

Avon Community School Corporation

Request for Proposals – Fiber WAN

Avon Community School Corporation (the “District/Applicant”) is requesting proposals for self-provisioned fiber construction or services provided over third party networks in order to provide WAN connections between eligible sites. Fiber Service must be active by May 1, 2025. Bidders are advised that this project will be contingent upon the successful obtaining of E-Rate funding and an Applicant-issued Notice to Proceed, and the contract agreement between the Applicant and the selected vendor must recognize that contingency. Sites to be connected are listed below. All viable proposed fiber paths will be considered.

1. Avon Middle School South (NOC), 7199 East US HW 36, Avon, IN 46123
2. Avon Middle School West, 1450 S. County Rd. 450 E., Avon, IN 46123. (this is a new construction school)
3. In each building, the selected vendor will demarc the service in an existing network closet to be designated by the Applicant.
4. All viable fiber routes will be considered. We have listed various potential fiber routes, as there is a railroad that must be crossed, and different options would result in above ground or below ground fiber installation. The proposed self-provisioned fiber route begins at Avon Middle School South (NOC), 7199 East US HW 36, Avon, IN 46123. Refer to **Appendix A** for the existing Avon Middle School South (NOC) location. From the NOC it will proceed south to CSX railway where open duct has been proofed, is accessible and is and is available to cross the CSX railway. See **Appendix B** for railway duct bank location. The proposed route will then proceed south to E County Road 100 S. Then west to S County Road 525 E.
 - a. The preferred self-provisioned fiber route then proceeds underground though the Prestwick Neighborhood to S County Road 450 E and south down S County Road 450 E to Avon Middle School West.
 - b. An alternate self-provisioned route utilizing pole attachments may be considered from the intersection of E County Road 100 S and S County Road 525 E. The Alternate Route proceeds south on S County Road 525 E to E County Road 200 S, then west to S County Road 450 E and north to Avon Middle School West.

Refer to **Appendix C** for a proposed fiber self-provisioned fiber path with an alternate path defined.

Appendix D contains the site plan and building plan for Avon Middle School West.

Note that E-rate uses the term “self-provisioned fiber” to describe fiber built to be owned by an applicant and dedicated solely for the applicant’s use. E-rate program rules require applicants who might consider having a contractor construct such fiber for them to compare the costs and benefits of owning that fiber to those of leasing any comparable connection/s provided via a vendor’s third-party network. Contractors considering bidding an owned (“self-provisioned”) solution should understand that this RFP describes the requirements of those other bidding options as well, and while it is expected that vendors and contractors read and understand all terms in this RFP, each is encouraged to focus specifically on the terms herein applicable to the technology they intend to propose. Notwithstanding the previous, nothing in this document should be construed as the Applicant expressing a preference of one type of solution over

another. The Applicant will consider any technology-neutral owned or leased transport medium including both fiber and non-fiber options.

Your proposal should include pricing options for connections between each site as described in the specifications that follow, and leased service agreements should allow for service level changes to be made to any location during the term of the contract.

The Applicant wishes to work with the selected vendor to establish an appropriate initial service tier for each building to maximize the cost effectiveness of these services to the district. Sites to be connected should be priced separately (individually); the Applicant reserves the right to remove locations from this list prior to the commencement of the project at its discretion.

Construction cannot begin until after January 1, 2024.

Options to be Bid

The Applicant is seeking multiple options for bids. Respondents may bid any or all options.

1. The first option is for the construction of customer-owned (“self-provisioned”) fiber connecting the designated locations and including all eligible special construction charges. Bidders may, as an option, also provide pricing for the purchase of equipment necessary to light the fiber, although that option must be priced separately.
2. The second option is for an ongoing leased service to be delivered over the service provider’s third-party network. This category includes the following solutions:
 - a. A fully managed, leased lit fiber solution. One-time special construction should be bid separately from the monthly recurring cost for the fully managed leased service.
 - b. A leased dark fiber solution that may include special construction, the monthly lease fee, monthly maintenance and operations fees, and may, as an option, also include pricing for the purchase of equipment necessary to light the fiber. Any one-time special construction costs must be bid separately from the monthly lease fee. Monthly recurring maintenance and operations fees should be itemized separately from monthly recurring dark fiber lease fees.
 - c. Any other type of transport service delivered over a service provider or other third-party owned network that delivers the bandwidth speeds and meets the uptime, latency, and jitter specifications outlined in the leased lit fiber option. While the bandwidth and service requirements are the same as leased lit fiber, this request is technology neutral and can include non-fiber solutions.

In E-rate terminology, “special construction” refers to the upfront, non-recurring costs associated with the installation of new fiber to or between eligible entities, including construction of network facilities, design and engineering, and project management. Special construction does not include the network equipment necessary to light fiber, nor the services necessary to maintain the fiber. Charges for network equipment and fiber maintenance are eligible for E-rate support as separate services.

All of the options above can include special construction or one-time E-rate eligible non-recurring costs as well as E-rate eligible recurring circuit costs. Lit fiber proposals which require an upfront payment may only include a

special construction cost if any new fiber is being installed. If new fiber installation is not necessary, the payment is considered a non-recurring cost and must be noted accordingly in your response.

Based on the bids and both a short term and long-term cost effectiveness analysis, the Applicant will determine which, if any, of the proposed solutions is acceptable. The specifications related to each solution option are as follows:

Customer-Owned (“Self-Provisioned”) Fiber:

The Applicant requests that respondents propose design and pricing for a self-provisioned build (installed by a vendor and owned by the Applicant) of new fiber capable of scaling from 1 Gbps to 40 Gbps between the specified locations. We are requesting that six (6) to twenty four (24) strands be built and we intend to light six (6) strands to each site in the first year. The cost of the strands not lit during the funding year will be allocated out as ineligible charges by the Applicant in accordance with E-rate rules.

The Applicant desires a fully “turn-key” project, so respondents should provide explanation for the Applicant’s involvement in the process including ownership and sourcing of permits, etc. The solution should include **all** costs related to the deployment of the proposed circuits.

Services Provided Over Third-Party Networks:

As an alternative, providers can quote leased services provided over their third-party network, using any transport medium (fiber, wireless, coax, copper) or equivalent that meets the specifications outlined in the required Service Level Agreement specification that follows.

