

## GENERAL DESCRIPTION AND SPECIFICATIONS

County Line SD is requesting proposals for self-provisioned fiber construction and services provided over third-party networks for delivery of wide area network (WAN) services to the district. **The applicant will accept bids for any type of leased or district owned connectivity, including wireless and other types of connectivity that can meet our connectivity goals.**

### DEFINITIONS

**Self-Provisioned Fiber (SPF)** is defined as fiber-optic cable (or wireless, copper, etc.) installed for County Line SD, that will be owned, maintained and lit by County Line SD after construction is completed. Detail on this option can be found in SPECIFICATIONS FOR SELF-PROVISIONED FIBER.

Service provided over 3<sup>rd</sup> party networks for delivery of wide area network services include:

**Lit-Leased Fiber (LLS)**, which is defined as any technology neutral point-to-point broadband service that provides the desired connectivity end-to-end. This could be fiber-optic cable, microwave, or other media where the service provider installs, operates and maintains all of the equipment necessary to provide end-to-end service for County Line SD.

**Leased Dark Fiber (LDF)**, which is defined as either existing fiber-optic cable, or fiber-optic cable that is installed for the use of County Line SD for the duration of the contract. The fiber-optic cable is maintained by the service provider, but County Line SD provides, operates and maintains the electronics to light the fiber.

**Leased Dark Fiber (IRU)**, which is defined as either existing fiber-optic cable, or fiber-optic cable that is installed for the use of County Line SD for the duration of the contract. The fiber-optic cable is maintained by the service provider, but County Line SD provides, operates and maintains the electronics to light the fiber. The Leased Dark Fiber (IRU) differs from Leased Dark Fiber mainly in the duration of the contract, which for The Leased Dark Fiber (IRU) will be for a period of either 10, 15 or 20 years.

**Any other type of transport service** - A technology-neutral 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. Requirements for this type solution will mirror the requirements for Leased Lit Service.

The current WAN services are provided by County Line SD owned multimode fiber optic cable providing 1 Gbps service but 10 Gbps services are now required to support current instructional needs and to meet the State Education Technology Directors Association standard recognized in the FCC Second E-rate Modernization order as the benchmark standard for bandwidth for school districts.

Vendors may submit proposals for any and all options as listed above that will provide point-to-point connectivity at the desired bandwidth. Specifics for each option are listed in the section titled WAN PROCUREMENT OPTIONS. Vendors may also submit proposals on the network equipment regardless of whether they submit proposals on connectivity options or not.

County Line SD is also seeking proposals for Modulating Electronics to support the self-provisioned, Leased Dark Fiber and Leased Dark Fiber (IRU) options. Details on specific equipment requirements and quantities are described under NETWORK EQUIPMENT.

Vendors providing proposals should have an ERate Service Provider Information Number (SPIN) from the SLD, and should include their SPIN on their proposal. There is no cost to register for a SPIN/498 ID, and application can be made at <https://www.usac.org/e-rate/service-providers/step-1-obtain-a-spin/>

Any measurements referred to in this document are estimates to aid vendors in locating routes and orientations. These measurements do not include service loops or slack left in manholes or on poles. These measurements are NOT to be relied upon to estimate materials and/or labor except in a general sense. Vendors are expected to obtain their own measurements to develop their proposal. No change orders, or increases to the price being proposed by the vendor as a result of inaccuracies of these measurements, will be accepted by County Line SD after award of this proposal.

## SERVICE LOCATIONS

All buildings in this project are co-located at 12092 W. State Highway 22, Branch, Arkansas 72928. Service is expected to be delivered from the district network operations center (NOC), identified as SAFE Room on the attached plans.

