equipment exist which exceed design loads indicated on structural contract documents, Contractor shall submit load data to Architect for review prior to proceeding with work.

B. Distribute the maximum load hung from any structural member for mechanical, electrical, plumbing, ductwork, piping, etc. over the member's tributary area in a way that the design superimposed dead loads listed in structural contract documents are not exceeded. The Contractor shall coordinate the loads and provide additional support or distribution framing as required achieving the allowable load distribution.

C. Connections of systems designed by Contractor's engineer such as, but not limited to mechanical, electrical, plumbing loads are assumed to impose vertical and/or horizontal loads on the base building structural members without generating torsion in the supporting structural members. Contractor is responsible for furnishing and installing all supplementary bracing members as required to prevent torsion on the base building structure.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A. See Drawings for Equipment Schedules for Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 EQUIPMENT SHORT CIRCUIT CURRENT RATING

A. Where the National Electrical Code or applicable codes require equipment to be marked with a Short Circuit Current Rating (SCCR), the equipment shall be manufactured as required such that the SCCR of the equipment meets or exceeds the available short circuit current at the equipment. Acceptable methods of complying with this requirement

are as follows:

1. Provide SCCR rating at the equipment that meets or exceeds the available short circuit current at the switchboard or panelboard where the equipment circuit originates.
2. Provide calculations, based on the available short circuit current at the switchboard or panelboard where the equipment circuit originates, that document the actual short circuit current available at the equipment. The SCCR rating of the equipment shall meet or exceed this calculated value.

2.3 MATERIALS

A. Unless otherwise specified, all materials and equipment shall be new, unused and undamaged. Materials and equipment shall be the current and standard designs of manufacturers regularly engaged in their production.

2.4 MATERIALS AND EQUIPMENT FURNISHED BY OTHERS

A. Where materials and equipment are indicated as furnished by others and installed or connected under this contract, it shall be the Contractor's responsibility to verify installation details and requirements.

2.5 QUANTITY OF SPECIFIED ITEMS REQUIRED

A. Wherever in these specifications an article, device or piece of equipment is referred to in the singular number; such reference shall apply to as many such articles as are shown on the drawings or required to complete the installation.

2.6 SLEEVES

A. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.7 ACCESS DOORS

A. Manufacturers:
   1. Access Doors:
      a. J. L. Industries
      b. Karp Associates, Inc.
      c. Larsons Mfg. Co.
      d. Milcor, Inc.
      e. Miller Limited Partnership
      f. Nystrom, Inc.

B. Prime coated 14 gauge steel, flush, with screwdriver operated cam lock, frame to accommodate construction type; size as indicated.

PART 3 EXECUTION

3.1 GENERAL

A. Fabrication, erection, and installation of the complete electrical system shall be done by qualified personnel experienced in such work and shall proceed in an orderly manner so

as not to hold up the progress of the project.

B. Check areas and surfaces where electrical equipment or materials are to be installed and report any unsatisfactory conditions before starting work.

C. Commencement of work signifies the Contractor's acceptance of the conditions as fit and proper for the execution of the electrical work.

D. Install equipment and systems in accordance with manufacturer's instructions, requirements, or recommendations.

E. Comply with NECA 1.

F. Unless otherwise noted, measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

G. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

H. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

I. Right of Way: Give to raceways and piping systems installed at a required slope.

J. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

3.2 DELIVERY AND STORAGE OF MATERIALS

A. Make provisions for the delivery and safe storage of materials. Make the required arrangements with other contractors for the introduction into the building of equipment too large to pass through finished openings.

B. Materials shall be delivered at such stages of the work as will expedite the work as a whole and shall be marked and stored in such a way as to be easily checked and inspected.

C. Adequately protect supplies and equipment during cold weather.

D. Protect items subject to cold weather damage by covering, insulating, or storing in a heated space.

3.3 COOPERATION WITH OTHER CONTRACTORS

A. Perform the electrical work in conformance with the construction called for by other trades and afford other contractors reasonable opportunity for the execution of their work.

B. Properly connect and coordinate the electrical work with the work of other contractors at such time and in such a manner as not to delay or interfere with their work.

C. Examine the contract documents for the General, Mechanical, and Electrical work and the work of other trades. Coordinate work accordingly.

D. Promptly report to the Architect any delay or difficulties encountered in the installation of the electrical work which might prevent prompt and proper installation of work required from other trades.

3.4 COORDINATION OF WORK

A. Plan work so it proceeds with a minimum of interference with other trades.

B. Inform the General Contractor of all openings required in the building construction for the installation of the electrical work.

C. Cooperate with other contractors in furnishing material and information, in proper sequence, for the correct location of sleeves, inserts, foundations, wiring, etc.

D. Make provisions for special frames, openings, and sleeves as required.

E. The Electrical Contractor shall pay for extra cutting and patching made necessary by his failure to properly direct such work at the correct time.

3.5 LAYING OUT WORK

A. Carefully lay out work in advance of installation using data and measurements from the site, the appropriate civil, architectural, and structural drawings, and shop drawings.

B. Confirm code required clearances.

C. Do not infringe upon space required for operation, maintenance, or clearance for items installed by other contractors.

D. Prior to installation of any work, make certain the location does not conflict with other items in or near the same location.

E. If the layouts so prepared indicate that the required conditions cannot be met in the space provided, inform the Architect prior to installation and request clarification.