The Applicant seeks a three (3) year contract with up to five (5) optional voluntary one-year extensions; other terms will be considered. All cost proposals must reflect the LCP (Lowest Corresponding Price), GSA pricing, and any available governmental unit discounts including existing state purchasing agreements or contracts. Any proposals referencing an existing state purchasing agreement or contract must include that information in the proposal. Bid prices must be complete for the services proposed and shall include all associated costs, even if the amounts are estimates based upon current applicable taxes, surcharges, or fees.

Leased Lit fiber service proposals should include pricing options for 1, 2, 5, and 10 Gbps connections between each endpoint site and the head-end site/s, and should allow for service level changes to be made to any location during the term of the contract. Proposals including throttling, asymmetrical bandwidth, and traffic restrictions are not acceptable.

Lit fiber circuits may be provisioned with an active, powered stand-alone network device on each end of the link or simply terminated into an optical interface module. Your proposal should clearly indicate which.

Please note that to compare the different options accurately, the Applicant assumes that lit fiber costs include:

1. Modulating Equipment (You must describe proposed electronics, with specifications and the expected life for the equipment.)
2. Annual maintenance (markers, general inspection, preventative maintenance, etc.)

3. Annual operating costs
4. Repair of Cuts, Diagnosis and Resolution of Outages, and Fiber Relocations at the cost of the provider
5. Emergency Restoration and Relocation
6. Miscellaneous Fees: Known right of way, pole attachment(aerial) fee, railroad crossing, other issues

In any contract for lit fiber service, the act of changing (raising or lowering) service tiers during the term shall not cause a change in the end date for that contract, and the price for such tier changes shall not increase above the tier pricing agreed to prior to the commencement of the initial term.

Leased Dark fiber service proposals should be for a lease of up to 6 strands of fiber from the hub to each eligible entity location; other configurations will be considered. The physical layer design of the proposed dark fiber solution should minimize or eliminate points of failure that impact more than one site in cases of a fiber cut, fiber bump or other physical layer impediment.

Respondents must offer recurring Maintenance and Operations services and can, as an option, also offer pricing for the purchase of equipment that the Applicant will need to light the fiber; both either themselves or through 3rd party subcontractors. In the case that respondents use external 3rd party service providers or contractors to deliver some or part of the solution, these should be clearly indicated in the response.

Respondents must separate non-recurring special construction charges, monthly recurring fiber lease and monthly Maintenance and Operations charges, and charges for equipment listed above as defined by E-rate eligibility rules.

Please note that to compare the different fiber options accurately, the Applicant assumes that dark fiber service includes the items listed below. Your proposal should include an overview of the maintenance practices associated with these responsibilities.

1. Ongoing maintenance of the fiber. The selected Bidder shall maintain the applicable fiber seven days per week, twenty-four hours per day. Upon notification from the Applicant of a malfunction relating to the applicable fiber, Bidder shall respond to such malfunction within two (2) hours and thereafter proceed to correct the malfunction with reasonable diligence.
2. Maintenance responses must also include information regarding:
 - a. Routine maintenance and inspection,
 - b. Scheduled maintenance windows and scheduling practices for planned outages,
 - c. Marker and handhole inspection and repair for buried fiber,
 - d. Bi-annual inspection of aerial installs and repair of sagging fiber or worn outer layer,
 - e. Handling of unscheduled outages and customer problem reports
 - f. What service level agreement is included, and what alternative service levels may be available at additional cost,
 - g. What agreements are in place with applicable utilities and utility contractors for emergency restoration,
 - h. Repair of fiber breaks,
 - i. Mean time to repair,
 - j. Replacement of damaged fiber,
 - k. Post repair testing,
 - l. Replacement of fiber which no longer meets specifications,

- m. Policies for customer notification regarding maintenance,
- n. Process for changing procedures, including customer notification practices,
- o. Process for moves adds and changes.

Other technical means of providing the described service not specifically described above (wireless, coax, copper) must meet or exceed the applicable portions of the Leased Lit fiber service description above.

Service Level Agreement

Respondents of Services Provided Over Third-Party Networks must provide a proposed Service Level Agreement (SLA) with their response. The proposed SLA must include a description of the services provided and describe how the end-to-end performance of these services will be measured (from each A location to the Z locations). At a minimum, an SLA for lit service should describe that the Respondent will make all reasonable efforts to ensure 99.99% network availability of each circuit. Each SLA should describe 24x7x365 trouble-reporting procedures including escalation procedures, offer commitments with regard to the time to respond to and repair service degradation and outages, describe service credits based on percentages of monthly fees, and describe provisions available in the event of chronic trouble. The minimum commitment to be guaranteed is a two-hour diagnosis and a four-hour temporary or permanent repair. Respondents should describe monthly and annual service reports offered, showing peak usage, downtime, and impaired performance versus the SLA, for each link. The services described in the SLA shall be maintained to the specifications of these commitments throughout the term of the contract, and the selected Service Provider shall remediate any deficiencies at no cost to the Applicant.

Each proposal for Services Provided Over Third-Party Networks must also include the following service commitments:

- Lit service proposals: frame/packet loss, network latency (less than 25ms expected), and network jitter commitments.
- Dark Fiber proposals only: Attenuation and splice loss commitments.

Commitments Required for Special Construction and Non-Recurring Costs

All E-Rate applications including special construction are subject to review and detailed questioning. Respondents should provide or be prepared to promptly provide the following information:

- A map file of the proposed fiber route
- The cost per foot of fiber
- The cost per foot of fiber installation (splicing, pulling through conduit, hanging on poles)
- The cost per foot of outside plant materials (conduit, handholes, markers, aerial make ready materials)
- The cost per foot of outside plant installation (trenching, handhole and marker installation, installation of aerial make-ready materials)

The amount of special construction capital requested will be examined by E-Rate program reviewers and compared to the cost of historical fiber builds in the region.

Service providers placing extra strands into the build for their own use must cost-allocate the cost of those provider-owned extra strands as well as all incremental costs of those extra strands from their bid. This is not a pro-rata share, but an incremental cost calculation that must be backed by detailed documentation. Neither the E-rate program nor the Applicant will be responsible for such costs.

