

SECTION 1

PROJECT SUMMARY

1.01 SUMMARY

- A. Clawson Public Schools (the "Owner") is soliciting Bids until **2:30 PM, March 4, 2022 (the "Due Date")** for the purchase of a Structured Cabling System (SCS) for the new middle school to be constructed from Fall 2022 to Spring 2023 opening in Fall 2023; followed by a major renovation of the existing middle school from Summer 2023 to Spring 2024 into the new elementary school opening in Fall 2024 all on the Clawson campus. Also, additional cabling in the new Trojan Hall at Clawson High School in Summer 2022.
- B. All questions and correspondence concerning this Request for Bid ("RFB") should be submitted to Scott Brune at Wright & Hunter, Inc. Address all correspondence and questions to sbrune@wrighthunter.com.
- C. The Owner reserves the right to accept or reject any and all Bids, either in whole or in part, to waive any informalities or irregularities therein, and to award the Contract to other than the Bidder(s) submitting the best financial Bid (low bidder), in its sole and absolute discretion. The Owner may award a contract to a single prime Contractor for all elements for the entire Project or may award any of the elements separately.
- D. Contractors must submit a single Bid for all of the elements described in this RFB. No Bid may be withdrawn after the Due Date for the receipt of Bids for at least ninety (90) days.
- E. The formal Bids to be received will be evaluated by several criteria including but not limited to cost, concurrence with technical specifications and requirements, with priority on a timely installation schedule.

1.02 UNIVERSAL SERVICE FUND (USF) CONDITION

- A. IDENTIFICATION NUMBER: The service provider's USF Service Provider Identification Number (SPIN) *must* be included in the Bid. Direct all questions regarding the USF requirements in this RFB to the Universal Service Administrative Company (USAC), Schools and Library Division (SLD) at (888) 203-8100.
- B. FY2022 FUNDING REQUESTS: The specified products and/or services are to be provided for FY2022 (July 1, 2022-June 30, 2023) and must qualify for universal service discounts under the FY2022 universal service support mechanism, E-Rate. The *E-rate Modernization Order* permits applicants to seek support for Category 2 eligible non-recurring services purchased on or after April 1, three months prior to the start of the

funding year on July 1. No invoices to USAC/SLD will be DATED or PAID before July 1, 2022.

- C. UNIVERSAL SERVICE DISCOUNTS: The service provider contract is conditional upon the Owner receiving universal service discounts under the FY2022 universal service support mechanism, E-Rate. The Owner reserves the unrestricted right to reduce the contract amount by reducing the amount of services and/or products in order to meet budget requirements in the event the level of the universal service discounts is reduced. Any such reductions to the contract amount will be taken prior to the start of the specific work being reduced or eliminated on a given building and/or Project.
- D. UNIVERSAL SERVICE DISCOUNT IMPLEMENTATION: The Owner reserves the unrestricted right to specify the filing option for the universal service discounts for each product and/or service offered within a Bid: Billed Entity Applicant Reimbursement (BEAR) or Service Provider Invoice (SPI).
- E. ELIGIBLE PRODUCTS AND SERVICES: The USF eligible products and/or services identified on the USAC FY2022 Eligible Services List, which is incorporated herein by reference, must be identified separately from any and all “ineligible” products and/or services in the Bid.
- F. PROJECT FUNDING REQUIREMENTS: This Project is entirely conditional upon receiving written notification in the form of a Funding Commitment Decision Letter from the USAC/SLD that the Owner has been approved for E-Rate Funding. If the Owner receives less than the full E-Rate Funding for which it applies, the Owner has the unrestricted right to reduce the number of units and services in the accepted Bid. In the event that E-Rate Funding is not available for the accepted Bid, Owner, in its discretion, may cancel and/or modify the Scope of Work (SOW) and subsequent purchases requested in this RFB.
- G. LOWEST CORRESPONDING PRICE: Lowest Corresponding Price (LCP) is defined as the lowest price that a service provider charges to non-residential customers who are similarly situated to a particular E-rate applicant for similar services. Service Providers cannot charge E-rate applicants a price above the Lowest Corresponding Price (LCP) and must actually charge the rate that is the LCP, not just offer the LCP in the Bid. In addition, promotional rates offered by a Service Provider for a period of more than 90 days must be included among the comparable rates upon which the LCP is determined.

1.03 INTRODUCTION

- A. The intent of this RFB is to secure under contract, all labor, materials, equipment and services of every kind necessary for the proper installation and maintenance of SCS in accordance with the technical specifications included in this RFB and ANSI/TIA-568B.1-E, ANSI/TIA-568.2-D and ANSI/TIA-568.3-D.

- B. This RFB solicits Bids for SCS to meet the current and projected needs of the Owner.

1.04 STATEMENT OF PURPOSE

- A. This RFB solicits Bids for the following major elements as detailed in the specifications section.
1. Provide and install Category 6/6A cabling, telecommunications outlets, patch panels, faceplates, and related components the new Clawson Middle School to be constructed from Fall 2022 to Spring 2023 opening in Fall 2023; followed by a major renovation of the existing middle school from Summer 2023 to Spring 2024 into the new elementary school opening in Fall 2024 all on the Clawson campus.
 2. Provide and install Optical Fiber backbone cabling at the new Clawson Middle School and Clawson High School.
 3. Provide and install new cabinets in the new Clawson Middle School MDF and new elementary school MDF and IDF and the renovated existing middle school into the new elementary school. Utilize existing equipment cabinets in Clawson High School.
 4. Provide and install grounding and bonding to equipment ground bus in all MDF and IDF communication closets.
 5. Provide system testing, documentation, and system warranty.
 6. Provide all equipment materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that all components are in compliance with the requirements stated or reasonably inferred by the Contract Documents.

1.05 TIMETABLE

- A. The anticipated timetable of key dates for this RFB are as follows:

1.	RFB Available for Contractors	January 28, 2022
2.	Contractor Questions Due	February 10, 2022 by 5:00 PM
3.	Answers Due	February 16, 2022 by 5:00 PM
4.	Bids Due Date	March 4, 2022 at 2:30 PM
5.	Award to Contractor	April 25, 2022
6.	New MS Start Date	June 1, 2022
7.	New MS Completion Date	March 20, 2023
8.	New ES Start Date	June 1, 2023
9.	New ES Completion Date	March 20, 2024

1.06 COVID-19 SAFETY PROTOCOL REQUIREMENTS

- A. Daily health self-assessment form shall be submitted through The Christman Company's form by all Contractor staff on all days the Contractor is onsite.
- B. Wearing of masks at all times while onsite.
- C. Maintaining 6-feet of social distance while onsite.
- D. Complying with additional future requirements deemed necessary by the Owner.
- E. Submit a copy of the Contractor's COVID-19 Preparedness and Response Plan to the Owner.

1.07 WORK HOURS

- A. All Work shall be performed from 7:00 AM to 4:00 PM.

1.08 FAMILIAL RELATIONSHIP DISCLOSURE STATEMENT

- A. As required by Public Act 232 of 2004, all Bids shall be accompanied by a sworn and notarized statement disclosing any familial relationship that exists between the owner or any employee of the Contractor and any member of the Clawson Public Schools board, or the superintendent of the School District.
- B. The Owner will not award a bid from a Contractor that does not submit this sworn and notarized disclosure statement.

1.09 IRAN ECONOMICS SANCTIONS ACT

- A. As required by the Iran Economic Sanctions Act, Public Act 517 of 2012, all Bids shall be accompanied by a sworn and notarized statement certifying that the Contractor is not an "Iran linked business" within the meaning of Act.
- B. The Owner will not award a bid from a Contractor that does not submit this sworn and notarized disclosure statement.

SECTION 2

CONTRACTOR INFORMATION & BIDDING PROCEDURES

CONTRACTOR INFORMATION

2.01 CONTRACTOR RESPONSIBILITY

- A. At the time of the Bid opening, each Contractor shall have examined the premises and sites to compare them with this RFB Documents.
- B. Failure or omission of any Contractor to examine any form, instrument or document contained in this RFB shall in no way relieve any Contractor from any obligation with respect to their Bid. No allowances or extra payment will be made to a Contractor for failure to comply with the provisions of this Section, or by reason of error or oversight on the part of the Contractor.
- C. It is understood, and the Contractor hereby agrees, that it shall be solely responsible for all equipment and/or services that it bids. Notwithstanding the details presented in these specifications, it is the responsibility of the Contractor to verify the completeness of the equipment required and its suitability to meet the intent of this Bid. Each system bid shall be for a complete turnkey system.
- D. The Owner reserves the right to withdraw this RFB at any time or the right to accept or reject any and all Bids, either in whole or in part, submitted in response to this RFB, without penalty. The Owner also reserves the right to waive any informalities or irregularities therein, and to award the Contract to other than the Contractor(s) submitting the best financial Bid (low bidder), in its sole and absolute discretion. The Owner further reserves the right to select a single Contractor as a prime for the entire Project or for only portions of it. The Owner will be the sole judge of its needs and of the best elements of a Bid to meet those needs. The Owner's decision is final.
- E. Bids containing terms and conditions different from this section of this RFB may be rejected.

2.02 CONTRACT LIABILITY

- A. The Contractor will be required to assume responsibility for all contractual activities offered in this Bid whether or not the Contractor performs them. Further, the Owner will consider the Contractor to be the sole point-of-contact with regard to contractual matters, including payment of any or all charges resulting from the anticipated Contract. If any part of the Work or component of the Bid configuration is to be subcontracted, such Bids must include a list of subcontractors, including firm name and address, contact person, complete description of Work to be subcontracted or

component to be provided and descriptive information concerning the subcontractor's responsibilities.

- B. The Owner reserves the right to approve subcontractors for this Project and to require the Contractor to replace subcontractors found to be unacceptable. The Contractor is totally responsible for adherence by the subcontractor to all provisions of the Contract. All Contract clauses between the Owner and the Contractor shall also apply to any contract between the selected Contractor and its subcontractor(s).

2.03 BID MODIFICATIONS

- A. Any exceptions, explanations or statements, which the Contractor wishes to make, must be written on or attached to the Bid Form. Unless indicated, it is understood that the Bid is in strict accordance with all requirements and specifications contained in this RFB, including the Contract. The Technology Designer and/or the Owner may request additional information to clarify the Contractor's Bid, to verify responsiveness to mandatory specifications, or to facilitate the fair comparison of competing Bids.
- B. Bids shall be deemed final, conclusive and irrevocable. No Bid shall be subject to correction or amendment for any error or miscalculation unless unit prices for the additional or missing item(s) are included on the Bid Form. Submitted Bids may be adjusted by unit prices up or down to ensure all Bids submitted are compliant and compared fairly. Bid prices shall provide for a complete turnkey system as specified. Installation shall include, but is not limited to, all labor required for a turnkey system.