F. Failure to properly coordinate and lay out work will require correction by the Contractor at the Contractor’s expense

3.6 DATA AND MEASUREMENTS

A. Mechanical and Electrical drawings are diagrammatic or schematic. Do not scale drawings.

B. The data given herein and on the drawings is as accurate as could be secured; absolute accuracy is not guaranteed.

C. Obtain exact locations, measurements, levels, etc., at the site and adapt their work to actual conditions.

D. Examine the General Construction, Mechanical, Electrical, and other applicable drawings and the Specifications.

E. Utilize only Architectural drawings, Structural drawings, and site measurements in calculations.

F. Layout and coordinate work prior to installation to provide clearances for operation, maintenance and codes. Verify non-interference with other work.

G. Locate outlets and devices mounted on finished surfaces with regard to paneling, furring, trim, etc.

H. Install outlets and devices with vertical edges of plates plumb.

I. Install boxes or plaster rings such that the front edge extends to the finished surface of the wall, ceiling or floor without projecting beyond the surface.

J. Install receptacles, switches, etc., on wood trim, cases, or other fixtures symmetrically and, where necessary, install with the long dimension of the plate horizontal.

K. Coordinate locations of outlets and devices with other contractors so as not to destroy the aesthetic effect of the surface in which the outlets and devices are mounted. Coordinate the locations of electrical items with work furnished by other trades to avoid interference.

L. Heights of outlets are measured from finished floor to centerline of device.

M. Adjust heights as necessary to clear wall-mounted cabinets, fin tube convectors, unit heaters, etc.

N. Mounting heights shall be in compliance with ADA requirements.

O. The mounting heights of disconnect switches, circuit breakers, motor controllers, pushbutton stations and other similar devices and equipment may vary depending upon location and whether individually or group mounted.

P. For convenience and safety, mount equipment with the center of operating levers, handles or buttons no more than 72 inches above the finished floor.

Q. Locate individual devices or pieces of equipment, unless otherwise specified, so the operating handle, lever or button is located approximately 5 feet above finished floor. Coordinate heights of electrical items with work furnished by other trades to avoid interferences.

R. Improperly located devices or outlets shall be relocated by the Contractor at the Contractor's expense including necessary patching.

3.7 PROTECTION OF APPARATUS

A. Take necessary precautions to properly protect apparatus, fixtures, appliances, material, equipment, and installations from damage.

B. Failure to provide such protection to the satisfaction of the Architect shall be sufficient cause for the rejection of any particular piece(s) of material, apparatus, equipment, etc., concerned.

3.8 SLEEVE INSTALLATION

A. Coordinate sleeve selection and application with selection and application of firestopping.

B. Concrete Slabs and Walls: Install sleeves during erection of slabs and walls. Space sleeves a minimum of three sleeve diameters on center, unless otherwise noted. Sleeves are not required for core-drilled penetrations.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Sleeves through walls: Install flush with both surfaces of wall.

E. Sleeves through floors: Extend 2 inches above finished floor.

F. Sleeves through roofs: Seal with flexible boot-type flashing units applied in coordination with roofing work

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceways or cable unless sleeve seal is to be installed.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

3.9 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to maintain fire-resistance rating of assembly.

3.10 WORK IN EXISTING BUILDINGS

A. Execute work in the existing building, indicated on the drawings or specified herein, with a minimum amount of interference with the normal activities of the occupants of the building.

B. Schedule work in advance with the Owner and proceed only with the Owner's written approval.

C. Utilities:
   1. Do not interrupt utilities without the Owner's prior written approval regarding the time and duration of such interruptions, minimum 72 hours notice.
   2. Do not disconnect utilities to existing facilities until new or temporary facilities are installed except for short periods of interruption which are necessary for the performance of the new work and which are approved by the Owner.

D. Fire Alarm System:
   1. As a minimum, maintain the existing degree of protection for all areas throughout construction.
   2. Coordinate required outages with the Owner and the Fire Marshal, minimum 72 hours notice.
   3. After any additions or modifications to the fire alarm system, a re-acceptance test shall be performed by a licensed party in accordance with NFPA 72.

E. Noisy Operations:
   1. Schedule noisy operations, such as those involving use of air hammers, etc., in demolition or cutting of openings, with the Owner.

F. Occupancy:
   1. The Owner will continue to occupy the building and carry on normal activity.
   2. Protect the occupied areas from dust, smoke, etc., by a method reviewed by the Architect.

G. Owner's Right to Direct Work: The Owner shall have the right to direct the places of beginning work, its prosecution, and the manner in which all work under this contract is to be conducted, insofar as may be necessary to secure the safe and proper progress and quality of the work.

H. Existing Conduits or Electrical Equipment:
   1. Remove or relocate, as required, or as directed by the Architect, existing conduit or electrical equipment which would interfere with the proper installation of new work.
   2. Modify existing work in conformance with these specifications.
   3. Use the same materials as for new work unless otherwise specified.

3.11 DEMOLITION AND REMODEL

A. Protect existing electrical equipment and installations indicated to remain.

B. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

C. Verify existing conditions in field prior to bid date.

3.12 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations.

B. Perform cutting by skilled mechanics of trades involved.

C. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces.

D. Install new fireproofing where existing firestopping has been disturbed.

E. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.13 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work. Repair as necessary.

3.14 CLEANING AND PROTECTION

A. Remove burrs, dirt, paint spots, and construction debris from electrical items.

B. Protect electrical items so that finishes are without damage or deterioration at time of Substantial Completion.

C. All cables and wiring shall be protected from paint. This includes but is not limited to power conductors and feeders, lighting control wiring, and fire alarm cabling. Painted cables shall be replaced in their entirety.