Questions

Any questions related to the technical aspects of this document should be directed to Jason Brames, Director of Technology, at JRbrames@avon-schools.org by 2:00pm EST by **January 5, 2024**. Answers to any written questions or any additional information, revisions, or clarifications to the RFP will be provided in the form of an addendum to be posted with the FCC Form 470 on the Universal Service (E-Rate) website. It is the sole responsibility of the Service Provider to check for any addenda that may be issued.

Compliance with Specifications

By submitting a proposal, the Service Provider certifies that it has read and agrees to the following terms and conditions. Failure to meet any requirement outlined herein is adequate cause to reject your proposal.

- The Service Provider has clearly listed any exceptions to any requirements or conditions set forth in this RFP with which it is unable or unwilling to comply and has included all relevant standard or additional contract terms and conditions with its proposal. Such exceptions, terms, and conditions must be set forth with specificity and may not be incorporated by reference.
- The Service Provider agrees that the final contract shall incorporate and not override any terms or conditions set forth in this RFP, minus any agreed-upon exceptions, and that the RFP will be incorporated into the final contract.
- The Service Provider agrees to follow and abide by the rules of the E-Rate program as promulgated by USAC and the FCC and certifies that it has not been suspended, debarred, or placed on Red Light Status within the prior three years. Service Provider further agrees that any costs not funded by the E-rate Program due to Service Provider violations of Program rules will be the sole responsibility of the Service Provider.

Response Format

Your response should describe the network topology being proposed, whether the circuits are dedicated end-to-end for the Applicant's use, and whether there are any mid-path electronics necessary to provision the circuits. You should describe all proposed handoffs, including whether you are handing off multiple connections at the head-end or a single, aggregated connection. Please indicate and specify all service provider owned onsite equipment necessary to hand off service to the Applicant's LAN equipment. Service provider should provide this information in the form of a network WAN diagram.

Additionally, **all** proposals must include the following information:

1. A description of services to be provided with detailed information regarding any required construction, including the timeline for completion of every phase of work – engineering, manufacturing, construction, permitting, electronics delivery, maintenance.
2. Complete pricing for the services described herein. Your proposal must clearly indicate which option it is a response to, and must provide detail regarding special construction, and non-recurring and recurring costs for the service being proposed for each site requested. If your proposed agreement has a built in “price escalator” clause, that escalator must be detailed within your bid response (not merely mentioned in your sample agreement).
 - a. When submitting a proposal including special construction, respondents must complete the pricing matrix located in *Appendix E: Special Construction Pricing* of this RFP.
3. Proposed network diagram.
 - a. For dark fiber and self-provisioned fiber responses, respondents must include identification of aerial vs. buried fiber segments, detailed drawings showing fiber and equipment locations, and other pertinent details as outlined in *Appendix F: Common OSP Installation Specifications for E-Rate Proposals*. Any deviations from the specifications in Appendix F should be clearly noted in your response.
4. Proposed Service Level Agreement.
5. Length of time your company has provided such services.
6. Three (3) reference sites where your company has performed a similar service, including business name, contact name and contact information. It is preferable that at least one reference should be for a school district of similar size within 200 miles of the Applicant. If your proposal is for more than one option (e.g. self-provisioned fiber as well as lit fiber service), provide 3 references for each.
7. Your E-Rate SPIN Number. (You must have a current SPAC form on file with USAC.)
8. A sample contract which includes the proposal requirements and the E-Rate contingencies outlined herein. (Failure to provide a contract in a timely fashion may be considered grounds for disqualification.)

Evaluation Criteria

The Applicant’s review of information will be primarily focused on the substance of the details provided in response to the requirements herein including but not limited to pricing and terms, technical details, SLA, experience and references, and compliance with the requirements laid out in this document.

Please note USAC’s posted guidance regarding the comparison of Lit and Dark Fiber proposals:

“In considering whether leased dark fiber or leased lit fiber is the more cost-effective option, applicants will need to identify a specific and comprehensive total cost for each of the responsive proposals received, and compare those costs over a defensible time period.” Accordingly, service providers should *“supply all of the information necessary [...] to identify the total cost of the service (e.g., all of the costs associated with deploying any new fiber to connect entities, purchasing Network Equipment, maintenance and operations, etc.)”*¹ In cases where a proposal does not include information required to make this comparison (e.g. a provider elects not to bid network equipment required to light the fiber), the Applicant will use available market pricing in place of the missing information.

Proposal Delivery

The Applicant reserves the right to reject each and every bid, and to waive informalities, irregularities, and errors in the bidding to the extent permitted by law. This includes the right to extend the date and time for

receipt of bids. In the event that a responsible bid is not received or if it is determined that the low bid received is too high, the bid received will be rejected and the project will be cancelled or re-bid.

Bids should be e-mailed to the office of Jason Brames, Director of Technology, at JRrames@avon-schools.org by 2:00pm EST on **January 19, 2024**.

¹ <https://www.usac.org/e-rate/applicant-process/competitive-bidding/requirements-for-leased-dark-fiber-self-provisioned-networks/>