2.04 DISCREPANCIES, OMISSIONS AND INTERPRETATIONS

- A. Contractors shall promptly notify Wright & Hunter (the "Technology Designer") of any ambiguities, inconsistencies or errors, which it may discover upon examination of this RFB, the Bid Form, Drawings, AIA documents, the Contract, purchase orders generated by the Owner, any addenda to the aforementioned documents and all other documents pertaining to the Structured Cabling System (the "Contract Documents") or of the site and local conditions. A Contractor requesting clarification or interpretation of the Bid/Contract Documents shall make a written request no later than **February 10, 2022 by 5:00 PM.** E-mail all questions to:

Scott Brune
Email: sbrune@wrighthunter.com

- B. All questions and answers will be shared with all Contractors issued through the SIGMA and School District websites via addenda which shall become part of this RFB. Each Contractor must in its Bid, to avoid any miscommunication, acknowledge all addenda which it has received, but the failure of a Contractor to receive, or acknowledge receipt of, any addenda shall not relieve the Contractor of the responsibility for complying with the terms thereof.

- C. If prior to the Due Date for submission of Bids, a Contractor fails to notify the Technology Designer of a known error in this RFB or of an error that reasonably should have been known to the Contractor and if a Contract is awarded to the Contractor, the Contractor shall not be entitled to additional compensation or time, by reason of the error or its later correction.
- D. In the event it becomes necessary to provide additional clarifying data or information, or to revise any part of this RFB, addenda or revisions will be provided to all known recipients of the initial RFB.
- E. Failure to acknowledge receipt of addenda or revisions, in accordance with the instructions contained in such addenda or revision, may result in Bids not being considered. Each Contractor's Bid shall stipulate that it is predicated upon all the terms and conditions of this RFB and any addenda or revisions thereto.
- F. The submission of a Bid is an acknowledgment to comply with all terms of this RFB, the form of Contract and any other Bid/Contract Documents, except and only to the extent that the Contractor provides an express objection to a provision or provisions in writing, attached as a separate document along with its Bid Form, and specifically identifying the objection and providing a Bid alternative thereto. Any exceptions to the terms and conditions contained in the Contract, or any other special considerations or conditions requested or required by the Contractor relative to this RFB or the form of Contract shall be expressly/specifically enumerated by the Contractor and be submitted as part of its Bid, together with an explanation as to the reason such terms and conditions cannot be met by; provided however, that exceptions or special conditions of the Contractor will not be binding upon the School District unless those exceptions or special conditions are expressly accepted by the School District, and incorporated into the final Contract.

2.05 WITHDRAWAL OF BIDS

- A. Bids may be withdrawn, modified and resubmitted at any time prior to the time set for the Due Date of Bids. The Contractor may not withdraw its Bid prices during the ninety (90) day period immediately following the Bid opening. All Bids and Bid prices shall be guaranteed for that period of time.
- B. When the selected Contractor(s) (the "Contractor") receives the notice of award from the Owner within the above ninety (90) day period, it shall guarantee the prices through the interval required through the duration of the Project.

2.06 ACCEPTANCE OF BID

- A. The Contract Documents shall include all bidding requirements and specifications, the terms of this RFB, the form of Contract, approved Project specifications and approved

Project manual. Except as to any specific objection as required by Paragraph 1.04.E above, all of the foregoing, as well as the accepted portions of the Contractor's Bid shall become contractual obligations of the Contractor upon award by the Board of Education. Failure of the successful Contractor to accept these obligations in a contractual agreement may result in cancellation of the award and this RFB, forfeiture of the entire Bid bond, and any additional damages incurred by the Owner. If the terms, conditions or assumptions included in the Contractor's Bid or response to this RFB differ from the Contract Documents, the terms and conditions that are most favorable to the Owner, as determined in the Owner's sole discretion, shall be binding.

2.07 SYSTEM ACCEPTANCE

- A. Payment will be made only to the successful Contractor for services properly performed under the Contract. The Owner will withhold retainage of 10% until final payment, which will follow the Contractor's fulfillment of all obligations.

2.08 INSPECTION OF WORK AND ACCEPTANCE TESTS

- A. The Contractor shall at all times, permit and facilitate inspection of the Work by the Technology Designer and by public authorities having jurisdiction. The Technology Designer shall have the authority to stop the Work, if necessary, to insure its proper execution. Tests will be performed and documented by the installing Contractor and turned over to the Owner as part of the "as-built" drawings at the time of completion. Deviations and/or corrections to the installation will be completed within ten (10) working days.

2.09 REQUIRED BONDS

- A. At the time Bids are submitted, Contractors are required to submit a ninety (90) day Bid Guarantee Bond (5% of the total dollar amount).
- B. The successful Contractor will be required to furnish a Labor and Materials Bond valued at the full amount of the Contract at the time the Contract is awarded for all labor and materials to be contracted and, in any event, before any Work commences.
- C. The successful Contractor will be required to furnish a Performance Bond valued at the full amount of the Contract at the time the Contract is awarded and, in any event, before any Work commences.

2.10 INSURANCE

- A. The Contractor shall purchase and maintain insurance for protection from the claims set forth below which may arise out of or result from the Contractor's operations under the Contract, whether such operations be by the Contractor or Subcontractor, or by anyone directly employed by any of them:

1. Claims under workers or workmen's compensation, disability benefits and other similar employee benefit acts;
 2. Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
 3. Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
 4. Claims for damages insured by usual personal injury liability coverage, which are sustained by any person as a result of an offense directly, related to the employment of such person by the Contractor;
 5. Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom; and
 6. Claims for damages because of bodily injury or death of any person or property damage arising out of the maintenance or use of any motor vehicle. The insurance required shall be written in the following minimum limits:
 - a. General Liability:
 - 1) \$2,000,000
 - 2) Including personal injury and property damage
 - 3) \$2,000,000 each aggregate
 - b. Automobile Liability:
 - 1) \$2,000,000
 - 2) \$2,000,000 each aggregate
 - c. Workers' Compensation:
 - 1) As required by the State of Michigan
 - d. Employers' Liability:
 - 1) \$2,000,000
 - 2) \$2,000,000 each aggregate
- B. Certificates shall name the Owner, Wright & Hunter, and Oakland Schools as additional insured.
- C. The Contractor's insurance shall either be (i) occurrence-based and in effect from the commencement of work and for 18 months following final completion of the work, or (ii) claims-based and in effect from the commencement of work and in effect for 6 years following final completion of the work.

2.11 QUANTITIES

- A. It is understood and agreed that the Owner reserves the right to either increase or decrease quantities and to buy additional services under the terms of any Contract resulting from this Bid, so long as in accordance with law.

2.12 PRICES

- A. Purchase prices shall remain firm throughout the entire Contract.
- B. The Contractor must use the Bid Form included with this RFB. If additional pages are necessary, they must be in the same format as the original.
- C. Any rebates applied in response to this RFB must be applied to line item pricing, and not be included as one lump sum.

2.13 RECIPROCAL PRICING

- A. The District technology services are managed by Oakland Schools. Oakland Schools is an intermediate school district acting as a regional service agency for all school districts located in Oakland County, Michigan.
- B. As a member of the Oakland Schools community, Clawson Public Schools requests that the successful bidder offer the extended unit prices, as defined in this RFB, to any requesting Oakland County school districts for duration of the project or a minimum of one (1) year.
- C. By submitting a bid, the bidder agrees to the terms above.

2.14 ALTERNATIVES

- A. All Bids must be based upon the specifications included in this RFB. In addition to a base Bid, the submission of voluntary alternatives is acceptable. The base Bid must conform to the materials, labor and terminations established by the Bid specifications in this RFB. The Contractor must Bid the base Bid to be eligible to Bid an alternative. Each Contractor must identify in their response any deviations to the scope of Work and any construction requirements not addressed.

2.15 CERTIFICATION OF INDEPENDENT PRICE DETERMINATION

- A. By submission of a Bid, the Contractor certifies, and in the case of a joint Bid, each party thereto certifies as to its own organization, that in connection with this procurement:

1. The prices in this Bid have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Contractor or with any competitor.
 2. Unless otherwise required by law, the prices, which have been quoted in this Bid, have not been knowingly disclosed by any Contractor and will not knowingly be disclosed by the Contractor prior to procurement or prior to award in the case of a negotiated procurement, directly or indirectly to any other Contractor or to any competitor.
 3. No attempt has been made or will be made by the Contractor to induce any other person or firm to submit or not to submit a Bid for the purpose of restricting competition.
- B. Each person signing this Bid certifies that:
1. He/she is the person in the Contractor's organization responsible within that organization for the decision as to the prices being offered herein.
 2. He/she is not the person in the Contractor's organization responsible within that organization for the decision as to the prices being offered herein, but that he/she has been authorized in writing to act as agent for the persons responsible for such decision.
- C. By submission of Contractor's Bid to this Project, the Contractor certifies, and in the case of a joint Bid, each party thereto certifies as to its own organization, that in connection with this procurement: that no relationship exists between the Contractor and the procuring or contracting agency that interferes with fair competition or is in conflict of interest, and no relationship exists between the Contractor and another person or organization that constitutes a conflict-of-interest that is adverse to the Owner.

2.16 PROPRIETARY INFORMATION

- A. This is a public Bid. Information submitted in response to this RFB is subject to Freedom of Information Act requests and to be viewed by any interested party by request. Any Bids identified in whole or in part as proprietary will be disqualified.
- B. Unless specifically excluded from this provision, all data, documentation and innovations resulting from contractual services will become the property of the Owner. Data contained in the Bid and all documentation provided as a result of these contractual services cannot be copyrighted and innovations developed as a result of these contractual services cannot be copyrighted or patented. Bids must clearly specify any data, documentation, software, or other innovations that are bid to be excluded

from this provision and specifically provide, where applicable, for licensing of these materials to the Owner for the life of the system.

2.17 NONCOMPLIANCE

- A. Failure to include in the Contractor's Bid all information requested in this RFB may be cause for rejection of the Bid. When responding to this RFB, please clearly state whether your firm complies with each section.

2.18 COST LIABILITY

- A. The Owner assumes no responsibility or liability for costs incurred by the Contractor prior to the signing of any Contract resulting from this RFB.