Service is expected to be delivered from the NOC to the following service locations:

### ERate Category One

Elementary School

High School

Middle School

### ERate Category Two

Science Building

Elementary Gymnasium

### ERate Ineligible

Administration

Bus Barn

## PROPOSALS

Proposals are due not later than 12:00 p.m. PST on 12/23/22. All questions and proposals must be submitted through the CRW Consulting IFCB online system at [www.crwconsulting.com/ifcb](http://www.crwconsulting.com/ifcb)

All Questions and Bids must be submitted using the on-line IFCB system. If for some reason the system is down before the respective deadline, please email your bid to [info@crwconsulting.com](mailto:info@crwconsulting.com) or fax it to 918.445.0049. Bids or questions submitted in this fashion will be disqualified if the on-line system is active at the time of submission

## EXISTING CONDITIONS

County Line SD currently has a network operations center (NOC) located in the SAFE ROOM shown on the attached diagram. District-owned multimode fiber-optic cable is currently installed in directionally-bored SDR conduit feeding all locations. The multimode does not support the 10 Gbps necessary to allow full utilization of wireless access points.

The existing underground conduit that currently contains the multimode fiber-optic (FO) cable is available for the vendor to use. Hand-holes are installed at each building entrance and at strategic locations along the cable runs to allow cable to be pulled along each pathway.

Due to the pending construction at the Elementary school, fiber runs to connect the Middle School, Elementary School, Elementary Gymnasium and Administration building will need to be re-routed. For these runs, vendor is responsible as part of this project to provide the new pathway. Direct burial of any fiber-optic cable will not be accepted unless the fiber-optic cable is contained inside a suitable conduit.

For existing conduit and hand holes that the vendor chooses to use to install their fiber-optic cable, existing multimode fiber-optic cable should be removed (with as little damage to the fiber as possible) and will remain the property of County Line SD.

## PRICING

Pricing for each Service location should be stand-alone. County Line SD requires new fiber-optic cable to the High School, Middle School and Elementary School. New fiber-optic connections to all remaining locations will be dependent upon cost and available budget.

## TIMELINE

Vendors shall include 2 timelines with their proposal:

- One identifying the earliest date (but not before July 1, 2023) the vendor could provide a “ready” connection to all locations, and when construction (if any) would need to begin in order to meet that timeline. Note that “ready” in this section means:
  - For **Leased Lit Service** and/or **Any other type of transport service** this means that all Ethernet connections are in place at all locations, and ready to provide Layer3 transport and 10 Gbps service from the hub to each location.
  - For **Leased Dark Fiber** or **Leased Dark Fiber IRU** this means that the fiber is in place end-to-end between the hub and each location, is terminated in the MDF at each location, and is ready to attach a Layer3 switch at each location and commence 10 Gbps data connection.
  - For **Self-Provisioned Fiber** this means that the fiber is installed end-to-end, terminated in the MDF at each location, and is ready to attach a Layer3 switch at each location and commence 10 Gbps data connection.
- One describing the earliest date the vendor could provide a “ready” connection to all locations based on a construction start date of September 1, 2023.

For all services (not including self-provisioned fiber) the new service is being planned to begin on July 1, 2023. For each response, respondents must include a timeline for bringing all sites online and an explanation of how much they are able to adhere to County Line SD’s specified timeline. Respondents with existing infrastructure in the area should be able to bring all sites online by the July 1 start of the funding year.

For self-provisioned fiber construction responses, service providers should develop two timelines.

- The first timeline should assume a construction completion date of June 15<sup>th</sup> 2023 and work backwards to identify when construction needs to begin in order to complete the project by June 15<sup>th</sup>.
- The second timeline should use September 1, 2023 as the construction start date and develop a timeline looking forward. For the second timeline, service providers should note how the timeline changes per site given an earlier or later start date. Actual start date on a self-provisioned fiber construction project may be dependent on the timing of the E-rate funding commitment decision letter (FCDL).

## WAN PROCUREMENT OPTIONS

County Line SD is seeking multiple options for bids. Service providers may bid one, all, or any number of options. **Except for vendors bidding only on Modulating Electronics (NETWORK HARDWARE), all respondents must be capable of providing telecommunication services under the Universal Service Support Mechanism, be a registered vendor with USAC, and have a USAC issued 498 ID (formerly Service Provider Identification Number-SPIN).**

**1. The first option is for services delivered over third-party networks. This category includes the following solutions:**

**Leased Lit Service/Transport** - A fully managed, leased lit fiber solution. This option may include Special Construction costs (see section on Special Construction). If Special Construction is included, it should be bid separately from the monthly recurring cost. Additionally, any installation or connection charges should be bid separately as a non-recurring cost. Maintenance cost for the Leased Lit Service should be included in the monthly recurring cost, and should include all transport media (fiber or other) maintenance, as well as the maintenance and any equipment refresh that is required during the course of the contract. With the exception of any Special Construction charges and any non-recurring costs stipulated by the service provider in their proposal, County Line SD shall only be liable for the service provider stated monthly recurring cost for the duration of the contract.