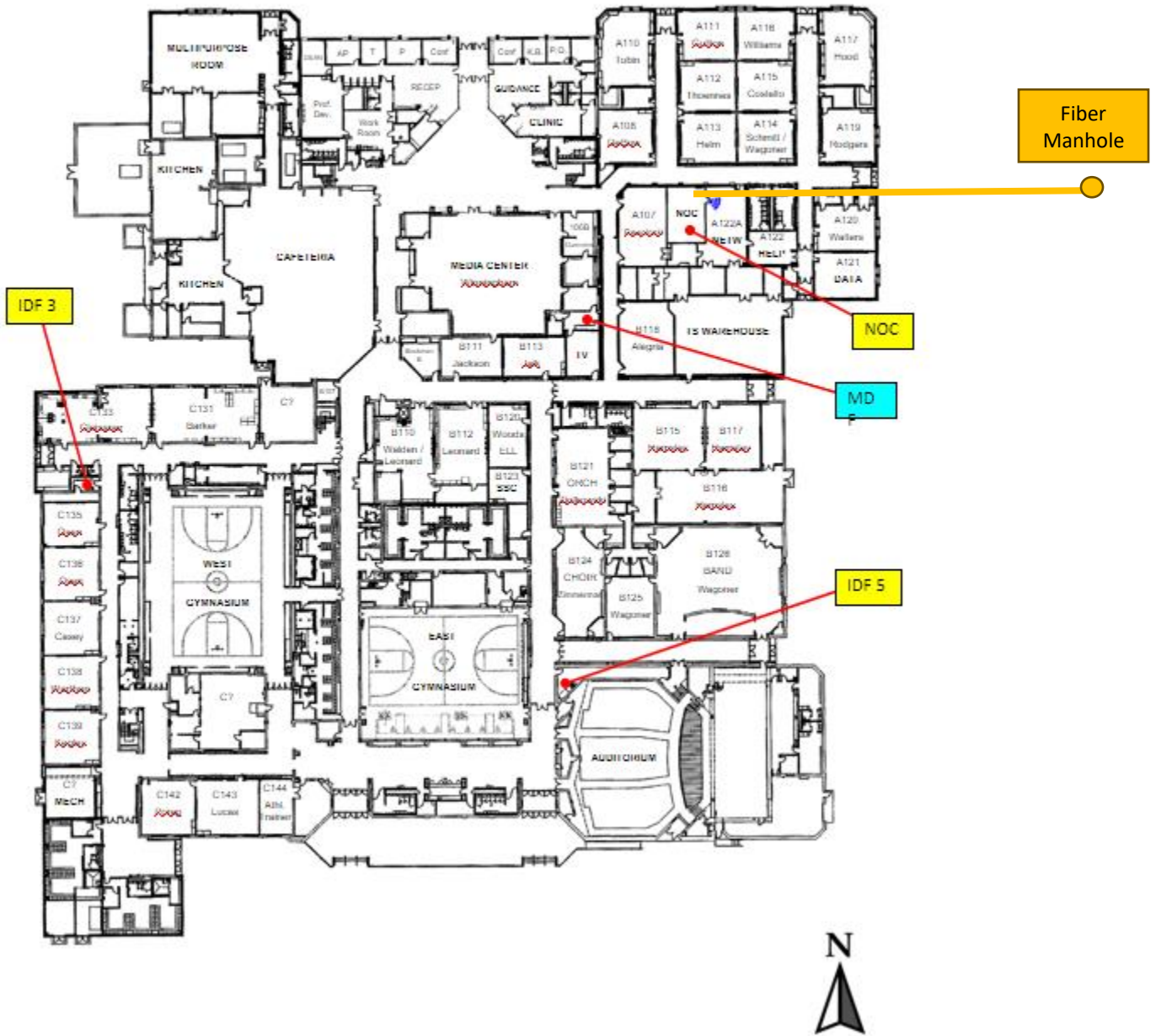
Appendix A: Avon Middle School South NOC location

A manhole is located on the East side of Avon Middle School South. A fiber splice case is located in the manhole. Conduit connecting the manhole to the Network Operation Center is accessible.