BIDDING PROCEDURES

2.19 SEALED BID RECEIPT

- A. BIDS MUST BE RECEIVED VIA EMAIL TIME STAMPED ON OR BEFORE THE DUE DATE AND TIME SPECIFIED. CONTRACTORS ARE RESPONSIBLE FOR TIMELY RECEIPT OF THEIR BID. BIDS WHICH ARE RECEIVED AFTER THE SPECIFIED DUE DATE AND TIME WILL NOT BE CONSIDERED.
- B. Clawson Public Schools will receive sealed bids for the Work as set forth in the Bid Specifications and Bid Forms (collectively the "RFB Documents") on or before **2:30 PM on March 4, 2022** (the "Due Date") to:

Scott Brune
Wright & Hunter
Email: sbrune@wrighthunter.com

- C. Clawson Public Schools will not consider or accept a Bid received after the Due Date, the date and time specified for Bid submission.
- D. If the District is closed for any reason on the due date, the due date will be extended to the next open school day at the same time.
- E. Bids will be publicly opened and read aloud immediately following the Due Date for submission of Bids via a WebEx meeting. You may attend the WebEx bid opening by clicking the link and entering the meeting information below:

- 1. WebEx Link:
<https://oneoakland.webex.com/oneoakland/j.php?MTID=m673e7ef14394bf551110f74f3d15c7e9>

- a. Meeting number (access code): 2300 456 3714
 - b. Meeting password: GTgmrMJ3D76
2. Join by phone:
 - a. Telephone number: 1-415-655-0001 US Toll
 - b. Access code: 230 045 63714

2.20 BID REQUIREMENTS

- A. Provide the following information as required under each tab, assembled in a PDF complete with a Table of Contents. All pages shall have page numbers, which shall be included in the Table of Contents.
- B. The Table of Contents shall be as follows:
 1. Tab No. 1 Cover Letter
 2. Tab No. 2 Required Bid Forms and Documents
 - a. Microsoft Word Document
 - 1) Bid Forms
 - 2) Familial Relationship Disclosure Statement
 - 3) Iran Economic Sanctions Act Disclosure Statement
 - 4) Criminal Background - Sex Offender Affidavit
 - b. Bid Bond or Bid Surety
 - c. Bill of Materials by Building shall include a complete bill of materials depicting quantities, manufacturer, catalog number, complete description, material unit price, extended price and labor cost breakdown.
 3. Tab No. 3 Organizational Chart / Schedule / Manpower
 4. Tab No. 4 Structured Cabling System
 5. Tab No. 5 Warranty, Maintenance and Service Agreements
 6. Tab No. 6 Company Profiles for Prime Contractors, Major Subcontractors and Major Suppliers
 7. Tab No. 7 Miscellaneous (Optional)

C. Description of Contents:

1. Tab No. 1, Cover Letter, shall include an executive overview of the Project and depict the Contractor's complete understanding of the Project.
2. Tab No. 2, Required Bid Forms and Documents, shall include a completed Bid Form with price break downs by building and completion dates, the Familial Relationship Disclosure Statement, Iran Economic Sanctions Act Disclosure Form and Criminal Background - Sex Offender Affidavit.

Other required forms include a Bid Bond or Bid Surety, and Appendix A shall include a complete bill of materials, by building depicting quantities, manufacturer, catalog number, complete description, material unit price, labor cost breakdown and extended price.

3. Tab No. 3, Organizational Chart, shall depict the prime Contractor, the subcontractors, major suppliers, Project managers, superintendents, executive staff of each firm, service staff, the names of the individuals occupying those positions, telephone numbers, and e-mail addresses of all individuals on the organizational chart.

a. The Contractor shall provide a schedule that depicts major milestones required to achieve the completion dates previously specified. Typical milestone events are as follows:

- 1) Equipment delivery date and installation dates.
- 2) Completion of system install / power up by site.
- 3) Installation completion dates
- 4) Final testing dates
- 5) Provide an estimate of anticipated manpower required at each building to meet the specified completion dates.

4. Tab No. 4, Structured Cabling System, shall include the following information:

- a. Manufacturers' names.
- b. Installation company's name.
- c. Number of years installing similar infrastructure.
- d. List of clients of similar size and type with contact information.
- e. Description of system operations.
- f. Equipment model numbers.
- g. System configuration.
- h. Complete bill of material indicating quantities (include line item prices), product descriptions, part numbers, and take-off for the products being provided must be included. Lump sum discounts are not acceptable.

5. Tab No. 5, Warranty information with sample maintenance and service contracts. Include current service rates, trip charge rates and any additional charges that may apply.
6. Tab No. 6 and 7 are self-descriptive as to their intended content.

SECTION 3

CONTRACT REQUIREMENTS

3.01 GENERAL

- A. A form of Contract is included with this RFB and shall be binding between the Owner and Contractor (the "Contract"). It is acknowledged that the form of Contract incorporates by reference the terms of this RFB and, in the event of any conflict among the Contract Documents; the provision most beneficial to the Owner shall govern. Notwithstanding the foregoing, the Owner reserves the right in its sole discretion to negotiate any term of the Contract prior to Contract award so long as any negotiated term does not affect the propriety of the competitive bidding process. While not limiting the breadth of the form of Contract's incorporation of the RFB, the following are all required Contractual provisions:

3.02 LAWS AND PERMITS

- A. The Contractor shall comply with all federal, state and municipal laws, rules, regulations, ordinances, or orders governing or affecting in any way the Work under this Contract, including board of education policies. Additionally, the Contractor must follow both the School District's and Construction Manager's COVID-19 requirements and Contractor's own Preparedness and Response Plan prior to coming to a School District Facility. Also, the Contractor shall give all notices and obtain all permits necessary and required for the Work and shall pay all costs and fees for the same. The Contractor must furnish copies of all approved inspection certificates and approvals from authorities having jurisdiction within thirty (30) days of completion and acceptance of Work as evidenced by applicable acceptance documents.
- B. Where appropriate, all equipment and installation workmanship shall comply with specifications contained in Electronics Industries Association Standards and the National Electrical Code. As pertinent, all equipment shall be FCC-certified, FCC type accepted and/or UL listed. All Work shall be conducted according to the standards of good engineering practice.

3.03 PROTECTION OF PERSONS AND OTHER STRUCTURES

- A. The Contractor agrees to exercise special precautions to avoid damage to facilities of the Owner and others. The Contractor hereby assumes responsibility for any and all damage to such facilities arising out of or caused by the conduct or property of the Contractor, whether by the negligence of the Contractor, its agents, employees or subcontractors. The Contractor shall make an immediate report to the Owner and the Technology Designer of any damage to the facilities or others. The Contractor hereby

agrees to repair or replace at their own expense or to reimburse the Owner for expenses incurred by the Contractor in making necessary repairs and replacements.

- B. The Contractor shall assume all responsibility for bodily injury to persons, including death or damages sustained or claimed by its employees, the employees of the Owner, or by any other person, and also for damage to property, including property of the Contractor, the Owner or any other person; and also, for any interruptions to electric or community antenna television or other communications service which may occur or allegedly occur because of, or result from, or in any manner are connected with, or directly or indirectly, arise out of or are caused in whole or in part by the material provided or the Work performed by the Contractor, its agents, employees or subcontractors under the Contract.

3.04 SAFETY

- A. Each Contractor shall be responsible for its own safety and hazard program. Each program shall be in accordance with provisions of the Occupational Safety and Health Act (OSHA), Michigan OSHA (MIOSHA), the Environmental Protection Agency (EPA), and the Material Safety Data Sheets (MSDS). The Contractor shall maintain an effective safety program and conform to all federal and local safety codes. Upon written request by the Owner and/or the Project Manager, the Contractor shall provide the registered programs documenting safety and hazard programs.
- B. During Projects in construction zones or if site conditions require, the Contractor and all of his/her staff, agents and/or subcontractors must wear Contractor provided hard hats anytime they are onsite. The Contractor shall assume sole responsibility and liability for hat usage of his/her staff, agents and/or subcontractors.

3.05 IMPLEMENTATION PLAN

- A. The successful Contractor must prepare and submit a final implementation plan and timeline as part of the final Contract Documents. The Contractor and the Owner will mutually determine the critical dates that must be met, so long as consistent with the then-applicable Project Schedule. The Contractor will be required to adhere to, meet and maintain activities to the timeline schedule as planned. The Contractor will also be required to be flexible towards changes in the priorities of the timeline schedule during the entire Project and will make all related changes at no additional cost to the Owner.

3.06 ADDITIONAL RESOURCE REQUIREMENTS

- A. If the Contractor fails to complete the Project or a segment of the Project within the time period agreed to in the Contract Documents, and if as a result, the Owner finds it necessary to incur any additional costs and/or expenses (for example, needing to hire additional Contractors to complete Work which is not being completed in a timely or

satisfactory manner), the Contractor shall pay all those costs and expenses incurred by the Owner. These costs and expenses may include, but are not limited to, such items as additional hours spent by the Technology Designer, additional architectural fees and fees related to the acquisition of additional Contractors to complete the job. These costs and expenses may be retained by the Owner from any payments otherwise due to the Contractor for Work, which has not been completed within the terms of the Contract Documents. The Owner may hire additional Contractors if seven (7) day notice has been given to the Contractor and the Contractor has failed to remedy the failure, to act in accordance with the notice, or has repudiated the Contract. Failure by the Contractor to give adequate assurances when deadlines on the timeline have not been met will also result in the Owner's right to bring in other Contractors to complete the Contract or a segment of the Contract.

3.07 CLEAN-UP AND MAINTENANCE

- A. During preparation and construction, the Project area must be kept free from scrap and debris in accordance with established safety and health standards. Upon completion of Work, each day and at the end of the Project, the Contractor will be held responsible to clean up and remove debris from the site. Damage to any portion of equipment or existing structure is the responsibility of the Contractor and repairs must be completed before acceptance and final payment is issued.

3.08 PAYMENT FOR SERVICES

- A. No later than two (2) weeks prior to the date of the first application for payment, the Contractor shall furnish the Owner with a breakdown of the Contract amount setting forth the schedule of values of labor and materials of the various parts of the Work on which the Contract is based as detailed from the specifications or as further directed by the Owner. A meeting between the Technology Designer and the Contractor shall also be required before the first application for payment is submitted to set forth the procedure and format in which all applications are to be submitted. Final payment will be made only after the successful completion of a performance-testing period, the Owner's acceptance of the system and final documentation has been received and approved by the Technology Designer and the Owner.
- B. Final payment by the Owner to the Contractor shall be made within thirty (30) days of final completion, Owner acceptance of the system as installed and receipt and approval of final documentation by the Technology Designer and the Owner.
- C. Ten percent (10%) of the total Contract amount will be withheld and will not be paid until after final acceptance, which includes submission and approval by the Owner and the Technology Designer of all Work, testing results, documentation and as-built drawings.