**Leased Dark Fiber & Leased Dark Fiber with Indefeasible Rights of Use (IRU)** - A leased dark fiber solution is a lease by County Line SD of the specified number of fiber strands between two locations. The monthly recurring lease charge for the fiber strands should include maintenance of the fiber. If the fiber maintenance is a separate monthly recurring charge, this should be clearly spelled out on the appropriate pricing sheet. A dark fiber lease may include a Special Construction charge, which should be listed separately in the space provided on the pricing sheets.

**Any other type of transport service** - A 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. Requirements for this type solution will mirror the requirements for Leased Lit Service.

**2. The second option is for self-provisioned (district owned) fiber to the designated locations and includes all eligible special construction charges.**

- a. Maintenance should be bid separately from the special construction charges for the self-provisioned fiber. Note that County Line SD may purchase fiber maintenance, but reserves the right to not purchase fiber maintenance at the school district's discretion.
- b. Specifics related to the self-provisioned fiber option are contained in the section SPECIFICATIONS FOR SELF-PROVISIONED FIBER.

County Line SD is also seeking proposals for the purchase of network equipment necessary to light any leased dark fiber, leased dark fiber (IRU), and/or self-provisioned solutions. Detail concerning the specific equipment that is required by County Line SD is outlined in the NETWORK EQUIPMENT section of this document. Note that applicant may already own some equipment necessary to light the aforementioned fiber so there may not be a direct correlation between the apparent and actual needs of County Line SD based on this document. The equipment outlined in NETWORK EQUIPMENT should be bid separately from any fiber services, and service providers are not required to bid on any of the aforementioned solutions in order to submit a proposal on network equipment.

For all options County Line SD will consider traditional network designs (such as hub and spoke) or alternative proposals (such as ring, bus, tree or other) that, in accordance with E-rate guidance, maximize cost effectiveness. Respondents should clearly illustrate proposed network design and construction routes. County Line SD is not advocating or mandating any preconceived network design or construction route and leaves this decision up to the vendor to present their best solution while recognizing the cited termination locations. For each response, vendor must include a network diagram displaying the paths to be used to serve each endpoint.

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. If no new fiber is being installed, then any installation costs are considered standard **non-recurring costs (NRC)**. Applicants may seek funding for special construction charges in connection with leased lit fiber, leased dark fiber, and self-provisioning. Special construction charges eligible for Category One support consist of three components:

- Design
- Construction of network facilities
- Project management

**Note:** The term Special Construction does not include network equipment necessary to light fiber, nor the services necessary to maintain the fiber.

All options can include Special Construction costs as well as E-rate eligible recurring circuit costs. For any proposed solution other than Self-Provisioned Fiber, an attempt by the service provider to add any fiber strands during construction that are NOT for County Line SD will trigger a requirement for the service provider to cost allocate out all costs related to the additional fiber strands. For self-provisioned fiber, service providers are restricted from adding additional fiber strands for their own use. County Line SD must own the entire self-provisioned fiber network end-to-end, to include fiber cable, conduit(s), and hand holes/manholes.

The winning service provider assumes full responsibility to ensure appropriate incremental costs are allocated out of the Special Construction charges to the district in accordance with FCC rules and orders. If, after the issuance of the Funding Commitment Decision Letter, USAC or the FCC determines that the winning service provider did NOT appropriately cost-allocate those charges associated with the additional strands, County Line SD will not be responsible for reimbursing the winning vendor and the winning vendor will assume fiscal responsibility for all costs deemed ineligible by USAC. For examples of cost allocation, please see documentation prepared by the State E-rate Coordinators' Alliance (SECA) attached.