Middle School South

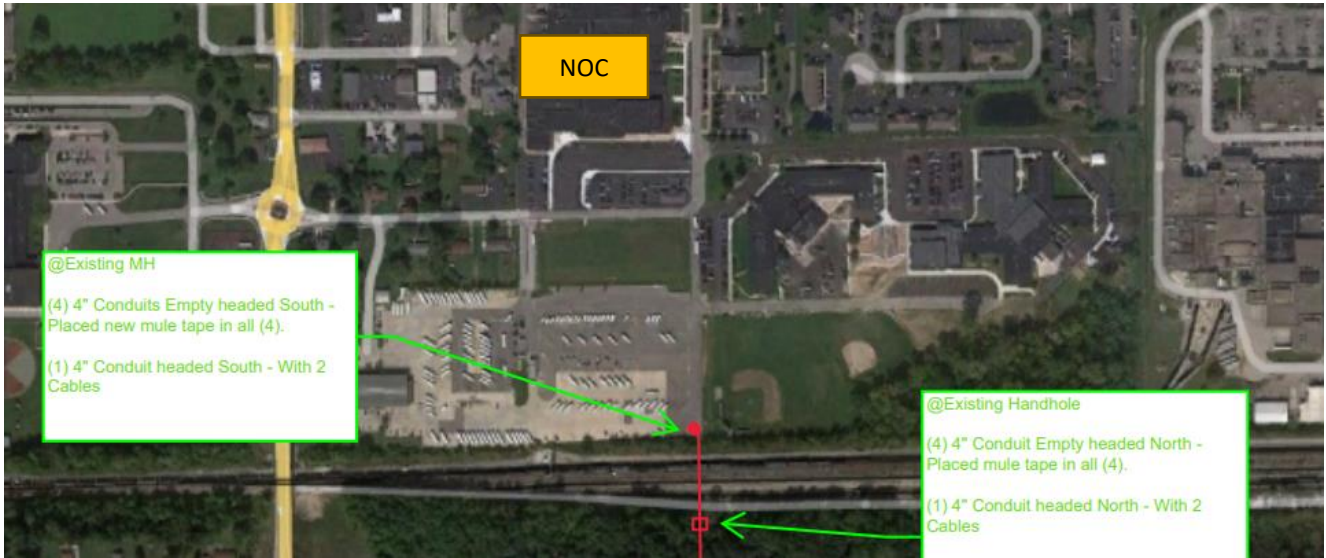
MDF & IDF3

1st Floor

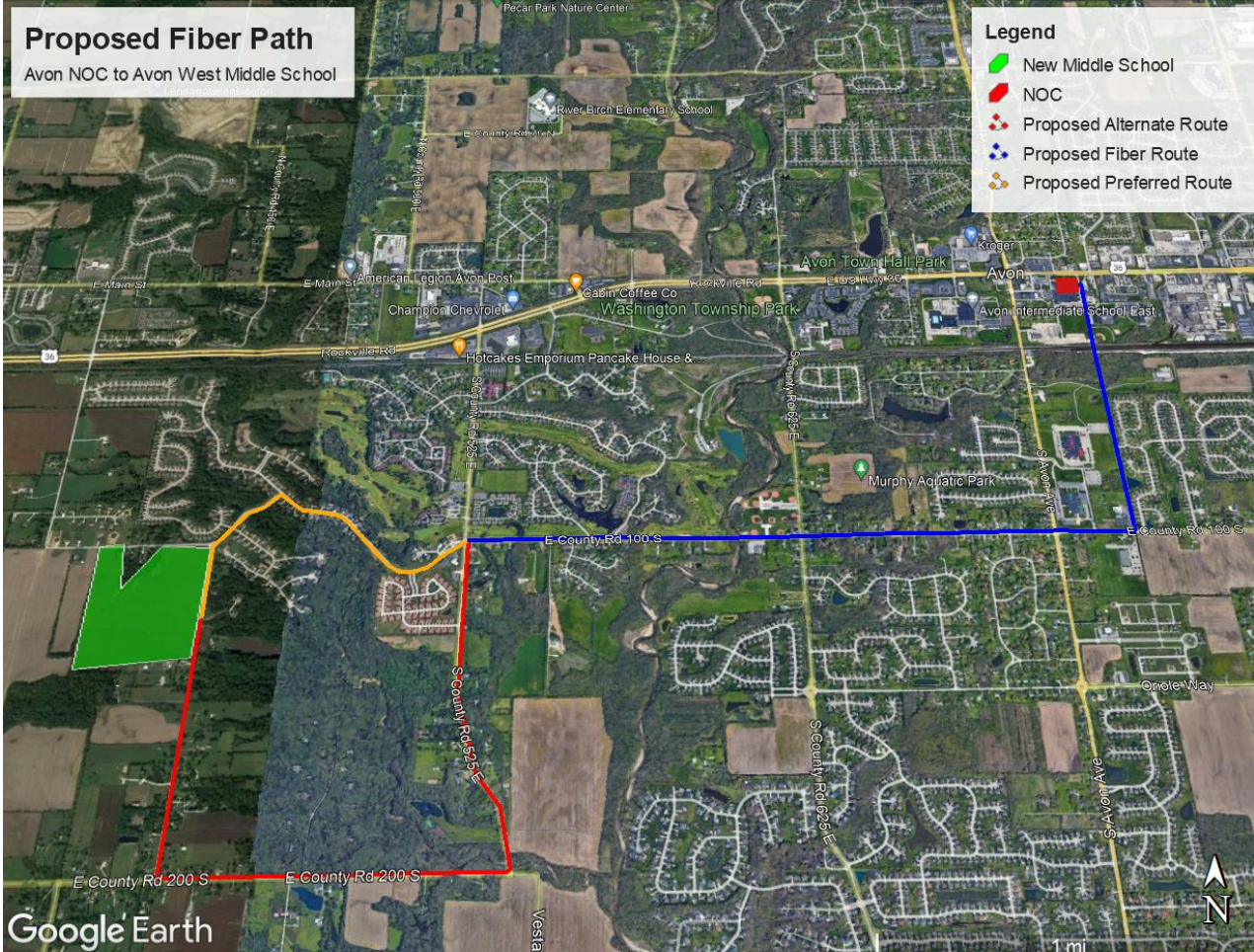


Appendix B: Railway Duct Bank Location

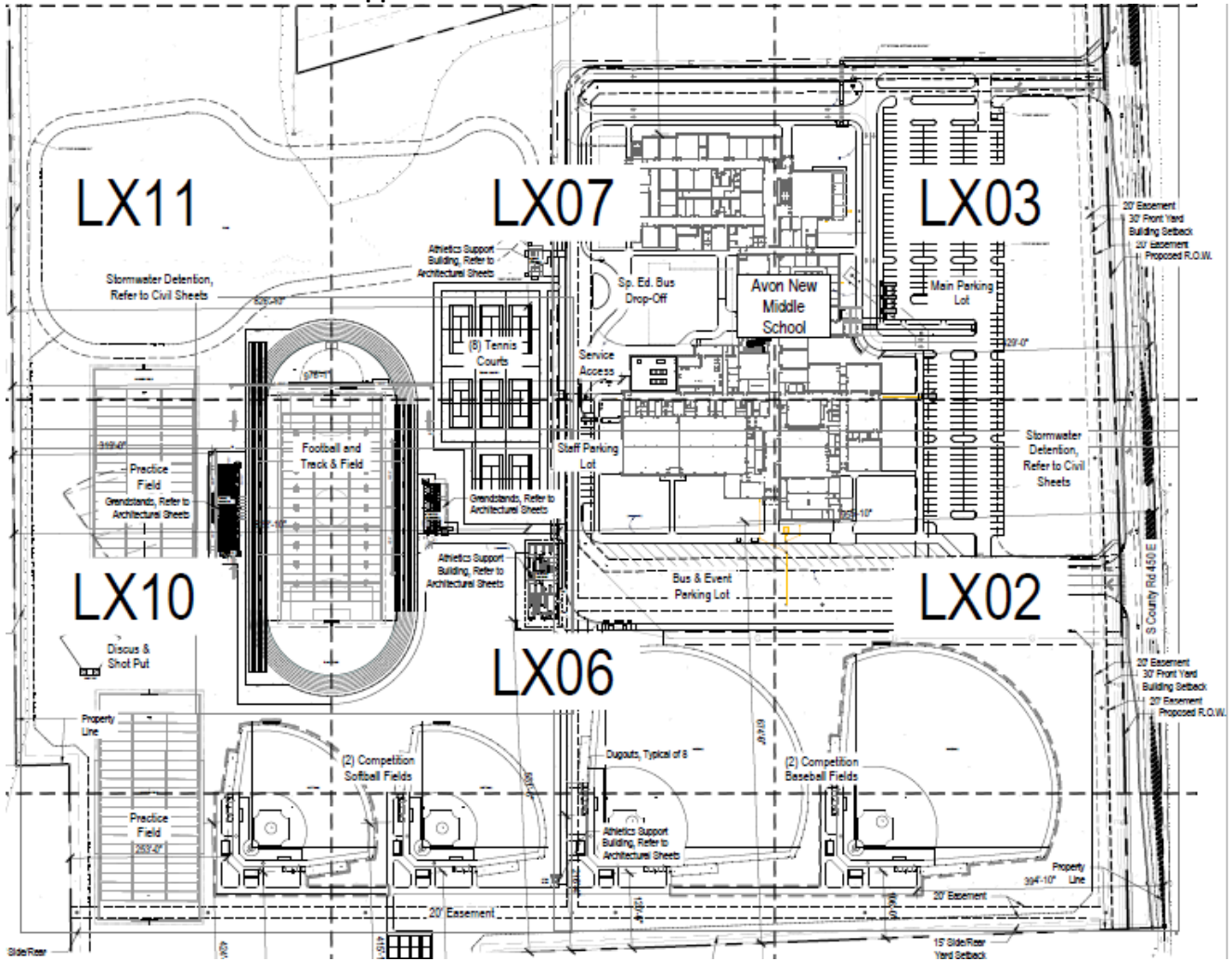
The Network Operation Center (NOC) location and the duct bank under the CSX railway are indicated below.