END OF SECTION

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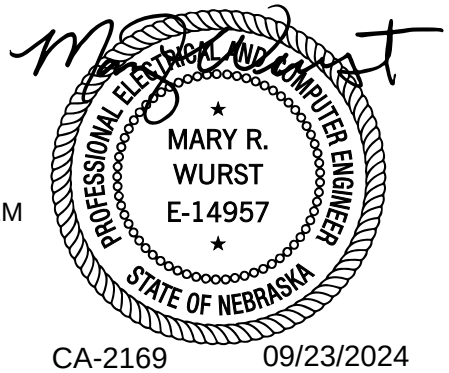
SECTION 27 32 43

EMERGENCY RESPONDER RADIO ENHANCEMENT SYSTEM



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PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Emergency Responder Radio Enhancement system including all components, wiring, and conduit for complete coverage of the facility.

1.2 REFERENCE CODES AND STANDARDS

A. 47 CFR 15 - Radio Frequency Devices.

B. ICC (IFC) - International Fire Code.

C. NFPA 70 - National Electrical Code.

D. NFPA 1221 - Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems.

E. NFPA 72 - National Fire Alarm and Signaling Code.

1.3 DEFINITIONS

A. DAQ: Delivered Audio Quality.

B. FACP: Fire Alarm Control Panel.

C. SINR: Signal to Interference plus Noise Ratio.

1.4 SUBMITTALS

A. Shop drawings submitted for pre-bid approval must be submitted at least 10 days prior to the bid date.

B. Submittals to Authorities Having Jurisdiction: Prior to submitting to the Architect, submit product data and shop drawings to authorities having jurisdiction. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to the Architect for review. Submittals received without the approval of authorities having jurisdiction will be returned with no action taken.

C. Product Data: Manufacturer's data sheets for each system component.

D. Shop Drawings: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
   1. Copy (if any) of list of data required by authority having jurisdiction.

2. System interfaces to fire safety systems.
3. Floor plans indicating locations of components. Show interconnection of devices.
4. Riser Diagram: Indicate circuiting, amplifiers and cable types.
5. Frequency band information and technical criteria received from the authority having jurisdiction.
6. Resume of qualifications.

E. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.

F. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration.

G. Maintenance Materials. Furnish the following for Owner's use in maintenance of project.
1. Interior Antennas: One of each type installed.
2. Keys: Three of each different key.

1.5 QUALITY ASSURANCE

A. Designer Qualifications: FCC-issued General Operators License, employed by radio equipment manufacturer, Contractor, or installer.

B. A resume of qualifications shall be submitted with the shop drawings indicating the following:
1. A list of five recently completed projects of similar type and size with contact names and telephone numbers for each.

C. Provide products listed and labeled by testing firm acceptable to the authority having jurisdiction as suitable for the purpose indicated.

1.6 WARRANTY

A. Guarantee work for a period of one year from the date of Substantial Completion. A manufacturer’s warranty beginning upon equipment receipt or startup shall be extended to one year from Substantial Completion. A manufacturer’s warranty in excess of one year shall remain in effect for its entire time period.

PART 2 - PRODUCTS

2.1 EMERGENCY RESPONDER RADIO ENHANCEMENT SYSTEM

A. Radio System: Provide a new Emergency Responder Radio Enhancement system:
1. Provide all components necessary for a complete and operating system.
2. Comply with the following:
a. The Americans With Disabilities Act (ADA).
b. The requirements of the State Fire Marshal.
c. The requirements of the local authority having jurisdiction.
d. The requirements listed and other applicable codes.

3. Coordinate with existing electrical, mechanical, and technology system code and maintenance required clearnances.

2.2 COMPONENTS

A. General:
1. Unless otherwise indicated, provide flush-mounted or semi-recessed units where installed in finished areas; in unfinished areas, surface-mounted units are acceptable.

B. Repeater/Amplifier:
1. Enclosure: NEMA 4- or 4x type enclosure. Arrange interior components so operations required for testing or for normal maintenance of the system are performed from the front of the enclosure.
   a. Mounting: Surface-mount.
   b. Keys: Common to all system components.
2. Trouble and Supervisory Systems: Automatic supervisory and trouble signals for repeater and power supply malfunctions. Monitor with fire alarm system monitor modules. Signals shall include the following:
   a. Donor antenna malfunction.
   b. Failure of critical system components.
   c. Failure of active RF emitting devices.
   d. Failure of link between the fire alarm system and the Emergency Responder Radio Enhancement system.
   e. Loss of normal AC power.
   f. Failure of battery charger.
   g. Low-battery capacity, when battery capacity reaches 70 percent.
3. Power Supply:
   a. Battery Capacity: Sufficient to operate entire system for period specified by applicable codes without the use of a generator.
   b. Battery Charger: Solid state, automatic with variable charging rate with capacity for 150 percent of connected system load while maintaining batteries at full charge.

C. Antennas:
1. Indoor Antennas: Ceiling mount with appropriate mounting hardware.
2. Donor Antenna: Mounting brackets and hardware appropriate for mounting location and compatible with roofing.

D. Cabling:
1. Type as recommended by the system manufacturer to meet survivability requirements and applicable codes.

PART 3 EXECUTION

3.1 INSTALLATION

A. It shall be the responsibility of the equipment supplier or his representative to determine the locations and types of components necessary to provide the required signal strength and coverage.

B. Install wiring in metal raceways. Conceal conduit, boxes, and supports where installed in finished areas

C. Install the radio system in accordance with approved manufacturer's wiring diagrams. Furnish all conduit, wiring, outlet boxes, junction boxes, cabinets, and similar devices necessary for a complete installation.