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

## LIT LEASED FIBER/TRANSPORT

**Leased Lit Service/Transport** - A fully managed, leased lit fiber solution. This option may include Special Construction costs (see SPECIAL CONSTRUCTION). If Special Construction is included, it should be bid separately from the monthly recurring cost. Additionally, any installation or connection charges should be bid separately as a non-recurring cost. Maintenance cost for the Leased Lit Service, as well as all other costs (fiber/circuit/transport lease, fiber/circuit/transport maintenance, modulating electronics, routing equipment, equipment refreshes, pole attachment fees, maintenance, etc.) should be included in the monthly recurring cost. With the exception of any Special Construction charges and any non-recurring costs stipulated by the service provider in their proposal, County Line SD shall only be liable for the service provider stated monthly recurring cost for the duration of the contract.

County Line SD desires a single technology neutral connection from the network operations center to each location. County Line SD must have dedicated, symmetrical transport bandwidth to each location with Service Level Agreement (SLA) guarantees between the designated endpoints.

This should include vendor-maintained equipment necessary at each end point to provide a 10 Gbps Layer-3 connection to the hub, as well as a 10 Gbps connection to the district-owned core router at the end point. At the hub, the vendor-maintained Layer-3 switch needs to have enough 10 Gbps ports to connect all end points, as well as enough 10 Gbps ports to connect to the district hub core switch without creating a network bottleneck.

County Line SD is requesting pricing for contracts of various lengths (12, 36, 60 & 120 months). All contracts shall be written so as to allow for up to two 1-year extensions.

With respect to portions on County Line SD property, service providers will abide by all applicable NEC, state and local codes. All cable entering a building must be indoor-rated, transitioned to an indoor-rated cable, or contained in an acceptable conduit that allows it to meet all codes; and all applicable grounding and bonding codes must be met.

Termination point for all options shall be the designated demarcation point within the buildings. Vendor provided services shall terminate in an appropriate vendor-provided patch panel or LIU, and LC patch cables of an appropriate length to reach County Line SD equipment shall be provided as part of the proposal. Unless otherwise stated in this document, hand-off protocol shall be TCP/IP Ethernet.

If County Line SD selects this option for providing WAN connectivity to schools, connections will need to be operational prior to July 1, 2023. Vendor must provide a timeline with their proposal defining the construction window necessary to have this service available beginning July 1, 2023. If service is not expected to be available July 1 2023, vendor shall supply 2 timelines as identified in section labeled TIMELINE above.

Vendor shall make all reasonable efforts to ensure 99.99% network availability on each circuit. Vendor shall provide the full bandwidth to each location, and at no time shall the vendor limit or throttle the capacity of the circuit at any time, for any reason. Additionally, the vendor shall provide a sample Service level Agreement that outlines the vendor's guarantees with regard to network functionality and availability, to include but not limited to:

- Network availability commitment



- Maximum acceptable frame/packet loss commitment
- Maximum network latency commitment
- Maximum network jitter commitment
- Maximum time to respond to outage (commencing from the time County Line SD notifies vendor of the outage)
- Maximum time to restore service
- How quality of service will be measured for credit to County Line SD
- How outage will be measured for credit to County Line SD
- How credit for reduced quality of service and outages will be credited to County Line SD

### **Excess Strands for Applicant's Future Use**

If the service provider installs additional strands for the applicant's exclusive future use in a leased dark fiber or leased lit fiber special construction project, and if the applicant can show documentation that buying a cable containing the number of strands placed in the fiber system for the applicant's future use is more cost effective than buying a fiber cable with the number of strands the applicant plans to place into service the first year, no cost allocation of the excess strands is required and no other special construction charges would need to be cost allocated.

If the service provider installs excess strands for the applicant's exclusive future use in a leased dark fiber or leased lit fiber special construction project where the excess strands will remain dormant until they are lit for the applicant in the future, and if the applicant cannot show that it is not more cost effective than buying the exact number of fiber strands being lit in the first year, the applicant must cost allocate the costs associated with the excess strands only. No other special construction charges would need to be cost allocated.