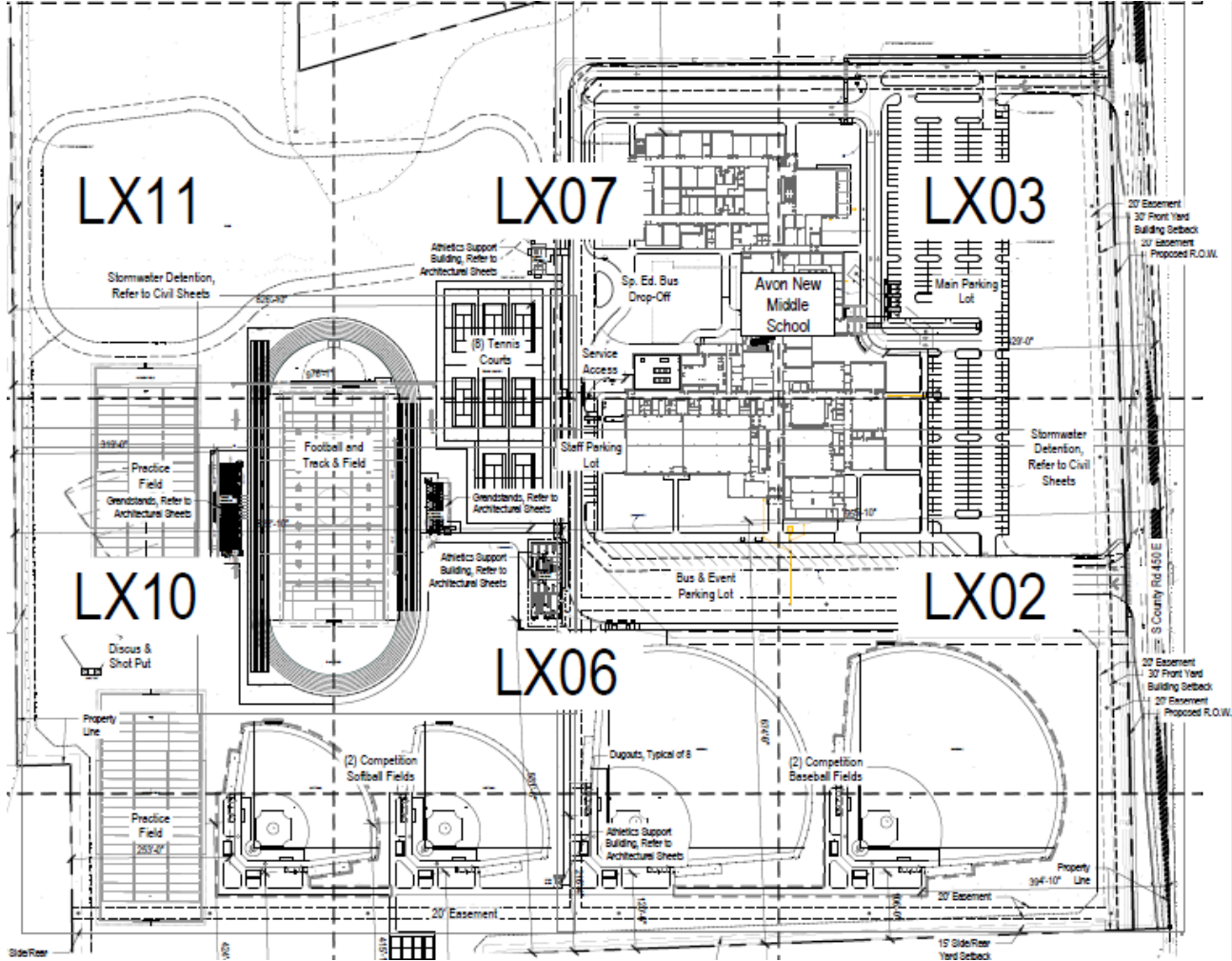
Appendix C: Proposed Fiber Path



Appendix D: Avon Middle School West Site Plan



Avon Middle School West Fiber Path (LX03)



20' Easement
 30' Front Yard
 Building Setback
 10' Easement
 Proposed R.O.W.

20' Easement
 30' Front Yard
 Building Setback
 10' Easement
 Proposed R.O.W.

St. County Rd 450' E.L.

Side Rear

15' Side/Rear
 Yard Setback

Appendix E: Special Construction Pricing
 (Required with all bid submissions that include special construction)

Segment Location	Strand Count	Segment Length (feet)	Total Segment Cost	Eligible Cost	Ineligible Cost*
Total project distances and costs					

All E-rate applications featuring special construction are subject to review and detailed questioning. Vendors should be prepared to promptly provide the following information: a map file of the proposed fiber route in KMZ format, and the cost per foot (aerial and buried separately) of fiber, fiber installation (splicing, pulling through conduit, hanging on poles), outside plant materials (conduit, hand-holes, markers, aerial make ready materials), and outside plant installation (trenching, hand-hole, and marker installation, installation of aerial make ready materials).

***Note on Cost Allocation required of Lit/Dark Service Providers:**

Often, Lit/Dark service providers wish to install more strands than are required by an E-Rate applicant for the lit provider’s future use. These additional strands are ineligible for E-Rate support, as are the incremental costs related to them (e.g., additional labor costs for splicing, additional plant costs, etc.). Lit/Dark service responses should include documentation which outlines any added incremental costs attributable to designing, managing and constructing a fiber system if deploying a larger strand cable than is required to provide the services requested in this RFP. Such costs include (but are not limited to):

- Splice Labor. If any fibers over the district’s fibers are spliced, the labor for these additional splices must be cost allocated.
- Splice Enclosures are placed to protect splices. If any fibers over the applicant’s fibers are spliced and require an enclosure, the enclosures for these additional splices must be cost allocated.
- Fiber Installation Labor. This represents the incremental cost of pulling a larger cable through the buried conduit.
- Structured materials installation. This represents the additional cost of burying a larger conduit to support the additional fibers.