3.09 CONTRACT PAYMENT SCHEDULE

- A. The Contractor shall pay all sales, consumers, use and any and all other applicable taxes required by law.
- B. The Technology Designer will review and certify the accuracy of invoices for the Owner's subsequent review, approval and payment. Certification by the Technology Designer that the invoice is an accurate account of Work properly performed does not prevent the Owner from disputing the propriety of any applicable payment. Any questions regarding the payment process should be directed to **Rob Richcreek** at **(248) 767-7009** or by e-mail at richcreek@wrighthunter.com. All invoices and requests for payment should be sent directly to the Technology Designer via email.
- C. Rates quoted in response to this RFB are firm through the duration of the Project. No increases will be permitted. Any requests for modification to the original design and/or scope of Work must be approved in writing by the Owner prior to any modification.
- D. Each Application for Payment shall be consistent with previous applications and payments as certified by the Technology Designer and paid for by the Owner.
 - 1. The Application for Payment at time of Substantial Completion and the final Application for Payment involve additional requirements.
- E. Payment Application Times: The date for each progress payment is the 15th day of each month. The period of construction Work covered by each Application for Payment is the period ending fifteen (15) days prior to the date for each progress payment and starting the day following the end of the preceding period.
- F. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment.
- G. If the Bid involves more than one Project, each Project shall have separate payment application forms. The Technology Designer will identify each Project.
- H. Application Preparation: Complete every entry on the form, including notarization and execution by the person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.
 - 1. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.
- I. Transmittal: Submit one (1) electronic executed copy of each Application for Payment to the Technology Designer. The executed copy shall include waivers of lien, proof of

items stored, proof of insurance for stored items and similar attachments, when required.

- J. Waivers of Mechanics Lien: With each Application for Payment, submit waivers of mechanics lien from every entity who may lawfully be entitled to file a mechanics lien arising out of the Contract, and related to the Work covered by the payment. The Contractor acknowledges that liens cannot be placed on public property and are therefore inapplicable to this Project.
- K. Application for Payment at Substantial Completion: Actions and submittals that shall proceed or coincide with this application include:
1. As built drawings (should be received by the Technology Consultant Once Contractor states the Project is complete – before punch list has been issued to the Contractor).
 2. Warranties (guarantees) and maintenance agreements.
 3. Test/adjust/balance reports.
 4. Maintenance instructions.
 5. Start-up performance reports.
 6. Final cleaning.
 7. Application for reduction of retainage, and consent of surety.
 8. Punch list of incomplete Work.
- L. Final Payment Application: Actions and submittals that shall precede or coincide with this application include:
1. Completion of Project closeout requirements.
 2. Completion of items specified for completion after Substantial Completion.
 3. Transmittal of required Project construction records to the Owner.
 4. Proof that taxes, fees and similar obligations have been paid.
 5. Removal of surplus materials, rubbish and similar elements.

3.10 CONTRACTOR'S SWORN STATEMENT AND WAIVER OF LIEN

- A. The Contractor's sworn statement and waiver of lien shall be submitted with the invoice. The Contractor must state all subcontractors and status of payment for labor and materials to each. Payment will not be processed until these forms have been received.

3.11 INTERRUPTION OF OCCUPANCY

- A. The installation must not interrupt the normal activity of the Owner. All Work which will cause disruption of the Owner's existing systems and services must be accomplished during time periods when it is least inconvenient to the Owner and

completed in the shortest possible time frame (i.e., after normal school hours). The Owner is not responsible for any overtime and/or premium time not identified in the Contractor's Base Bid pricing response.

- B. Each Contractor is responsible to plan, coordinate and execute their Work in such a manner that there will be no disruption of the Owner's operations. If an interruption of operations is unavoidable, the Work will be scheduled with the Owner prior to beginning such Work.

3.12 REJECTING DEFECTIVE WORK

- A. The Technology Designer and/or the Owner will have the authority to disapprove or reject Work, which is defective, unsatisfactory, faulty, does not conform to the requirements of the Contract Documents or does not meet the manufacturers' requirements. The Technology Designer and/or the Owner will also have the authority to require special inspection or testing of the Work whether or not the Work is fabricated, installed or completed.

3.13 SPECIFICATION DEVIATION

- A. Commodities procured under these specifications shall not deviate from those originally Contracted for without written approval from the Owner and so long as consistent with law.
- B. The Owner has sole responsibility for the interpretation of all documents. Any claims and/or disputes associated with and/or arising from this RFB must be submitted in writing and directed to the Owner within thirty (30) days of dispute and/or claim.

3.14 EXECUTED CONTRACT TO CONSTITUTE ENTIRE AGREEMENT

- A. All Contracts for Work herein are subject to all existing and applicable provisions for the payment of prevailing rate of wages to laborers, workmen and mechanics engaged in the Work.
- B. Except as set forth in paragraph below, the contents of the Contract Documents of the successful Contractor shall be contractual obligations upon Bid acceptance. Failure of the successful Contractor to accept these obligations in the Contract may result in a cancellation of award and forfeiture of bid bond.
- C. The Owner reserves the right to negotiate provisions in addition to those stipulated in this RFB or proposed by the successful Contractor for the purpose of obtaining the best possible Bid. If the Contractor should discover any provisions in the Contract that are contrary to or inconsistent with the law, ordinance, order or decree, the Contractor shall immediately report it to the Owner in writing.

3.15 CONTRACT SUSPENSION, TERMINATION AND CANCELLATION

- A. The Owner may cancel the Contract effective as a result of this RFB in whole or in part as follows:
1. By mutual agreement of the contracting parties. Upon such termination, the Owner's liability shall be limited to the reasonable value of services performed and deemed acceptable by the Owner upon the date of such mutual agreement.
 2. If the Owner deems that such termination is in its best interest. In the event that the Owner gives notice to terminate pursuant to this subsection, such notice shall be given no less than thirty (30) days prior to the date on which the termination becomes effective. Upon such termination, the Owner's liability shall be limited to the reasonable value of services performed and deemed acceptable by the Owner as of the effective date of the termination.
 3. For cause, which shall include, but is not necessarily limited to, failure or unwillingness of the Contractor to comply with the approved program, including attached conditions; failure to comply with applicable state statutes or other applicable laws or policies; or failure to comply with such directives as may become generally applicable at the time; refusing/failing to provide enough properly skilled workers to timely complete the Work; failing to pay subcontractors and suppliers; failing to prosecute the Work with diligence; and breaching any term of the Contract.
 4. Due to lack of appropriation of necessary funding, cancellation due to lack of appropriation shall be without penalty. Upon such cancellation, the Owner's liability shall be limited to the reasonable value of services performed and deemed acceptable by the Owner as of the effective date of cancellation.
- B. The Contract may only be modified by: (i) mutual written agreement of the parties, (ii) a properly-executed change order, signed by the Contractor, Owner and Technology Designer describing the additional/different Work, price and time frame for performance, and (iii) a construction change directive issued by the Owner, for which the Contractor must commence prosecution of the Work promptly (but no less than 10 days) and any modification to Contract price or time will be later determined. In the event the parties cannot mutually agree to an adjustment in price or time for a construction change directive, the Technology Designer shall have the right and authority to determine same. If the Contractor objects to such determination, it may file a claim in accordance with the Contract. Rejection by the Contractor of any construction change directive may be the basis of Contract suspension, termination or cancellation.

- C. No cancellation will affect any expenditures or legally binding commitments made prior to receiving notice of the cancellation, suspension or termination provided such expenditures or commitments were made in good faith and not in anticipation of cancellation and are otherwise allowable.
- D. Upon execution of the Contract, the Owner shall be deemed the owner of all materials and equipment actually incorporated into or purchased for the Project, as well as the owner of all documentation used with respect to same. In the event of cancellation prior to the full term of the Contract, the Contractor shall arrange to provide the Owner with all Work documents, computer programs and files used/developed by the Contractor during the period the Contract was effective. The title to such programs and materials as well as any equipment and materials supplied while the Contract is in effect, shall rest with the Owner.

3.16 DELAYS AND EXTENSIONS OF TIME

- A. If the Contractor is delayed at any time in the progress of the Work by any act or neglect of the Owner, an employee of the Owner, any separate Contractor employed by the Owner (whether related to technology improvements or non-technology improvements), changes ordered in the Work, acts of God, fires, floods epidemics, quarantine restrictions, or any other cause beyond the Contractor's reasonable control, then the Contract time shall be extended by change order for such reasonable time as the Owner and the Contractor may determine. An extension of time for performance shall be the only remedy for any such delay, and damages related to any such delay are inapplicable.
- B. If the Technology Designer and/or the Owner determines that the progress of the Work falls behind the current Project schedule due to the control, management, direction, acts or omissions of the Contractor, its agents, employees or subcontractors the Contractor shall take whatever remedial action as directed, including, but not limited to the following:
 - 1. Increase staff and labor force
 - 2. Work overtime
 - 3. Add or change subcontractors
 - 4. Utilize more expensive materials/methods
 - 5. Reschedule
- C. Costs of any remedial action, which are caused by the control, management direction, acts or omissions of the Contractor, its agents, employees or subcontractors, shall not be assigned to the Owner and no increase in Contract price will be authorized.

3.17 DELIVERY OF EQUIPMENT AND/OR MATERIALS

- A. Delivery shall be destination, set in place, ready for use unless otherwise specified, with packing and debris removed by the Contractor. The Contractor shall receive and accept its equipment and/or materials from the transportation company or carrier and shall provide all handling, carrying, etc., to the final location for each piece of equipment and/or materials in the building. Crating materials and other trash resulting from the installation shall be removed from the premises daily. Excelsior and similar hazardous trash shall be removed immediately upon unpacking. No accumulation of trash shall be permitted.
- B. The Contractor must have a representative at the job site during all unloading and placing of equipment. This service shall be included in the Contractor's Bid (and, thus, the Contract Sum). The Owner shall hold this representative operationally responsible for the services indicated and he/she shall have such capability and be given such responsibility by the Contractor that he/she can act on the Contractor's behalf in any situation, which may arise on the site of delivery. The Contractor's representative shall use some method, approved by the Owner, to show the item has been inspected and whether it has been "Approved" by the Contractor or if repairs or replacement is necessary. This shall be done prior to the Owner's final inspection. Any Owner rejection shall be honored, even if the Contractor has previously "approved" the equipment.
- C. Contractors are cautioned to check their manufacturing and shipping schedules carefully before fixing their proposed delivery schedule. If, for any reason, any items of equipment should arrive prior to the building being ready to receive them, the successful Contractor shall make its own arrangements for temporary storage arrangements at no cost to the Owner. No on site storage will be available and all staging should be complete before delivery and installation of the equipment.
- D. Contractors doing Work are to cooperate fully and coordinate the Work of all other Contractors to expedite the proper and timely completion of the furnishing Projects. It is acknowledged that coordination with non-technology Contractors (e.g., mechanical and electrical Contractors installing improvements to facilitate technology upgrades) is expected and required, so as to provide a seamless and efficient installation of all Owner improvements pursuant to the bond Project.
- E. In making delivery and installation, the Contractor must repair, at its own expense, any damage done to any of the buildings, equipment or property that are a part of this Project that occur as a result of the control, management, direction, acts or omissions of the Contractor, its agents, employees or subcontractors and hold the Owner harmless from any other claims or property damage and/or personal injury.