### **Excess Strands for Service Provider's Future Use**

For lit services special construction and leased dark fiber special construction, if the service provider wishes to place extra strands in the build for its own use, the E-rate applicant must cost allocate the cost of the service provider-owned extra strands, as well as all incremental costs of those extra strands from the special construction E-rate funding request. It is not a pro-rata share, but an incremental cost calculation that must be backed by detailed documentation.

## **LEASED DARK FIBER & LEASED DARK FIBER IRU**

A leased dark fiber solution is defined as a lease by County Line SD of the specified number of fiber strands between two locations. The monthly recurring lease charge for the fiber strands should include maintenance of the fiber. If the fiber maintenance is a separate monthly recurring charge, this should be clearly spelled out on the appropriate pricing sheet. A dark fiber lease may include Special Construction charges, which should be listed separately in the space provided on the pricing sheets.

County Line SD is requesting 2-strands from the network operations center to each entity described under SERVICE LOCATIONS, and will be lighting 2-strands the first year. In accordance with USAC rules, the cost of any strands not lit during the funding year must be allocated out as ineligible charges and as such, vendor will be responsible for cost allocating out any extra strands of fiber to each location. Vendor should use the guidance in documentation prepared by the State E-rate Coordinators' Alliance [SECA] in attached PDF). Fiber should be single mode ITU-T G.652.C/D compliant, and dB loss across each link must allow for acceptable data transmission using existing district modulating equipment, and/or new equipment specified in NETWORK EQUIPMENT. Acceptable dB loss must be maintained for the duration of the lease.

County Line SD is requesting pricing for contracts of various lengths (12, 36, 60 & 120 months). All contracts shall be written so as to allow for up to two 1-year extensions.

For all options, with respect to portions on County Line SD property, service providers will abide by all applicable NEC, state and local codes. All cable entering a building must be indoor-rated, transitioned to an indoor-rated cable, or contained in an acceptable conduit that allows it to meet all codes; and all applicable grounding and bonding codes must be met.

Termination point for all options shall be the designated demarcation point within the buildings. Vendor provided services shall terminate in an appropriate vendor-provided patch panel or LIU, and LC patch cables of an appropriate length to reach County Line SD equipment shall be provided as part of the proposal. Unless otherwise stated in this document.

Leased Dark Fiber responses require maintenance as part of the response, even if maintenance is subcontracted out to a third party. In the case of the 3<sup>rd</sup> party maintenance, the respondent must hold and manage the subcontract and is ultimately responsible for the Service level Agreement. It is assumed that the dark fiber network is part of a more comprehensive fiber infrastructure of the service provider. The respondent will include only the portion of maintenance that is required to support County Line SD fiber segments versus overall network maintenance. If the fiber serves multiple customers, the cost of maintenance should be shared among all the recipients.

Vendor shall make all reasonable efforts to ensure 99.99% network availability on each circuit. Additionally, the vendor shall provide a sample Service level Agreement that outlines the vendor's guarantees with regard to network functionality and availability, to include but not limited to:

- Leased fiber availability commitment
- Maximum acceptable dB loss per circuit (in the event that this level is exceeded, vendor is responsible for whatever repairs are necessary to reduce the dB loss to acceptable levels)
- Maximum time to respond to outage (commencing from the time County Line SD notifies vendor of the outage or issue)
- Maximum time to restore service
- How quality of service (dB loss) will be measured for credit to County Line SD
- How outage will be measured for credit to County Line SD
- How credit for reduced quality of service and outages will be credited to County Line SD

### **Excess Strands for Applicant's Future Use**

If the service provider installs additional strands for the applicant's exclusive future use in a leased dark fiber or leased lit fiber special construction project, and if the applicant can show documentation that buying a cable containing the number of strands placed in the fiber system for the applicant's future use is more cost effective than buying a fiber cable with the number of strands the applicant plans to place into service the first year, no cost allocation of the excess strands is required and no other special construction charges would need to be cost allocated.