D. Coordinate system programming with the authority having jurisdiction.

E. Coordinate the installation of equipment and devices that pertain to the work of other trades with the appropriate contractors.

F. Install in accordance with applicable codes and the contract documents.

3.2 RADIO COVERAGE

A. Critical Areas:
   1. Provide 99 percent floor area radio coverage for fire pump room, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the authority having jurisdiction.

B. General Building Areas:
   1. Provide 95 percent floor area radio coverage for general building areas.

C. Signal Strength:
   1. When required to be tested by applicable codes or by the authority having jurisdiction, provide a minimum inbound/outbound signal strength throughout the coverage area as required by the authority having jurisdiction.

D. Delivered Audio Quality (DAQ):
   1. When required to be tested by applicable codes or by the authority having jurisdiction, provide minimum inbound and outbound signal level not less than the required DAQ level, as specified by the authority having jurisdiction.

3.3 DEVICE INSTALLATION

A. Provide devices as indicated on drawings and as required to perform specified functions.

B. Antennas:
   1. Interior Antennas:
      a. Provide ceiling mounted antennas. Coordinate with other trades.
   2. Donor Antennas:

a. Install donor antenna on roof in a manner which will maintain the roofing system warranty.
b. Coordinate antenna location with other trades. Do not interfere with working clearances of equipment or personnel access walkways.
c. Location, pathway, and installation intent to be reviewed onsite with owner prior to comensing installation.

C. Repeater/Amplifier Enclosure:
1. Mount repeater a maximum of 72 inches above finished floor to the top of the cabinet.
2. Provide a 4-inch space between adjacent equipment and 3-foot working clearance in front of enclosure and behind any rack-mounted equipment.

3.4 INTERCONNECTION TO OTHER SYSTEMS

A. Alarm Indicating:
1. Provide wiring in conduit as required from supervisory and trouble contacts in repeater to fire alarm control panel. Coordinate with Fire Alarm Contractor.

3.5 IDENTIFICATION

A. Label each amplifier, coupler, interior antenna and donor antenna with a visible mechanically printed label. Include room number in label. Label ID should match ID on drawings.

B. Uniquely identify the component to the originating amplifier and coaxial branch.

C. Affix inbound and outbound frequencies for each amplifier to its enclosure.

D. Affix the name and telephone number of the local service organization to central amplifier enclosure.

3.6 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of a factory-authorized service representative to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Test the system as required to meet applicable codes and as required by the authority having jurisdiction. Document test procedures and submit to the authority having jurisdiction for as-built purposes.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents and applicable codes.

3.7 OWNER PERSONNEL INSTRUCTION

A. Furnish the services of a manufacturer's authorized representative to perform training.

B. Schedule training with the Owner through the Architect, with at least seven days advance notice.

C. Provide a minimum of four hours training.

D. Point out the locations of all equipment.

E. Provide hands-on instruction using operational system.

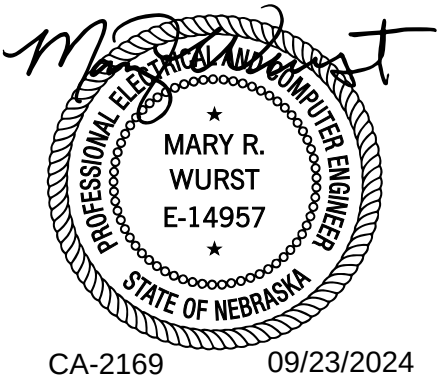
F. Provide instructional DVD.

3.8 MAINTENANCE

A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of the emergency responder radio enhancement system for five years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

1. Conduct site visit at least once every each year to perform inspection, testing, and preventive maintenance. Submit report to Owner indicating maintenance performed along with evaluations and recommendations.
2. Maintain an on-site log listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced.

END OF SECTION



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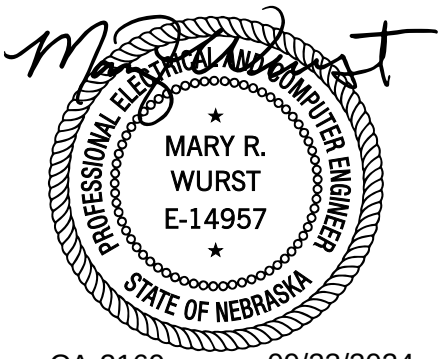

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SECTION 28 46 00

FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.

B. NFPA 70 - National Electrical Code.

C. NFPA 72 - National Fire Alarm and Signaling Code.

1.2 DEFINITIONS

A. FACP: Fire Alarm Control Panel

1.3 SUBMITTALS

A. Submittals to Authorities Having Jurisdiction: Prior to submitting to the Architect, submit product data and shop drawings to authorities having jurisdiction. Resubmit if required to make clarifications or revisions to obtain approval. On receipt of comments from authorities having jurisdiction, submit them to Architect for review. Submittals received without the approval of authorities having jurisdiction will be returned with no action taken.

B. Product Data: Manufacturer's data sheets for each system component.

C. Shop Drawings: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
   1. Copy (if any) of list of data required by authority having jurisdiction.

D. Inspection and Test Reports:
   1. Submit inspection and test plan prior to closeout demonstration.
   2. Submit documentation of satisfactory inspections and tests.
   3. Submit NFPA 72 "Inspection and Test Form," filled out.

E. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:

1.4 QUALITY ASSURANCE

A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer .

B. Provide products listed and labeled by testing firm acceptable to the authority having jurisdiction as suitable for the purpose indicated.