Service providers should not include such costs in their special construction billing to the district and should be prepared to show evidence during the E-Rate review and approval process that it did not charge the applicant for these incremental costs. List them as "ineligible costs" in the table above.

Appendix F: Common OSP Installation Specifications for E-Rate Proposals

Material Requirements

- Material will comply with those standards as established by UL or NEMA and shall be commercial grade. All materials will be new and free from defects.
- If a buried proposal all buried conduit shall be EMT (Electrical Metallic Tubing) multi-duct with at least three innerducts. EMT fitting shall be gland or set screw type, and each conduit shall be equipped with a graduated pull tape or rope.
- If a buried proposal, unless specified by right-of-way owner, crossings will be two conduits, PVC-Sch 40 or better.
- If a buried proposal, the exact requirements for location and type of conduit within the building shall be verified with building owner.
- If a buried proposal, all Hand Holes shall be Indiana DOT approved, 45,000 lb. load rated CDR or comparable enclosures on roadways and railways, and pedestrian rated hand holes for non-roadways and railways.
- If a buried proposal, large-radius sweeps shall be provided where required for offset or change in direction of conduit. Bend radius rating of the cable must be adhered to for all conduit bends, pull boxes, and hand holes.
- Fiber must be single-mode with the following specifications:
 - Singlemode G.652 ITU standard
 - For singlemode fiber, the loss is about 0.5 dB per km for 1310 nm sources,
 - 0.4 dB per km for 1550 nm. (1.0 dB/km for premises/0.5 dB/km at either wavelength for outside plant max per EIA/TIA 568). This roughly translates into a loss of 0.1 dB per 600 (200m) feet for 1310 nm, 0.1 dB per 750 feet (250m) for 1300 nm.
 - Provider must produce insertion loss tests for each span of existing and newly constructed fiber that will be part of the WAN. These test results must be within the specifications listed in this section in order for the leased dark fiber solution to be accepted by the Applicant or the leased lit fiber solution to be approved for provisioning by the Applicant.
 - Connector types should be LC unless otherwise specified by the district.

Specifications

Survey

- Comply with all ordinances and regulations. Where required, secure permits before placing or excavating on private property, crossing streams, pushing pipe or boring under streets/railways.
- If a buried proposal, Bidder will locate underground lines of third parties in cable route area.

Permits and Traffic Control

- The Bidder must adhere to all applicable laws, rules and requirements and must apply for permits to place infrastructure per specification per county or city ordinance applicable to where the infrastructure is being placed.
- All traffic control, in accordance with local, state, county, or permitting agency laws, regulations, and requirements, will be the Bidder's responsibility. The Bidder's construction schedule will take into consideration sufficient time for the development and approval of a traffic control plan.

Tracer Wire Installation

- If a buried proposal, tracer wire shall be placed with all conduit installed unless armored or traceable cable is used. The Bidder will provide the tracer wire and shall install, splice and test (for continuity) the tracer wire. If the tracer wire is broken during installation, the wire should be repaired and tested for continuity after repair.
- If a buried proposal, for multi-duct installation, install a 5/8" X 8" copper clad ground rod in the hand-hole located on public right-of-way. Place a #12 insulated copper locate wire from the ground rod to the fiber optic termination room or to the outside of the building directly below the pull box and terminate on one side of an insulated indoor/outdoor terminal block to the master ground bar in the fiber optic termination room or place a ground rod on the outside of the building. Locate block in an accessible location. This is for "locate purposes only," not for grounding purposes. Note on as-built where ground is placed and tag located wire as "locate wire."

Depth of Burial (If a buried proposal)

- Except where otherwise specified, the cable shall be placed to a minimum depth of 24" along roadways and 18" on private property. Greater cable depth will be required at the follow locations:
 - Where cable route crosses roads, the cable shall be placed at a minimum depth of 48" below the pavement or 36" below the parallel drainage ditch, whichever is greater, unless the controlling authority required additional depth, in which case the greatest depth will be maintained.
 - Where cable crosses existing sub-surface pipes, cables, or other structures: at foreign object crossings, the cable will be placed to maintain a minimum of 12" clearance from the object or the minimum clearance required by the object's owner, whichever is greater.

Highway, Railroad, and Other Bored Crossings (If a buried proposal)

- All crossings of state or federal highways and railroads right-of-way shall be made by boring and placing a pipe casing. The cable shall be placed through the pipe casing. Country road and other roadways shall be bored, trenched, or plowed as approved by the appropriate local authority.
- All work performed on public right-of-way or railroad right-of-way shall be done in accordance with requirements and regulations of the authority having jurisdiction there under.
- Bidder shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn.
- Where the cable route crosses railroad right-of-way, the cable shall be placed at a minimum depth of 60" below the railroad surface or 36" below the parallel drainage ditch, whichever is greater, unless the controlling authority requires additional depth, in which case the greatest depth will be maintained.

Cable Markers (If a buried proposal)

- Cable markers shall be placed within 48 hours of cable installation. Unless the right-of-way or property owner specifies otherwise, cable markers shall be placed at all change in directions,

splices, fence line crossings, at road and stream crossings, and other points on the route not more than 1,000 feet apart.

- In addition, on highway right-of-way, the markers shall be located at the highway right-of-way line. Markers shall always be located so that they can be seen from the location of the cable.

Hand Holes (If a buried proposal)

- Hand holes will be placed in accordance with standard industry practice following the specifications provided in the construction plans, typical drawings, and detail drawings. Attention and planning must be exercised to ensure accessibility by other groups after construction has been completed.
- All hand holes unless otherwise stipulated by the drawings will be buried with 12" to 18" of cover at final grade.
- Immediately after placement, the soil around and over the hand hole will be tamped and compacted. Should any washouts occur, the Bidder will be responsible for correcting the problem immediately without additional cost to the district.
- After cable placement, all ducts will be sealed.
- All splice hand holes/manholes will be grounded.
- A sufficient coil of cable shall be left in each hand hole/building for splicing use.