If the service provider installs excess strands for the applicant's exclusive future use in a leased dark fiber or leased lit fiber special construction project where the excess strands will remain dormant until they are lit for the applicant in the future, and if the applicant cannot show that it is not more cost effective than buying the exact number of fiber strands being lit in the first year, the applicant must cost allocate the costs associated with the excess strands only. No other special construction charges would need to be cost allocated.

### **Excess Strands for Service Provider's Future Use**

For lit services special construction and leased dark fiber special construction, if the service provider wishes to place extra strands in the build for its own use, the E-rate applicant must cost allocate the cost of the service provider-owned extra strands, as well as all incremental costs of those extra strands from the special construction E-rate funding request. It is not a pro-rata share, but an incremental cost



calculation that must be backed by detailed documentation.

## SELF-PROVISIONED FIBER

Self-Provisioned fiber is a fiber-optic Wide Area (WAN) built specifically for County Line SD. It consists of the requested number of fiber strands from the network operations center (NOC) to the Main Distribution facility at each school. Once construction is complete, the Self-Provisioned fiber-optic WAN will belong to County Line SD, and County Line SD will be responsible for maintenance and operations of the Self-Provisioned network, to include the network electronics to light the fiber and route the network traffic across the WAN. Vendors should include maintenance of the fiber for the first year in their proposal, either included as part of the project as a separate line item. Vendors are encouraged to submit proposals for ongoing, annual maintenance of the fiber on their pricing sheet.

### Maintenance should, as a minimum, include:

- Physical location and marking of underground County Line SD fiber optic cable in response to locate requests. This includes the physical locate services as well as any necessary markings (paint, flags, etc.).
- Reparations to fiber-optic cable in the event of damage. This includes all fiber-optic cable that is part of this project from end-to-end, including fiber cable, terminations, tracer wire, conduit, manholes, handholes, etc.
- Maintenance contract may be in the form of a monthly fee that covers all services and repairs, a monthly fee for locate services and a separate time and materials contract for repairs, or any other combination of services that will provide end-to-end support for the County Line SD OSP fiber plant.
- If time and materials contract is included, vendor shall state the hourly rate for repairs (normal hours and after hours, weekend and holiday) and shall delineate normal hours and holidays. For materials, the vendor shall specify the markup on materials, or another acceptable method for accountability at time of invoicing.
- The pricing sheet provided is laid out for an all-inclusive contract with monthly payments. If the vendor wishes to provide any other type of contract for the maintenance, the vendor should include their own pricing sheet in lieu of the one provided as part of this RFP packet.

Project management should include all necessary paperwork and permits including but not limited to rights of way, easements, and pole attachments. County Line SD desires a fully “turn-key” project so respondents should provide explanation for County Line SD’s involvement in the process including ownership and sourcing of permits, etc. Specific construction details are outlined in the SPECIFICATIONS FOR SELF-PROVISIONED FIBER section of this document.

County Line SD desires that 6-strands of fiber be run to each service location. County Line SD intends to light 2-strands to each service location. In accordance with USAC rules, the cost of any strands not lit during the funding year must be allocated out as ineligible charges and as such, vendor will be responsible for cost allocating out any extra strands of fiber to each location. Vendor should use the guidance in documentation prepared by the State E-rate Coordinators’ Alliance [SECA] in attached PDF).

If the applicant installs the exact number of fiber strands that they will light in the first year, and no extra fibers are installed, all fiber strands and special construction charges are eligible and no cost allocation is required.

If the applicant installs more fiber strands than it will light in the first year, E-rate will pay for the number of strands being lit in the first year, but not the additional strands. No cost allocation is required for the special construction charges. E-rate applicants can only receive E-rate funding for self-provisioned fibers

that are lit within the funding year. If they request excess strands that will remain dormant until the applicant lights the excess strands for their exclusive future use, then they would need to cost allocate the cost of the unlit strands in the applicable funding year.

If the applicant can show documentation that buying a cable containing the 6-strands is more cost effective then buying a fiber cable with the 2-strands the applicant plans to place into service the first year, no cost allocation for excess strands by the applicant is required. If cost allocation is required for the additional strands, County Line SD requests that vendors provide 2 pricing sheets, one with 2-strands and one with 6-strands.