1.5 WARRANTY

A. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Notifier: www.notifier.com

2.2 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide modifications and extensions to the existing automatic fire detection and alarm system:
   1. Provide all components necessary, regardless of whether shown in the contract documents or not.
   2. Comply with the following:
      a. The Americans With Disabilities Act (ADA).
      b. The requirements of the State Fire Marshal.
      c. The requirements of the local authority having jurisdiction .
      d. NFPA 72 and other applicable codes.
   3. Fire Alarm Control Panel (FACP): Existing.

2.3 EXISTING COMPONENTS

A. Maintain existing fire alarm system in a fully operational condition until new equipment has been tested and accepted.

B. Do not interrupt fire alarm service to the facility unless approved by the Owner.
   1. Obtain written approval from the Owner.
   2. Provide minimum 72 hours notice in advance of interruption of service.
   3. Provide a temporary fire watch for the duration of the service interruption as required by the Owner or the authority having jurisdiction.

C. Clearly label components that are "Not In Service."

D. Remove unused existing components and materials from site and dispose of properly.

2.4 COMPONENTS

A. General:
   1. Unless otherwise indicated, provide flush-mounted or semi-recessed units where installed in finished areas; in unfinished areas, surface-mounted units are acceptable.

B. Fire Alarm Control Units, Initiating Devices: Analog, addressable type; listed by Underwriters Laboratories or other testing agency acceptable to authority having jurisdiction as suitable for the purpose intended.

C. Initiating Devices:

D. Addressable Interface Devices:
1. Monitor Module: Allows individual monitoring of non-addressable points.
2. Control Module: Provides a system address to relays for control functions.
a. Relay: 24 VDC coil; contacts rated 10A, 115 VAC, minimum; suitable for control function required.

E. Circuit Conductors:
1. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 degrees C, color-coded insulation.
a. Low-Voltage Circuits: No. 14 AWG, minimum.
b. Line-Voltage Circuits: No. 12 AWG, minimum.
2. Power-Limited Circuits: Types FPL, FPLR, or FPLP, as recommended by manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. The locations and spacing of alarm initiating devices and notification appliances indicated on the drawings are approximate. Quantities indicated are minimum. The equipment supplier shall verify device requirements and spacing and shall add devices as required to satisfy governing authorities. It shall be the responsibility of the equipment supplier or his representative to determine the type of detector required by local authorities for each type of installation.

B. Install the fire alarm system in accordance with approved manufacturer’s wiring diagrams. Furnish all conduit, wiring, outlet boxes, junction boxes, cabinets, and similar devices necessary for a complete installation. Boxes shall be installed in accessible spaces without requiring the removal of light fixtures or any other equipment.

C. Coordinate system programming with the authority having jurisdiction.

D. Coordinate the installation of equipment and devices that pertain to the work of other trades with the appropriate contractors.

E. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.

F. Install wiring in metal raceways.

G. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

H. Install end-of-line resistors at farthest device from panel or module.

I. Ground cable shields and equipment according to manufacturer's instructions.

J. Install instruction cards and labels.

3.2 DEVICE INSTALLATION

A. Provide devices as indicated on drawings and as required to perform specified functions.

B. Control Devices:
   1. Provide control modules and relays as required to implement the required control sequences.

3.3 INTERCONNECTION TO OTHER SYSTEMS

A. Emergency Responder Radio Enhancement System:
   1. Provide monitor modules as necessary for monitoring status of the Emergency Responder Radio Enhancement system.
   2. Coordinate with Emergency Responder Radio Enhancement system installer.

3.4 IDENTIFICATION

A. Label each control module to indicate the equipment controlled.

B. Maintain wiring color codes throughout the system.

3.5 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of a factory-authorized service representative to supervise inspection and testing, correction, and adjustments.

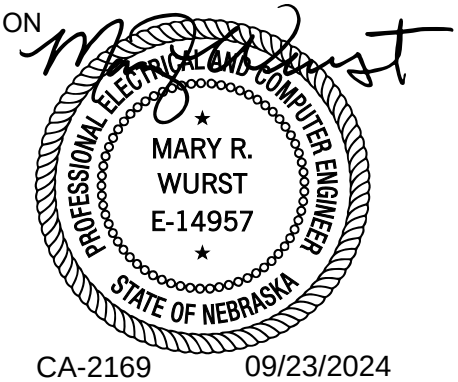
D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents and applicable standards.

END OF SECTION



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Appendix

Native/Unamplified Signal Test Report

Emergency Responder Radio Coverage
Native/ Unamplified Signal Test Report

Date Prepared:	Apr 29, 2024
Test File:	Forest Station - 042924
Test Location:	Forest Station Elementary
Jobsite Address:	1010 Childs Rd. W, Bellville, NE. 68147
FCC#:	0031482201

The test results set forth in this report reflect conditions at the time of testing.