3.18 SUBCONTRACTING AND ASSIGNMENT

- A. The Contractor shall be responsible to the Owner for the acts and omissions of all its employees and all subcontractors, their agents and employees and all other persons performing any of the Work under a Contract with the Contractor.
- B. This Contract, with all its rights and duties, and any part thereof, shall not be deleted, subcontracted or assigned to another Contractor without prior written permission of the Owner.

3.19 RECORD KEEPING AND RECORD RETENTION

- A. It is acknowledged and agreed that the Contractor shall not be entitled to any additional costs or expenses for its scope of Work, other than as is consistent with the Contractor's accepted Bid. For a change in the scope of Work, the Contractor's costs shall be determined: (a) if a change order, as agreed in the approved change order, and (b) if a construction change directive and the parties cannot mutually agree to a modified amount, as determined by the Technology Designer. For purposes of the Technology Designer's determination, the Contractor shall establish and maintain adequate records of all expenditures incurred under the construction change directive. All records shall be kept in accordance with general accepted accounting procedures. All procedures shall be in accordance with Federal, State, and local ordinances.
- B. The Owner shall have the right to audit, review, examine, copy, and transcribe pertinent records or documents relating to any Contract resulting from this RFB held by the Contractor. The Contractor shall retain all documents applicable to the Contract for a period of not less than six (6) years after final payment.

3.20 RISK OF LOSS OR DAMAGE

- A. The Owner shall be relieved from all risks of loss or damage to materials or equipment during the period of transportation, installation, and during the entire time the equipment is in possession of the Contractor, unless and until such time as unencumbered title for the equipment is vested in the Owner and the materials or equipment is in the exclusive possession of the Owner.
- B. Should the materials or equipment be lost or damaged under such circumstances where the Owner is relieved from the risk of loss or damage, the Contractor shall immediately cause the damaged materials or equipment to be repaired or replaced at no cost to the Owner.
- C. In such event, any payments for the lost or damaged equipment shall be suspended from the time loss or damage occurs until such time as the lost or damaged materials or equipment is repaired or replaced and accepted by the Owner.

- D. It is understood, and the Contractor hereby agrees, that the Contractor shall be solely responsible for all equipment and/or services that the Contractor proposes. Notwithstanding the details presented in these specifications, it is the responsibility of the Contractor to verify the completeness of the equipment required and its suitability to meet the intent of this RFB. Any additional equipment required for installation shall be provided by the Contractor; it is understood that complete operating systems are required.

SECTION 4

STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

4.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract Documents apply to work of this section.

4.02 SUMMARY

- A. Clawson Public Schools (the Owner) plans the installation of a Structured Cabling System (SCS) in the new middle school to be constructed from Fall 2022 to Spring 2023 opening in Fall 2023; followed by a major renovation of the existing middle school from Summer 2023 to Spring 2024 into the new elementary school opening in Fall 2024 all on the Clawson campus. Also, additional cabling for the replacement of the wireless access points at the Baker Building and in the new Trojan Hall at Clawson High School.
- B. Clawson Middle School drawings are included with the bid documents to detail locations and quantities.
- C. Clawson Elementary School drawings are not included with the bid documents. Provide and install (320) Category 6 cable drops and (70) Category 6A cable drops.
- D. These specifications, in conjunction with the drawings, establish the requirements necessary to achieve the intended performance and function consisting of Structured Cabling System for Clawson Public Schools. This RFB solicits proposals for solutions to meet the current and projected needs of the Owner.
- E. All work shall be in accordance with the intent of these specifications, and as required to leave the SCS complete and in manufacturer recommended operating conditions, excluding those items listed under "Related Work provided by Others."
- F. The Contractor shall provide the services necessary to engineer, furnish, install, test, certify and provide maintenance support for a warranted and fully operational SCS conforming to manufacturer specifications and acceptable industry standards. All work shall be in accordance with the true intent of these drawings and specifications, and as required to leave the SCS complete and in satisfactory operating condition, excluding those items listed under "Related Work Provided by Others."
- G. The Contractor shall provide a complete Bill of Materials, catalog cuts, unit and extended cost for labor and materials.

- H. The Contractor shall verify dimensions and conditions at the job site prior to bidding, installation, and perform installation in accordance with these Specifications, manufacturers' recommendations and the latest edition or revision of all applicable codes and standards.
- I. Equipment, materials, labor, and services to provide Structured Cabling System including, but not limited to:
1. Copper horizontal cabling, outlets and terminations
 2. Optical fiber vertical cabling, connectors, and terminations
 3. Cabling support system in ceilings terminations
 4. Category 6/6A patch cords
 5. Bonding and Grounding
 6. Labeling of patch panels, Category 6/6A cabling, and faceplates
 7. Category 6/6A certification testing
 8. OTDR and power meter testing of Optical Fiber
 9. Provide as-built drawings
 10. Other Requirements:
 - a. Sleeve, cores, raceway, power poles, back boxes, and conduit not provided by other Trades.
 - b. Fire stop all floor or wall penetrations
 - c. Provide a 20-year manufactures warranty
- J. Provide all equipment, materials, labor, and services, not specifically mentioned or shown, which may be necessary to complete or perfect all parts of the installation. Ensure that they follow requirements stated or reasonably inferred by the contract documents.

4.03 QUALITY ASSURANCE

- A. The SCS will adhere to the most current applicable rulings of the Federal Communications Commission (FCC). Provide the FCC registration number with the equipment submittal. All components and installations shall bear an Underwriters' Laboratories (UL) listing and shall conform with the latest edition or revision of the following codes and standards:
1. ANSI American National Standards Institute
 2. ASTM American Society for Testing and Materials
 3. BICSI Building Industry Consulting Service International
 4. CSI Construction Specifications Institute
 5. EIA Electronics Industries Alliance
 6. FCC Federal Communications Commission

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| 7. | ICEA | Insulated Cable Engineers Association |
| 8. | IEC | International Electro Technical Commission |
| 9. | IEEE | Institute of Electrical and Electronics Engineers |
| 10. | ISO | International Organization for Standardization |
| 11. | NEC | National Electrical Code |
| 12. | NEMA | National Electrical Manufacturer's Association |
| 13. | NFPA | National Fire Protection Association. |
| 14. | TIA | Telecommunications Industry Association |
| 15. | UL | Underwriters Laboratories, Inc. |

B. The code or standard establishing the more stringent requirements shall be followed where areas of conflict occur between codes and standards or between codes and standards and drawings and specifications.

C. References:

1. BICSI Telecommunications Distribution Methods Manual, 14th Edition
2. BICSI Cabling Installation Manual
3. CSI Master Format 2016 Edition – Division 27 - Communications
4. ANSI/TIA-568.1-E – Commercial Building Telecommunications Infrastructure Standard
5. ANSI/TIA-568.2-D – Balanced Twisted-Pair Telecommunications Cabling and Components Standard
6. ANSI/TIA-568.3-D – Optical Fiber Cabling and Components Standard
7. ANSI/TIA-569-E – Telecommunications Pathways and Spaces
8. ANSI/TIA-606-D – Administration Standard for Telecommunications Infrastructure
9. ANSI/TIA-607-D – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
10. ISO/IEC 11801 – Information Technology – General Cabling for Customer Premises
11. ISO/IEC 11801 – Information Technology – Pathways and Spaces for Customer Premises Cabling
12. NFPA 70, NEC and NFPA 255
13. UL Cable Verifications Program
14. UL Testing Bulletin

D. The SCS shall be manufactured and tested by manufacturers who are regularly engaged in the production of the components of similar SCS systems for a minimum of five (5) years.

E. The supplier of the SCS shall maintain service facilities in the installation. The facilities shall include a permanent source of factory trained service technicians experienced in servicing this type of cabling system and shall provide warranty and routine

maintenance service to afford the Owner maximum coverage. The Contractor shall also provide a central source of support to guarantee immediate answers to Owner's problems and questions.

- F. The Contractor selected for this project must be certified by the manufacture(s) specified within their submittals, adhere to the engineering, installation and testing procedures and utilize the recommended components in provisioning the voice and data aspects of this Project.
- G. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of Category 6/6A distribution systems and have personnel who are trained and certified in the use of such tools and equipment.
- H. A resume of qualification shall be submitted with the Contractor's proposal indicating the following:
 - 1. A list of recently completed projects of similar type and size with contact names and telephone numbers for each.
 - 2. A list of test equipment proposed for use in verifying the installed integrity of Category 6/6A and optical fiber.
 - 3. A technical resume of experience for the Contractor's Project Manager and on-site installation supervisor who will be assigned to this project.
 - 4. A list of technical product training attended by the Contractor's personnel that will install the SCS system shall be submitted with the response.
- I. Any sub-contractor who will assist the Contractor in performance of this work shall have the same training and certification as the Contractor.
- J. The Contractor shall procure and pay for all necessary permits, licenses and inspections and observe any requirements stipulated therein. The Contractor shall conform in all trades with all local regulations and codes.
- K. The Contractor shall guarantee at the time of the bid that all cabling and components meet or exceed specifications of ANSI/TIA-568-1.E, ANSI/TIA-568.2-D, and ANSI/TIA-568.3-D.
- L. All materials shall be new and shall conform to applicable provisions of UL and the American Standards Association.
- M. The Structured Cabling components shall be new, of modern design, and current standard production of the various manufacturers.

- N. The Contractor shall be present at weekly or bi-weekly on-site or virtual meetings, as required, throughout the duration of the project with the construction manager and other trades while onsite.

4.04 SUBMITTALS

- A. Shop Drawings: Within ten (10) calendar days after award of contract, the Contractor shall submit product data cut sheets and catalog information to the Technology Designer for approval. The Contractor shall not begin installation or fabrication without such approval. The Technology Designer will indicate approval of shop drawings, product data, and samples submitted to the Designer by stamping such submittals "APPROVED" with a stamp. All shop drawings shall be marked with the pertaining specification paragraph or drawing number when submitted. Submit electronically of each item to the Technology Designer.
- B. Shop drawings shall be submitted on the following:
1. Bill of materials and cut sheets.
 2. Project schedule including all major work components that materially affect any other work on the project.
 3. Anticipated lead times on all major components
- C. A technical data sheet from the manufacturer shall be included with the response for each product proposed. This data sheet shall include the physical specifications as well as the following electrical and transmission characteristics if appropriate:
1. Mutual Capacitance
 2. Impedance
 3. DC Resistance
 4. Attenuation
 5. Worst Pair-to-Pair Near End Cross Talk
 6. Power Sum Near End Cross Talk
- D. Submittals shall include all manufacturers cut sheets for the following:
1. Category 6/6A cable and patch cords
 2. Category 6/6A outlets, jacks, faceplates, and inserts
 3. Copper patch panels
 4. Optical fiber cable, connectors, and termination panels
 5. Data cabinet
 6. Cable support system J-hooks and ladder rack in closets
 7. Grounding and surge suppression system components

4.05 EXISTING CONDITIONS

- A. The Contractor shall visit the sites prior to submitting a bid. No subsequent allowance will be made due to failure to thus observe and verify conditions, which may affect the work. The Contractor shall report to the Technology Designer any discrepancies between these specifications and existing conditions and similarly report obvious omissions.