## **NETWORK EQUIPMENT (FOR OTHER THAN LIT LEASED FIBER/TRANSPORT)**

County Line SD is also seeking bids for necessary network equipment to place leased dark fiber, leased dark fiber (IRU) and/or self-provisioned fiber into service at 10 Gbps once fiber is available. All references to make/model are strictly to demonstrate desired functionality, and all equivalent equipment proposed will be considered by County Line SD. If vendor is specifying an equivalent item, vendor shall include a specification sheet for each such item with the proposal when it is submitted. County Line SD may, at their discretion, request vendor to demonstrate that the proposed equipment is equivalent to any equipment listed in the RFP.

Vendors shall provide pricing for the following equipment as part of this proposal:

- 1 Gbps Single-Mode SFP fiber-optic short-haul Transceiver
- 10 Gbps Single-Mode SFP fiber-optic short-haul Transceiver

Pricing information, as well as manufacturer/model of equipment proposed, should be included in equipment pricing matrix included in the pricing sheets. Network equipment for leased dark fiber, leased dark fiber (IRU) and self-provisioned fiber may be bid as a stand-alone service by anyone, even if they are not bidding on any fiber service. Please note that respondents submitting a fiber proposal may also bid on equipment provided they bid them separately and do not bundle equipment costs with their fiber proposal.

Vendor may be responsible for installation and configuration of the equipment listed above, and shall include pricing for installation/configuration on the pricing sheet in the appropriate location. County Line SD reserves the right to determine at the time of purchase which, if any, equipment will be installed and/or configured by the vendor.

County Line SD reserves the right to change (increase or decrease) the quantities at time of purchase and prices must remain firm.

## **SPECIAL CONSTRUCTION**

### DESCRIPTION

For the purposes of the E-rate Program, special construction charges are the upfront, non-recurring costs of deploying new fiber or upgraded facilities to E-rate eligible entities. Special construction consists of three components:

1. Construction of network facilities
2. Design and engineering
3. Project management

Special construction does not include charges for Network Equipment, i.e., modulating electronics and other equipment necessary to make a Category One service functional.

An applicant may not receive E-rate support for recurring charges for leased lit fiber or leased dark fiber until the fiber is lit. Additionally an applicant may not receive E-rate support for special construction related to leased lit fiber or leased dark fiber if the fiber is not lit by the end of the funding year (i.e., June 30). Similarly, applicants may only receive E-rate support for a self-provisioned network if the network is constructed and is in use within the funding year.

All E-rate applications including Special Construction are subject to detailed questioning during PIA review where the cost of proposed special construction will be reviewed based on the cost of historical fiber builds in the region. Additionally, certain information on necessary special construction is needed to accurately fill out the Form 471. Respondents are **required** to fill out the special construction table included with the pricing sheet for each project type. Additionally, respondents are encouraged (but not required) to submit the following additional information that will likely be requested during PIA review.

Information that can be included now, but will be requested at a later date for chosen solution:

- Special construction cost breakdown worksheet
- Any cost allocation worksheets, if applicable (see documentation prepared by the State E-rate Coordinators' Alliance [SECA] in attached PDF)
- Route map of all build segments in kmz format
- Explanation of alternative routes that were explored and why the chosen route is most cost-effective
- Explanation of special materials and procedures required that may have increased construction costs. Such as:
  - Historical preservation or environmental issues
  - Bridge, waterway, railway, or highway crossings
  - Directional boring through hard rock or under paved surfaces
  - An excessive number of hand holes, marker posts, or other OSP materials
  - Expensive pole attachment fees or make-ready costs

If respondents do not submit this information above with their bid, and their solution is chosen, they must be prepared to promptly provide that information and any additional information not described in this RFP when requested. Please note that vendors may assist applicants with preparing funding requests or responding to PIA questions and may speak directly with PIA reviewers.