PROJECT DETAILS

Job:	Forest Station Elementary School
Bldg Type/Use:	Existing: K-12
Address:	1010 Childs Rd W, Bellevue, NE 68147
Coverage Area:	80,000 SF/ 2 Levels
County:	Sarpy County, Nebraska
AHJ:	Bellevue Fire Department / Omaha Public Schools
Fire Codes & AHJ Policy:	International Fire Code (IFC) Section 510, Edition 2021
Public Safety Radio System:	ORION P25 >Sarpy County Simulcast: 800 MHz
Required Signal Coverage:	RSSI: -95 dBm in 99% Critical Areas & 95% General Building Areas
	Delivered Audio Quality (DAQ): 3.0 in 100% of building (measured in Bit Error Rate/BER)
Tower:	1238725 (2.73 miles from Jobsite)

CONTACTS

TECHNICAL:
Marc Zucker
marc@veridastech.com
mobile/direct: 314-296-1055

BUSINESS:
Amy Zucker
amy@veridastech.com
mobile/direct: 317-502-2489

Building: Forest Station
Result: Fail

Test Report Summary

Channel/ Ch Group	Freq (MHz)	Technology	Band	Result	Area Points passed (%)	Critical Points passed (%)
Sarpy County CCs 042924: 1, 2, 3, 4	858.23750 858.98750 859.23750 859.78750	P25	Sarpy County CCs	Fail	19/29 (65%)	0/0 (0%)

Test Details			
Number of Floors Tested:	3	**Result Calculation:**	By area per floor
Number of Areas Tested:	29	**Area Pass Criteria:**	95%
Number of Critical Points Tested:	0	**Critical Points Pass Criteria:**	99%
		Apply Adjacent Area Rule:	No

Equipment Configuration

Vendor	Application	Device	Calibration Expires	Antenna info
PCTEL	SeeHawk Touch rel 4.2.0.5	SeeGull IBflex Device rel 3.9.6.0 SN: 082309002	9-25-2025	Ant1:SEEHAWK

Threshold Settings

Measurement	DL Area Point	DL Critical Point	DL Use for grading
P25 Power (RSSI)	-95.0 dBm	-95.0 dBm	Yes
P25 S/N (SINR)	20.0 dB	22.0 dB	Yes
P25 FBER	2.0 %	1.5 %	Yes
DAQ	3.0		Yes

Sample collection method

Measurement	Sample Collection Method
P25 Traffic Channels Power	Max
P25 Control Channels Power	Average
P25 Traffic Channels SINR	Average

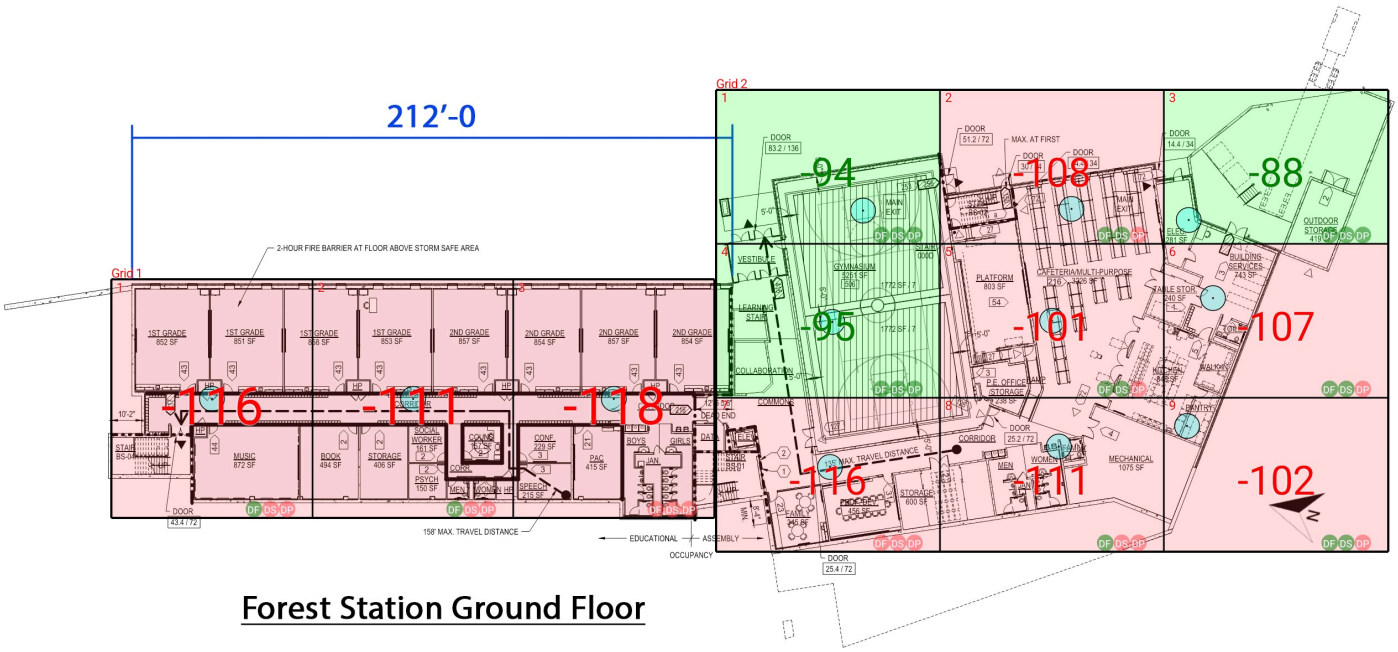
Floors Result

Floor Plan	Sarpy County CCs 042924
Forest Station Ground Floor - 042624	Fail
Forest Station First Floor - 042624	Fail
Forest Station Second Floor - 042524b	Pass

Floor: Forest Station Ground Floor

Group: Sarpy County CCs 042924 Channels: 1, 2, 3, 4
Result: Fail

Freq (MHz)	Tech	Band	Ant Gain	Cable Loss	Ph.	Type	Mod	NAC	Area Points passed (%)	Critical Points passed (%)
858.23750	P25	Sarpy County CCs	0.00	0.00	1	CC	CQPSK	146	3/12 (25%)	0/0 (0%)
858.98750					1	CC	CQPSK	146		
859.23750						CC				
859.78750					1	CC	CQPSK	146		