4.06 JOB CONDITIONS

- A. The Contractor shall keep the job adequately staffed at all times. Unless illness, loss of personnel or other circumstances beyond the control of the Contractor, the Contractor shall maintain the same individual in charge throughout the Project.
- B. The Contractor shall cooperate with all appropriate parties to achieve well-coordinated progress with the overall construction completion schedule and satisfactory final results.
- C. The Contractor shall watch for conflicts with work of other contractors on the job and execute, without claim for extra payment, moderate moves or changes as are necessary to accommodate other equipment or to preserve symmetry and aesthetically pleasing appearance.
- D. The Contractor shall immediately report to the Technology Designer any design or installation irregularities, particularly architectural elements that interfere with the intended systems operation, so that appropriate action may be taken.
- E. The Contractor shall do all cutting, patching and painting necessary for proper and finished installation of the system and repair any damage done as a result of such installation.
- F. The Contractor shall cleanup and dispose of trash from all SCS work areas daily.

4.07 RELATED WORK BY OTHERS

- A. Power outlets and electrical wiring
- B. Conduits and outlet boxes
- C. Conduit sleeves, as indicated on the drawings
- D. Raceways, as indicated on the drawings
- E. Network Switches

- F. Wireless Access Points (WAPs)
- G. Uninterruptible Power Supplies (UPS's)
- H. Security Cameras
- I. Audio Video Equipment

4.08 WARRANTY

- A. All SCS components and installation of same shall be guaranteed free of defects in materials and workmanship and shall be repaired or replaced within twenty-four (24) hours following report of such component defects and installation workmanship by the Owner.
- B. The Contractor shall be available on call and shall respond on site within one (1) business day of notice, and without cost to the Owner, during the first twelve (12) months of full- scale operation, following acceptance of the system, to repair and/or correct any problems that may arise during the initial period of operation.
- C. The components of this project, upon completion will be warranted by the manufacturer. The warranty for this wiring system shall be provided as follows:
 - 1. The twenty (20) Year Warranty shall ensure against product defects, that all approved cabling components meet or exceed the specifications and performance requirements of ANSI/TIA-568.1-E, ANSI/TIA-568.2-D, and ANSI/TIA-568.3-D, ANSI/TIA -569-E, ANSI/TIA-606-D, ANSI/TIA-607-D and ISO/IEC 11801 for the copper and fiber optic cabling links/channels. The end-to-end passive product solution shall be capable of delivering Category 6/6A performance to the networked devices. The warranty shall apply to all passive SCS components.
 - 2. The twenty (20) Year Product Warranty shall cover the replacement or repair of defective product(s) and labor for the replacement or repair of such defective product(s) for a twenty (20) year period.
 - 3. A twenty (20) Year Application Assurance shall cover the failure of the cabling system to support the application which it was designed to support, as well as additional application(s) introduced in the future within the recognized standards or user forums that use the ANSI/TIA-568.1-E, ANSI/TIA-568.2-D, and ANSI/TIA-568.3-D and ISO/IEC IS 11801 component and link/channel specifications for cabling.

4. Upon successful completion of the installation and subsequent inspection, the Owner shall be provided with a certificate, from the manufacturer, registering the installation.

PART 2 – PRODUCTS

4.09 GENERAL

- A. The proposed major components shall have a consistent architecture to reduce total cost of ownership for on-going support, maintenance and training.
- B. The Contractor shall provide all equipment, miscellaneous cables, terminators, materials, parts, software and labor for a complete and satisfactory operating environment.
- C. SYSTEMS SHALL BE IN FULL ACCORDANCE WITH THE RECOMMENDATIONS OF THE EQUIPMENT AND SOFTWARE MANUFACTURERS, WITH THE REQUIREMENTS OF THE SPECIFICATIONS, AND WITH ALL CURRENT EDITION OR REVISIONS OF ALL APPLICABLE CODES AND STANDARDS AS PREVIOUSLY LISTED UNDER “REGULATORY AGENCIES” OF THIS SECTION OF THE SPECIFICATIONS.

4.10 CATEGORY 6 CABLE

- A. Category 6 rated, 100ohm balanced Unshielded Twisted Pair (UTP) with four individually twisted-pairs, which exceed the mechanical and transmission performance specifications in ANSI/TIA-568.2-D, 250 MHz.
- B. 23 AWG solid bare annealed copper
- C. NEC/CEC Type CMP (NFPA 262) compliant for plenum spaces
- D. Cable color specification:
 1. Data – Blue
 2. Cameras – Green
- E. Approved Manufacturers:
 1. Superior Essex
 2. Belden
 3. General Cable
 4. Hubbell
 5. Or pre-approved equivalent

4.11 CATEGORY 6A CABLE – WIRELESS ACCESS POINTS ONLY

- A. Category 6A rated, 100ohm balanced Unshielded Twisted Pair (UTP) with four individually twisted-pairs, which exceed the mechanical and transmission performance specifications in ANSI/TIA-568.2-D, 500 MHz.
- B. 23 AWG solid bare annealed copper
- C. 0.265” maximum nominal cable diameter
- D. NEC/CEC Type CMP (NFPA 262) compliant for plenum spaces
- E. Cable color specification:
 - 1. Wireless Access Points – Black
- F. Approved Manufacturers:
 - 1. Superior Essex
 - 2. Belden
 - 3. General Cable
 - 4. Hubbell
 - 5. Or pre-approved equivalent

4.12 CATEGORY 6 DATA JACKS

- A. Data jacks shall be 8-position configuration and shall meet all the transmission performance of the specified Category 6 cable.
- B. The jacks shall be wired to TIA/EIA 568B color code wiring scheme.
- C. Keystone type module.
- D. Jack color specifications:
 - 1. Data – Orange
 - 2. Cameras – Green
- E. Jacks shall mount within keystone faceplates at the workstation locations.
- F. Jacks shall mount within new modular patch panels in MDF and IDF locations.

- G. Approved Manufacturers:
 - 1. Hubbell
 - 2. Panduit
 - 3. Or pre-approved equivalent

4.13 CATEGORY 6A DATA JACKS – WIRELESS ACCESS POINTS ONLY

- A. Data jacks shall be 8-position configuration and shall meet all the transmission performance of the specified Category 6A cable.
- B. The jacks shall be wired to TIA/EIA 568B color code wiring scheme.
- C. Keystone type module.
- D. Jack color specifications:
 - 1. Wireless Access Points – Black
- E. Jacks shall mount within keystone faceplates at the workstation locations.
- F. Jacks shall mount within new modular patch panels in MDF and IDF locations.
- G. Approved Manufacturers:
 - 1. Hubbell
 - 2. Panduit
 - 3. Or pre-approved equivalent

4.14 PATCH PANELS

- A. 19 in. rack mountable, 48-port, 2 RU flush mount modular patch panels.
- B. Keystone openings to accept the data jacks specified.
- C. Patch panels shall have area for labels and identifications of each port.
- D. Patch panels shall be black in color.
- E. Patch panels must include rear cable strain relief bar.
- F. Approved Manufacturers:
 - 1. Hubbell

2. Panduit
3. Or pre-approved equivalent

G. Quantity:

1. New middle school = To be determined by the bidder.
2. New elementary school = All bidders shall include seven (7) Cat 6 and four (4) Cat 6A patch panels.
3. Unit pricing will be utilized to adjust to the actual quantity required in the new elementary school.

H. Approved Manufacturers:

1. Panduit
2. Hubbell
3. Or pre-approved equivalent

4.15 FACEPLATES AND OUTLET BOXES

- A. The Contractor shall provide faceplates, as indicated on the drawings. Install blanks as required. Conduit and back box shall be provided and installed by others.
- B. Faceplates shall accept keystone modules.
- C. Faceplates shall be satin-finished stainless steel.
- D. Faceplate-securing screws shall match the faceplate finish.
- E. The Contractor shall provide Wiremold inserts at all Wiremold locations, as indicated on the drawings. Install blanks as required. Wiremold 4000 raceway will be supplied and installed by others.
- F. Provide modular inserts, jacks and/or connectors and blanks for all unused outlet ports.
- G. Approved Manufacturers:
 1. Hubbell
 2. Panduit
 3. Wiremold for 4000 raceway inserts, as required
 4. All faceplates and surface boxes shall match existing color scheme of new Wiremold and existing outlets within each facility

4.16 SURFACE MOUNT BOXES

- A. Provide one (1) two-port surface box at each Camera and Wireless Access Point drop locations in all schools as indicated on the project drawings.
- B. Surface mount backboxes shall be plenum rated.
- C. Surface mount backboxes shall accept keystone modules.
- D. Surface mount backboxes shall be white in color.
- E. Surface mount backboxes shall include a label field with a protective clear cover.
- F. Surface mount backboxes shall be affixed to the building structure above the ceiling, not ceiling grid or ceiling supports.
- G. Contractor shall blank all unused outlet ports.
- H. Approved Manufacturers:
 - 1. Hubbell
 - 2. Panduit
 - 3. Or pre-approved equivalent

4.17 COPPER PATCH CORDS

- A. The Contractor shall provide one (1) Category 6/6A patch cord for each drop installed for the MDF/IDF end of the link.
- B. The Contractor shall provide one (1) Category 6/6A patch cord for each drop installed for the station/device end of the link.
- C. The copper patch cords shall match the color of the cable for which it is being supplied.
- D. Copper patch cords shall be small diameter, 28AWG, and have stranded conductors for the MDF/IDF end of the link.
- E. Copper patch cords shall be standard diameter, 23AWG, and have stranded conductors for the station/device end of the link.
- F. The copper patch cords shall meet or exceed ANSI/TIA 568.2-D standards for Category 6/6A patch cords.

G. Quantities:

1. The Contractor shall provide 1-foot (Blue) for data, 1-foot (Black) for wireless access points, and 1-foot (Green) for cameras.
2. The Contractor shall provide 10-foot (Blue) for data, 10-foot (Black) for wireless access points, and 10-foot (Green) for cameras.