Splicing (both buried and aerial)

- Fiber to fiber fusion splicing of optical fibers at each point including head ends is required.
- Complete testing services, such as end to end, reel testing, and splice loss testing, ORL, power meter/laser source testing and WDM testing is required.
- Individual splice loss will be 0.10 dB for single-mode unless after 3 attempts these values cannot be achieved, then the fibers will be re-spliced until a splice loss within 0.05 dB of the lowest previous attempts is achieved. Splice loss acceptance testing will be based on the fusion splicer's splice loss estimator.
- All cables to buildings shall be fusion spliced within a minimum of 50' of entering a building at a location to be determined by the owner with an existing single mode fiber and terminated at customer's rack.

Aerial Plant

- District is open to aerial fiber runs using existing utility poles, but Bidder must adhere to pole owners' requirements for clearances, spans, grounding, guys and attachments.

Testing Cable (both buried and aerial)

- The Bidder shall be responsible for on-reel verification of cable quality prior to placement.
- Completed test forms on each reel shall be submitted to the district.
- Bidder assumes responsibility for the cable after testing. This responsibility covers all fibers in the cable.
- The Bidder shall supply all tools, test equipment, consumables, and incidentals necessary to perform quality testing.
- The cable ends shall be sealed upon completion of testing.
- In addition to splice loss testing, selected Bidder will perform end-to-end insertion loss testing of

single-mode fibers at 1310 nm and 1550 nm from one direction for each terminated fiber span in accordance with TIA/EIA-526-7 (OFSTP 7). For spans greater than 300 feet, each tested span must test to a value less than or equal to the value determined by calculating a link loss budget.

Restoration (both buried and aerial)

- All work sites will be restored to as near their original undisturbed condition as possible, all cleanup will be to the satisfaction of the district and any permitting agencies.
- Bidder shall provide a brief description of restoration plan in the response, with the expectation that a more detailed restoration plan will be delivered prior to construction begins.
- Work site restoration will include the placement of seed, mulch, sod, water, gravel, soil, sand, and all other materials as warranted.
- Backfill material will consist of clean fill. Backfilling, tamping, and compaction will be performed to the satisfaction of the district, the representative of any interested permitting agency, and/or the railroad representative.
- Bidder will be responsible for any restoration complaints arising within one year after the district's final acceptance.
- Excess material will be disposed of properly.
- Debris from clearing operations will be properly disposed of by the Bidder/subcontractors as required by permitting agencies or the railroad. Railroad ties, trees, stumps or any foreign debris will be removed, stacked, or disposed of by the Bidder as per requirements by other interested permitting agencies, and/or the district.
- Road shoulders, roadbeds, and railroad property will be dressed up at the end of each day. No payment for installation will be permitted until cleanup has been completed to the satisfaction of the any permitting agencies, and/or the district.
- Site clean-up will include the restoration of all concrete, asphalt, or other paving materials to the satisfaction of the other interested permitting agencies, and/or the district.

Documentation (both buried and aerial)

As-built drawings will include:

- Fiber cable routes
- Drawings, site drawings, permit drawings, and computerized design maps and electronically stored consolidated field notes for the entire route must include:
 - Verification of as-built and computerized maps
 - Splicing locations
 - Optical fiber assignments at patch panels and splice locations
 - Installed cable length
 - Date of installation
 - Aerial installation documents should include
 - Pole attachment applications and inventories
 - Pole attachment agreements between Bidder and other utilities
 - GPS points of reference for utility poles
 - Photo images of poles to which fiber is attached
 - Underground installation documents should include
 - Conduit design and detailing and manhole detailing

- Preparation of all documentation for approval of conduit construction and/or installation,
- Fiber details will include:
 - Manufacturer
 - Cable type and diameter
 - Jacket type: singlemode
 - Fiber core and cladding diameter
 - Fiber attenuation per kilometer
 - Fiber bandwidth and dispersion
 - Index of refraction
- OTDR documentation will include:
 - Each span's traces shall be recorded and mapped, with each splice loss from each direction and the optical length between splices as well as info required by Span Map.
 - Reel acceptance
 - Individual fiber traces for complete fiber length
 - Losses of individual splices
 - Anomalies
 - Wavelength tests and measurement directions
 - Manufacturer, model, serial number, and date of last calibration of OTDR
- Power Meter documentation will include:
 - Total link loss of each fiber
 - Wavelengths tested and measurement directions
 - Manufacturer, model, serial number, and date of last calibration for all equipment used

References, Standards, and Codes

Specifications in this document are not meant to supersede state law or industry standards. Bidders shall note in their response where their proposal does not follow the requested specification to comply with state law or industry standard. The following standards are based upon the *Customer-Owned Outside Plant Design Manual* (CO-OSP) produced by BICSI, the *Telecommunications Distribution Methods Manual* (TDMM) also produced by BICSI, ANSI/TIA/EIA and ISO/IEC standards, and NEC codes, among others.

It is required that the Bidder be thoroughly familiar with the content and intent of these references, standards, and codes and that the Bidder be capable of applying the content and intent of these references, standards, and codes to all outside plant communications system designs executed on the behalf of the district.

Listed in the table below are references, standards, and codes applicable to outside plant communications systems design. If questions arise as to which reference, standard, or code should apply in a given situation, the more stringent shall prevail. As each of these documents are modified over time, the latest edition and addenda to each of these documents is considered to be definitive.

Standard/Reference	Name/Description
BICSI CO-OSP	BICSI Customer-Owned Outside Plant Design Manual
BICSI TDMM	BICSI Telecommunications Distribution Methods Manual
BICSI TCIM	BICSI Telecommunications Cabling Installation Manual
	Customer-Owned Outside Plant Telecommunications Cabling Standard
TIA/EIA – 568	Commercial Building Telecommunications Cabling Standard
TIA/EIA – 569	Commercial Building Standard for Telecommunication Pathways and Spaces
TIA/EIA – 606	The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
TIA/EIA – 607	Commercial Building Grounding and Bonding Requirements for Telecommunications
TIA/EIA - 455	Fiber Optic Test Standards
TIA/EIA - 526	Optical Fiber Systems Test Procedures
IEEE 802.3 (series)	Local Area Network Ethernet Standard, including the IEEE 802.3z Gigabit Ethernet Standard
NEC	National Electric Code, NFPA
NESC	National Electrical Safety Code, IEEE
OSHA Codes	Occupational Safety and Health Administration, Code of Federal Regulations (CFR) Parts 1910 - General Industry, and 1926 - Construction Industry, et al.