Forest Station Ground Floor

Grid	# of Areas	Area Size (sq. ft)	Area Width (ft)	Area Height (ft)	Ignore Area Color	Comments
1	3	5954.65	70.86	84.03	Black	
2	9	4280.45	78.98	54.20	Black	

Floor: Forest Station Ground Floor

Group: Sarpy County CCs 042924 Channels: 1, 2, 3, 4

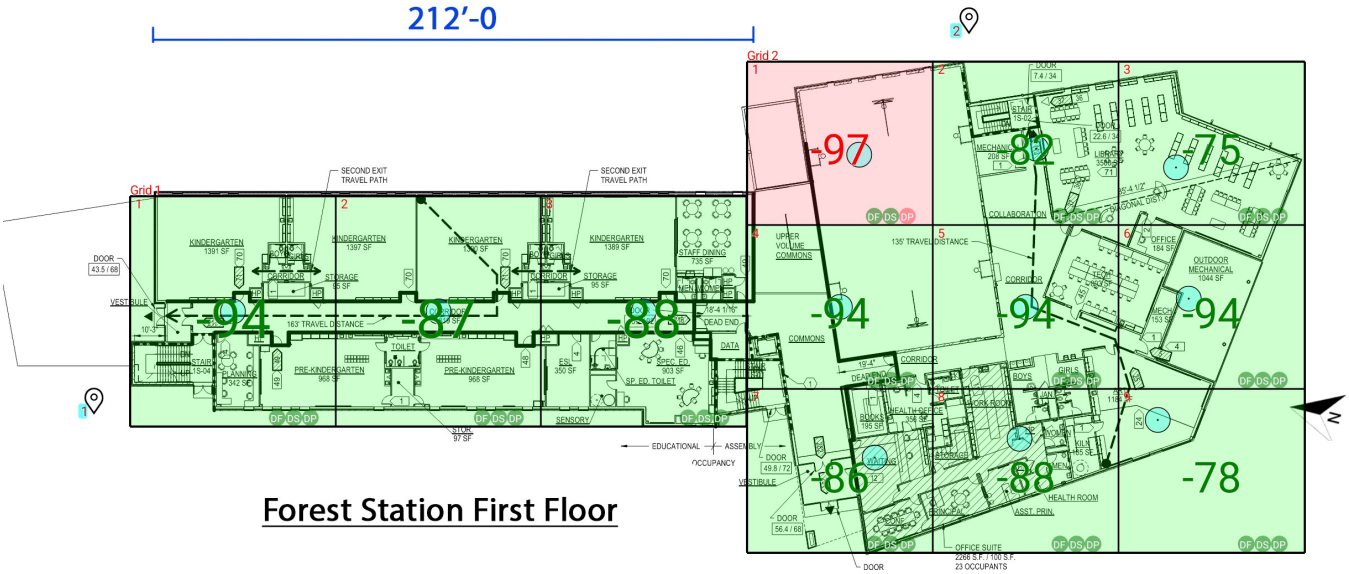
Area Points

Grid	Area	DL Power (dBm)	DL S/N (dB)	DL FBER (%)	DL DAQ	Result	DL Loss (dB)	Comment
1	1	-116.00	11.70	1.04		Fail		
1	2	-110.42	18.62	0.00		Fail		
1	3	-117.48	9.57	8.10		Fail		
2	1	-93.60	33.28	0.00		Pass		
2	2	-107.85	20.21	0.00		Fail		
2	3	-87.29	34.79	0.00		Pass		
2	4	-94.24	33.04	0.00		Pass		
2	5	-100.22	28.43	0.00		Fail		
2	6	-106.26	25.72	0.00		Fail		
2	7	-116.00	11.77	4.50		Fail		
2	8	-110.54	19.42	0.00		Fail		
2	9	-101.83	27.82	0.00		Fail		

Floor: Forest Station First Floor

Group: Sarpy County CCs 042924 Channels: 1, 2, 3, 4
Result: Fail

Freq (MHz)	Tech	Band	Ant Gain	Cable Loss	Ph.	Type	Mod	NAC	Area Points passed (%)	Critical Points passed (%)
858.23750	P25	Sarpy County CCs	0.00	0.00	1	CC	CQPSK	146	11/12 (91%)	0/0 (0%)
858.98750					1	CC	CQPSK	146		
859.23750						CC				
859.78750					1	CC	CQPSK	146		



Forest Station First Floor

Grid	# of Areas	Area Size (sq. ft)	Area Width (ft)	Area Height (ft)	Ignore Area Color	Comments
1	3	5926.03	72.76	81.45	Black	
2	9	3811.70	65.84	57.89	Black	