Building	6" & 1'Cat 6A	6" & 1'Cat 6A	10-foot Cat 6A	10-foot Cat 6
Clawson Middle School	24	162	24	162
Clawson Elementary	70	320	70	320
Clawson High School	3	5	3	5
Baker Building	13	0	13	0
Totals	110	487	110	487

3. Ninety percent (90%) six-inch (6") category 6/6A patch cords.
4. Ten percent (10%) one-foot (1') category 6/6A patch cords.
5. Final quantities, lengths, and colors shall be confirmed with the Owner prior to ordering.

H. Approved Manufacturers:

1. Hubbell
2. Panduit
3. Match cabling link warranty manufacturer for all patch cords
4. Or pre-approved equivalent

4.18 FIBER OPTIC BACKBONE CABLE

- A. Single-mode (OS2)
- B. 12 fiber count
- C. Tight buffered
- D. Interlocking armor
- E. 8.2 μm fiber core diameter
- F. Yellow outer jacket color
- G. NEC Type OFCP compliant for plenum spaces.

- H. Approved Manufacturers:
 - 1. Corning
 - 2. Pre-approved equivalent

4.19 FIBER OPTIC CONNECTORS

- A. Single-mode (OS2)
- B. LC type
- C. No epoxy, no polish field installable
- D. Ceramic ferrule
- E. Composite housing
- F. Blue housing color
- G. Blue boot color
- H. 0.5 dB maximum insertion loss
- I. UPC polish
- J. Approved Manufacturers:
 - 1. Corning
 - 2. Pre-approved equivalent

4.20 FIBER OPTIC PATCH PANEL

- A. 19" rack mountable
- B. 1RU for two adapter panels.
- C. Powder coated metal and polycarbonate slide out tray
- D. Removable tinted polycarbonate front door
- E. Internal and external strain relief
- F. Lockable

- G. Approved Manufacturers:
 - 1. Corning
 - 2. Pre-approved equivalent

4.21 FIBER OPTIC ADAPTER PANELS

- A. Single-mode (OS2)
- B. Blue composite housing
- C. LC duplex adapters
- D. 12 fiber count
- E. Ceramic insert
- F. UPC polish
- G. Approved Manufacturers:
 - 1. Corning
 - 2. Pre-approved equivalent

4.22 FIBER OPTIC PATCH CORDS

- A. Fiber optic patch cords shall be provided by Technology Contractor and installed by Owner.
- B. Single-mode (OS-2)
- C. 2 fiber count
- D. LC duplex to LC duplex
- E. UPC polish
- F. Non-keyed
- G. Ceramic ferrule
- H. Composite housing

- I. Yellow jacket color
- J. Blue boot color
- K. Blue housing color
- L. 3 meters long
- M. Quantity:
 - 1. Twelve (12)
- N. Approved Manufacturers:
 - 1. Corning
 - 2. Approved equivalent

4.23 DATA CABINET - CLAWSON MIDDLE SCHOOL (MDF)

- A. Provide and install one (1) Middle Atlantic DRK-19-44-31 cabinet in the MDF at the new middle school as indicated on the drawing. The cabinet shall be equipped with the following components:
 - 1. (1) Top fan panel with guard-10
 - 2. (1) Fan-10 unit
 - 3. (1) Spare guard-10 for the inside of the cabinet
 - 4. (4) LF leveling feet
 - 5. (2) SPN-44-312 side panels
 - 6. (1) DLVFD-44 vented front door
 - 7. (1) DVRD-44 vented rear door
 - 8. (1) LT-1R rackmount light
 - 9. (1) LT-CABUTL single LED work light
 - 10. (1) APC AP9551 PDU
- B. Provide and install two (2) Middle Atlantic DRK-19-44-31 cabinets in the MDF and one (1) Middle Atlantic DRK-19-44-31 cabinet IDF-1, one (1) Middle Atlantic DRK-19-44-31 cabinet IDF-2 at the new elementary school. Each cabinet shall be equipped with the following components:
 - 1. (1) Top fan panel with guard-10
 - 2. (1) Fan-10 unit
 - 3. (1) Spare guard-10 for the inside of the cabinet
 - 4. (4) LF leveling feet
 - 5. (2) SPN-44-312 side panels

6. (1) DLVFD-44 vented front door
7. (1) DVRD-44 vented rear door
8. (1) LT-1R rackmount light
9. (1) LT-CABUTL single LED work light
10. (1) APC AP9551 PDU

C. All cabling in equipment cabinet shall be managed utilizing vertical wire organizers provided by the Contractor.

D. Approved Manufacturers:

1. Middle Atlantic
2. Or pre-approved equivalent

4.24 LADDER RACK

A. The Contractor shall provide and install cable tray or ladder rack in the new middle school MDF and new elementary school MDF to support and route cables between equipment racks/cabinets and to backboard.

B. Ladder rack shall be supported to building steel and shall be routed over the cabinets and to the backboard in each MDF.

C. Ladder rack shall be assembled with splice kits, cable waterfalls, wall mounts, ceiling mounts and any other required components for a smooth and professional installation.

D. APPROVED PRODUCT:

1. Chatsworth
2. B-Line
3. Or pre-approved equivalent

4.25 UNSPECIFIED EQUIPMENT AND MATERIAL

A. Any item of equipment or material not specifically addressed on the drawings or in this document and required to provide a complete and functional SCS installation shall be provided in a level of quality consistent with other specified items.

PART 3 – EXECUTION

4.26 GENERAL

A. The Contractor shall furnish and install all wiring as indicated in these specifications and on the drawings. All wiring and terminations shall be in full conformance with all of the

current editions or revisions of all applicable codes and standards as previously listed under "Regulatory Agencies" of this Section of the Specifications for their intended use on this Project.

- B. No exposed cabling shall be permitted in the wiring of any functions of the provided system. All cable shall be housed in appropriate raceways suitable and designed for such purposes.
- C. All work materials shall be removed at the end of the workday and the work area left in the same or better condition as found.
- D. This Contractor shall have a minimum of five (5) years of experience in the specific application of the equipment proposed of these systems.
- E. Adherence to a schedule of working hours which is agreeable with the Owner will be required.
- F. All cables must be routed and managed for a neat and aesthetically pleasing appearance. All work must be installed in a neat and workmanlike manner.
- G. The Contractor shall work carefully with all ceilings and return ceilings to original conditions. Any damage or expense is the responsibility of the Contractor. Every effort will be made to schedule the requirements under this contract in such a manner so as to complete all above ceiling work prior to ceiling tile installation.
- H. Communication bonding and grounding shall be in accordance with the NEC® and NFPA. Horizontal cables shall be grounded in compliance with ANSI/TIA-607-D, ANSI/NFPA 70, and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment.
- I. The Contractor shall not place any distribution cabling alongside power lines, or share the same conduit, channel, or sleeve with electrical apparatus.
- J. The Contractor shall provide any necessary screws, anchors, clamps, Velcro-style tie wraps, "J" hooks, miscellaneous grounding, ladder rack, cable tray and support hardware, etc., necessary to facilitate the installation of the system.
- K. It shall be the responsibility of the Contractor to furnish any special installation equipment or tools necessary to properly complete the system. This may include, but is not limited to, tools for terminating cables, testing and splicing equipment for copper cables, communication devices, jack stands for cable reels, or cable wenchers.
- L. All specialty back boxes shall be provided by the Contractor.

4.27 SITE REQUIREMENTS

- A. See the drawings for details on the number of cables per location. The cable will be pulled from the plan-specific closet to the appropriate location. The horizontal cabling will be terminated at the outlets with Category 6/6A jacks. At the MDF/IDF locations, the horizontal data cabling will be terminated to modular (48) port patch panels. The patch panels will be mounted into existing equipment cabinets.
- B. Installation practices shall follow BICSI standard and guidelines. TIA/EIA-568.1-E and TIA/EIA-568.2-D standards will be strictly followed and practiced.
- C. All cabling in the MDF or IDFs shall be secured using Velcro-style straps.
- D. All cabinets shall be grounded to the isolated ground bar, by the Contractor; using an approved ground lug and No. 6 AWG jacketed green ground wire.
- E. The Contractor shall provide and install all necessary grounding assemblies for each patch panel. The Contractor shall provide a No. 6 AWG stranded copper wire cable between equipment racks and ground to the building steel, as required. Vertical steel is preferred.
- F. The Contractor shall be responsible for fire-stopping the exterior of ALL cores and sleeves he/she provides as part of this project. The Contractor shall be responsible for fire-stopping the interior of ALL cores and sleeves provided as part of this project regardless of who provided cores and sleeves. Nelson or 3M moldable fire putty shall be used for floor cores. Nelson or 3M intumescent fire stop caulk with tightly packed mineral wool or ceramic fiber will be used for four-inch (4") conduit sleeves and fire pillows will be used for cable tray access through firewalls as required by local codes.
- G. The Contractor shall provide and install "J" hook cable supports. No D-rings or bridle/saddle rings shall be permitted.
- H. Contractor shall work in close coordination with the construction trades, under the direction of the Construction Manager.
 - 1. Work schedules during the school year shall be second shift and shall not interfere with operation of the buildings.
 - 2. Under no circumstances shall any construction tools, packing materials, loose equipment, ladders, trash, or litter be left in the classrooms at the end of daily shifts. All rooms shall be cleared daily and left in a satisfactory condition. Work activities during summer recess will be based on building schedules. All efforts shall be made during summer recess to have buildings and classrooms open for

extended periods. The Construction Manager will outline building schedules to all trades during these periods.

3. Contractor shall be responsible for confirming intended mounting positions of projectors, interactive flat panels, wireless access points, and cameras prior to actual installation. This coordination is required for the mounting of other new furnishings and power receptacles for all wall-mounted or ceiling-mounted devices under the scope of this Contractor. This is a critical sequencing requirement; as other Trades will be dependent on precise mounting in order to complete their installation work.

4.28 COPPER HORIZONTAL CABLE INSTALLATION

- A. All Category 6/6A cables shall be continuous from Main Distribution Frame (MDF) or Intermediate Distribution Frame (IDF) to media outlet and free from splices, reverses, grounds or other connections. The Contractor shall provide a five foot (5') minimum service loop at the jack end and a fifteen foot (15') minimum service loop in each closet, wireless access point and camera locations, above accessible ceiling for each terminated cable to accommodate future changes.
- B. The Contractor shall terminate all Category 6/6A cable according to T568B jack pin assignments.
- C. The Contractor shall remove only the amount of cable jacket necessary for termination. The Contractor shall maintain wire twist for all pairs of Category 6/6A cable to within one-half (1/2") of the termination point.
- D. The Contractor shall not run cable longer than the maximum ninety (90) meter TIA/EIA recommended length.
- E. Copper splices in the horizontal distribution are prohibited.
- F. All cables installed shall be plenum-rated.
- G. All cables shall be installed using "J" hooks, conduits, cable tray or an approved raceway system. Where cable tray is not available, horizontal cable will be supported every five feet (5') with "J" hooks sufficient in size to handle all bundled cables while minimizing crushing. The Copper cables will be divided into separate bundles and run in separate "J" hooks. If cable slack exceeds twelve (12) inches between supports, additional supports will be installed to take up slack and relieve cable stress.
- H. The Contractor shall carefully lay all cable with appropriate radius of curvature and protect at bends and corners. The Contractor shall observe minimum bend radius and tension limitations as specified by ANSI/TIA for Category 6/6A cables.

- I. The Contractor shall loosely bundle cables with Velcro-style ties, suitable for Plenum environments, every twenty feet (20').
- J. Cable bundles shall not exceed **192 cables**.
- K. Patch panels shall be arranged to allow for natural wiring progression in functional fields, eliminate crossing of wires and allow for the easy access to each component.
- L. The Contractor shall assure that at the completion of cable installation, cables are free from twists, kinks, sharp bends, cuts, gouges or any other physical damage that might cause alterations to the electrical characteristics of the cables.
- M. The Contractor shall install EMT conduit sleeves between hallways and classrooms/offices, as required, to route new Category 6/6A cables to the outlets. The Contractor shall seal each sleeve, including the outside perimeter, with Nelson or 3M fire retardant caulk, putty or pillows after cable installation.
 - 1. The fire rating classification shall equal or exceed the fire rating of the wall.
 - 2. The size of the conduit shall meet a maximum of a 40% fill ratio.
 - 3. Unit pricing will be utilized for any sleeves and conduits required.

4.29 FIBER OPTIC BACKBONE INSTALLATION

- A. Install the optical fiber backbone in a continuous length from the fiber optic patch panel in the MDF to a fiber optic patch panel within each IDF.
- B. Upon entering the MDF/IDF the backbone fiber optic cable shall be routed on cable tray to the designated rack location.
- C. Throughout the length of the cable, maintain the minimum bend radius and pulling force recommended by the manufacturer and required by industry standards, both during installation and after termination and testing.
- D. Provide 20' slack loops at each end of all fiber optic backbone cables.
- E. Cable slack in each MDF/IDF shall be contained and routed in the cable tray. Do not coil the cable to achieve the service loop.
- F. Provide a 3' maintenance loop of stripped fiber strands at each end of the link, neatly wrapped at each fiber optic patch panel.

- G. On each end, remove all outer jacket and strength member materials to expose the individual 900-micron buffering of the individual strands for a length of 0.5 m (18 inches).
- H. On each end, hold the cable ends securely in place with the cable clamping accessories in each fiber optic patch panel.
- I. Route individual strands in the rear of the fiber optic patch panel in a neat and orderly fashion and place them so as not to create undue stress or micro bending of the strands.
- J. Secure all cable bundles with proper bundling or securing materials to ensure that the cable runs are securely held in place both vertically and horizontally.
- K. Do not tighten bundling materials or securing devices so tightly that they deform the inherent cable geometry or construction.
- L. Do not use cable ties or hook-and-loop tape to secure cable runs to other building systems such as electrical conduit, Electric Metallic Tube (EMT), sprinkler pipes, or ceiling suspension members.
- M. In environmental air-handling spaces, use only appropriately listed materials.
- N. Follow all manufacturer's written specifications for installation.

4.30 GROUNDING AND BONDING

- A. Communication bonding and grounding shall be in accordance with the NEC® and NFPA. Horizontal cables shall be grounded in compliance with ANSI-607-D, ANSI/NFPA 70, and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks, active telecommunication equipment and test apparatus and equipment. When required by local code, provide a Telecommunications Bonding Backbone utilizing a No. 6 AWG or larger bonding conductor that provides direct bonding between equipment rooms and telecommunications closets. This is part of the grounding and bonding infrastructure (part of the telecommunications pathways and spaces in the building structure) and is independent of equipment or cable.

4.31 LABELING

- A. The Contractor shall provide cable number designations tags on the cables in each outlet box. All cable designations and color-coding shall be in full compliance with TIA/EIA 606.

1. The Contractor shall clearly label cables at both ends with permanently applied, mechanically printed labels. Handwritten labels **will not** be acceptable. The Contractor shall use standardized colors and alphanumeric codes. The Owner shall approve the labeling system and method prior to installation.
2. Data: In work areas, the Contractor shall place cable ID labels around each new cable drop in the outlet boxes within two (2) inches of the jacks and **on front of the faceplates at all locations**. Use flexible vinyl or polyester labels that will flex as cables are bent. The Contractor must provide proof of concept labels for Owner approval before any work is performed.
3. In all MDF and IDF locations, the Contractor shall place ID labels around each cable. Labels shall be located within six (6) inches of the termination. Use flexible vinyl or polyester labels that will flex as cables are bent.
4. The Contractor shall front label each telecommunications outlet, room, rack, patch panel, and patch panel port and perform continuity, polarity, and map test for each port.
5. The Contractor shall label all feed/backbone riser cables with destination room number or location.
6. The specific labeling scheme for each facility will be determined by the Owner at the time of installation.

4.32 CATEGORY 6/6A UTP CABLE TESTING

- A. The Contractor shall, at all times, permit and facilitate work inspection by the Owner Representative and by public authorities having jurisdiction. The Owner's Representative shall have the authority to stop the work, if required, to insure proper execution.
 1. Each UTP cable pair shall be tested end to end from the outlet termination to the patch panel.
 2. Tests shall be permanent link only.
- B. Cables and connectors comprising Category 6/6A must be certified compliant with the performance requirements listed in TIA/EIA-568.2-D.
 1. As a minimum, test documentation shall include:
 - a. Cable Identification Number
 - b. Worst Case Near End Cross Talk (NEXT)

- c. Attenuation
 - d. PSNEXT
 - e. Resistance
 - f. Return Loss
 - g. ELFEXT
 - h. PSELFEXT
 - i. Propagation Delay
 - j. Propagation Delay Skew
 - k. Cable Length
 - l. Test Date
2. Each data circuit, including all connectors, shall be tested to verify all bandwidth performance and crosstalk specifications as outlined for Category 6/6A cabling. Any cables not in one hundred percent (100%) compliance with the minimum performance criteria relating to Category 6/6A will be replaced with no additional cost to the Owner.
- C. Cable testing will be conducted by a programmable, ISO/IEC 11801 Class C, D, E, F micro-computer-based tester capable of testing all specific standard requirements and generating completed printed test results.
 1. Test equipment shall be a designed, and of such grade, as to provide reliable certification and testing compliant with the SCS manufacturer's requirements.
 - D. A detailed hard copy of all test reports shall be provided to the Owner with two (2) electronic copies on USB flash drives. Test reports shall be in their original format as downloaded from the test equipment. Software to view the test results must be provided free of charge to the Owner. Additionally, this Contractor shall provide hardcopy documentation indicating cable length and the pass/fail test result for each Category 6 cable installed.
 - E. Any outlet, cable or component that does not meet the required operational tests or fails to meet installation standards as specified shall be repaired or replaced by the Contractor as directed by, and at no expense to, the Owner.

4.33 FIBER OPTIC CABLE TESTING

- A. The Contractor shall test all fiber optic cables installed under these specifications.
- B. Testing shall be performed on a fully completed system after all hardware is installed and attached and all labeling and identification has been completed.
- C. Fiber shall be tested utilizing the one-jumper reference method.

- D. Perform end-to-end, bi-directional attenuation test for each fiber at 1310nm and 1550nm wavelengths.
- E. The attenuation shall not exceed the maximum fiber loss allowable per TIA-568.3-D.
- F. The Contractor shall supply test results which include the following:
 - 1. Date of test
 - 2. Test personnel
 - 3. Field instrument used (Manufacturer model number and serial number)
 - 4. Test equipment calibration date
 - 5. Type and length of reference jumpers
 - 6. Fiber ID
 - 7. Test procedure and reference method used
 - 8. Link-loss results
- G. Cable test results shall be stored and presented to the Technology Designer in both hard copy and electronic format for approval.

4.34 DRAWINGS AND DOCUMENTATION

- A. Fully detailed documentation and record drawings of installation layout and performance shall be submitted for review within thirty (30) days of completion of work and shall include as a minimum:
 - 1. Marked drawings showing routing of all inside cable with gauge, type and numbering scheme.
 - 2. Location of outlets with their new identification number prepared on most recent installation drawing.
 - 3. Drawings shall accurately record actual locations of each item of fixed equipment and show interconnecting wiring. Drawings will indicate location of equipment and tagged circuits. A functional block diagram will also be required.
- B. Drawings, whenever submitted, shall be submitted with two (2) copies to the Owner.
- C. Final record drawings shall be submitted as two (2) sets of scaled 20# bond drawings and two (2) USB flash drive in AutoCAD 2016 or higher format. Drawings shall be professionally done. Hand drawings and notations will not be accepted.
- D. Submit pictures of the equipment rooms, backboards, and rack elevations. Pictures must include room entry point, all surrounding walls, backboards, front rack elevations and rear rack elevations.

- E. All drawings and the information contained therein become the sole property of the Owner.

4.35 CLOSEOUT

A. Punch List

1. The Contractor shall perform required remedial work, without claim for additional labor or other costs. Where required, the Contractor shall re-test and submit a revised Test Report.
2. The Contractor shall notify the Technology Designer of completion of the Punch List.
3. If after notification and inspection by the Technology Designer, the identified Punch List items have not been corrected the Contractor will be notified that remedial work is still required. Additional time spent by the Technology Designer, due to the failure of the Contractor to correct Punch List items and finish the project by the agreed upon completion date as set forth in the Contract Documents, will be charged to the Contractor at the rate of one hundred twenty-five dollars (\$125) per hour and deducted from the Contractors retainage.
4. Fully detailed documentation, record drawings of the installation, cabinet layouts, and performance shall be submitted for review, as described in Section 4.34.
5. Final payment/retainage will NOT be considered if all aspects of Sections 4.32, 4.33, 4.34 and 4.35 have not been satisfied and approved by the Technology Designer.

4.36 THE OWNER'S RIGHT TO USE

- A. Acceptance of the Work of this Section will occur after completion of corrections and adjustments required by "Punch List" (as generated during on-site inspections and review of testing documentation).
- B. The Owner reserves the right to use equipment, material and services provided as part of Work of this Section, prior to Acceptance, without incurring any obligation to accept any equipment or completed systems until Punch List work is complete and systems comply with Contract Documents.