Floor: Forest Station First Floor

Group: Sarpy County CCs 042924 Channels: 1, 2, 3, 4

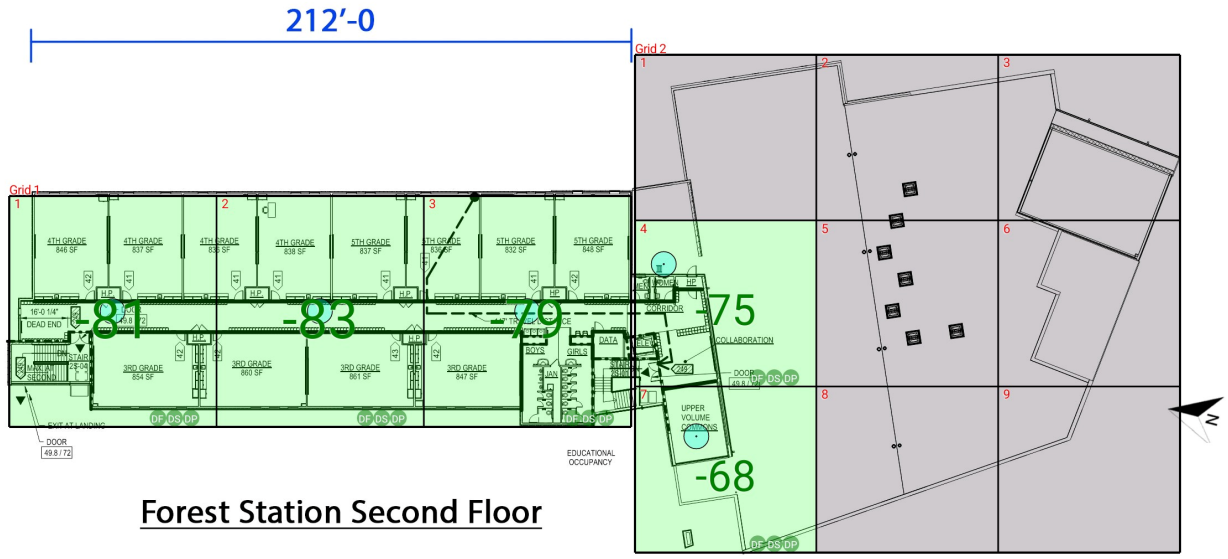
Area Points

Grid	Area	DL Power (dBm)	DL S/N (dB)	DL FBER (%)	DL DAQ	Result	DL Loss (dB)	Comment
1	1	-93.13	32.48	0.00		Pass		
1	2	-86.83	35.35	0.00		Pass		
1	3	-87.87	35.48	0.00		Pass		
2	1	-96.29	30.90	0.00		Fail		
2	2	-81.50	36.14	0.00		Pass		
2	3	-74.79	36.10	0.00		Pass		
2	4	-93.20	33.07	0.00		Pass		
2	5	-93.61	32.53	0.00		Pass		
2	6	-93.70	32.00	0.00		Pass		
2	7	-85.65	35.34	0.00		Pass		
2	8	-87.79	34.98	0.00		Pass		
2	9	-77.38	36.24	0.00		Pass		

Floor: Forest Station Second Floor

Group: Sarpy County CCs 042924 Channels: 1, 2, 3, 4
Result: Pass

Freq (MHz)	Tech	Band	Ant Gain	Cable Loss	Ph.	Type	Mod	NAC	Area Points passed (%)	Critical Points passed (%)
858.23750	P25	Sarpy County CCs	0.00	0.00	1	CC	CQPSK	146	5/5 (100%)	0/0 (0%)
858.98750					1	CC	CQPSK	146		
859.23750						CC				
859.78750					1	CC	CQPSK	146		



Forest Station Second Floor

Grid	# of Areas	Area Size (sq. ft)	Area Width (ft)	Area Height (ft)	Ignore Area Color	Comments
1	3	5957.29	73.20	81.38	Black	
2	9	3752.29	64.16	58.48	Black	

Floor: Forest Station Second Floor

Group: Sarpy County CCs 042924 Channels: 1, 2, 3, 4

Area Points

Grid	Area	DL Power (dBm)	DL S/N (dB)	DL FBER (%)	DL DAQ	Result	DL Loss (dB)	Comment
1	1	-80.13	36.13	0.00		Pass		
1	2	-82.40	36.32	0.00		Pass		
1	3	-78.99	36.66	0.00		Pass		
2	1	NT	NT	NT	NT	NT		
2	2	NT	NT	NT	NT	NT		
2	3	NT	NT	NT	NT	NT		
2	4	-74.04	35.32	0.00		Pass		
2	5	NT	NT	NT	NT	NT		
2	6	NT	NT	NT	NT	NT		
2	7	-67.09	37.04	0.00		Pass		
2	8	NT	NT	NT	NT	NT		
2	9	NT	NT	NT	NT	NT		

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UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

General Radiotelephone Operator License

ATTN: MARC
ZUCKER, MARC
2 CITY PLACE DRIVE
PO BOX SUITE 200
SAINT LOUIS, MO 63141

FCC Registration Number (FRN): 0031482201

Special Conditions / Endorsements
NONE

Grant Date	Effective Date	Print Date	Expiration Date
10-14-2021	10-14-2021	10-15-2021	

File Number	Serial Number	
0009754195	PG00070853	

THIS LICENSE IS NOT TRANSFERABLE

(Licensee's Signature)

FCC 605-FRC - May 2007

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Licensee: This is your radio authorization in sizes suitable for your wallet and for framing. Carefully cut the documents along the lines as indicated and sign immediately upon receipt. They are not valid until signed.

The Commission suggests that the wallet size version be laminated (or another similar document protection process) after signing. The Commission has found under certain circumstances, laser print is subject to displacement.

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Serial Number	Grant Date	Expiration Date	File Number	Print Date	Effective Date
PG00070853	10-14-2021		0009754195	10-15-2021	10-14-2021

FCC Registration Number (FRN)
0031482201

ATTN: MARC
ZUCKER, MARC
2 CITY PLACE DRIVE
PO BOX SUITE 200
SAINT LOUIS, MO 63141

General Radiotelephone Operator License

FCC 605-FRC - May 2007

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THIS LICENSE IS NOT TRANSFERABLE
Special Conditions / Endorsements:
NONE

(Licensee's Signature)
FEDERAL COMMUNICATIONS COMMISSION

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