Vendors proposing Special Construction need to either include with their proposal, or be prepared to provide if awarded, detailed information on the special construction. Specifically:

- For all combined aerial segments
  - An average cost per foot for the eligible fiber cable
  - An average cost per foot for labor to install eligible fiber cable
  - An average cost per foot for the eligible fiber plant materials (attachment hardware, slack storage, and other materials)
  - An average cost per foot for labor to install fiber plant materials
- For all combined buried segments
  - An average cost per foot for the eligible fiber cable
  - An average cost per foot for labor to install eligible fiber cable

- An average cost per foot for the eligible fiber plant materials (conduit, hand holes, manholes, trace wire and grounding rods, etc.)
- An average cost per foot for labor to install fiber plant materials (trenching, backfill, restoration, ground rods, etc.)
- For all combined directionally bored segments
  - An average cost per foot for the eligible fiber cable
  - An average cost per foot for labor to install eligible fiber cable
  - An average cost per foot for the eligible fiber plant materials (conduit, hand holes, manholes, trace wire and grounding rods, etc.)
  - An average cost per foot for labor to install fiber plant materials (directional boring, backfill, restoration, ground rods, etc.)

Special construction and service eligibility for reimbursement have changed starting funding year 2016. See the Federal Communications Commission E-rate modernization order 2 (WC Docket No. 13-184) (<https://www.fcc.gov/document/fcc-releases-order-modernizing-e-rate-21st-century-connectivity>) for more information.

## PAYMENT PLAN

In addition to allowing vendor to separate Special Construction charges from the monthly recurring cost so that the Special Construction charges can be paid up-front<sup>1</sup>, USAC allows vendors to extend a payment plan to applicants to allow them to pay their share over a period of up to four years.

County Line SD requests that the vendor allows County Line SD to make monthly payments for their share of the Special Construction charges over a period of either 3 or 4 years. County Line SD is eligible for an 70% discount, making County Line SD's cost share 30% of eligible expenses. If vendor agrees to allow County Line SD to pay their share of Special Construction charges over time, vendor should include the monthly charge (to include all interest and carrying charges, if any) and to specify whether the payments will be for three or four years.

## NOTICE TO PROCEED & BUDGET CONTINGENCIES

This project is being proposed as an ERate project, and is subject to funding approval by the Schools and Libraries Division (SLD) of the Universal Services Administrative Company (USAC). Additionally, this project is subject to available funding in the County Line SD budget to cover the district share of this ERate project.

Funding notification by SLD is NOT approval for the vendor to proceed with the purchase of materials for this project, nor approval for the vendor to begin construction. Vendor will wait to receive a purchase order and notice to proceed from County Line SD before beginning this project.

County Line SD reserves the right to not award some or all of the components based on negotiated pricing and availability of funds.

County Line SD will follow the purchasing policies of the County Line SD Board of Trustees, as well as requirements and procedures of the FCC's E-rate program as administered by the Universal Service Administrative Company to be eligible for all available funding. The implementation of any associated

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<sup>1</sup> Once funded by USAC, Special Construction charges can be invoiced as work is completed (even before fiber is lit), and USAC will pay the discounted share (80%) of eligible costs.

contracts resulting from this competitive bid process will be dependent on the district's issuance of a written Notice to Proceed, a USAC Funding Commitment Decision Letter alone is not sufficient. The district will have the right to allow the contract to expire without implementation if appropriate funding does not come available.

## REFERENCES & QUALIFICATIONS

Vendors providing proposals should have an ERate Service Provider Information Number (SPIN) from the SLD, and should include their SPIN on their proposal. There is no cost to register for a SPIN, and application can be made at <https://www.usac.org/e-rate/service-providers/step-1-obtain-a-spin/>

Vendors submitting proposals including Special Construction, and any vendor submitting proposals for Self-Provisioned Fiber, must provide documentation relating to any qualifications in outside plant design and/or installation.

Vendors submitting proposals including any fiber installation must provide documentation of any qualifications in fiber installation, to include splicing, termination and testing.

Vendors submitting proposals for network equipment must provide documentation of qualifications for installing and configuring said network equipment.

For each response, vendor must provide 3 references from current or recent customers (preferably K-12) with projects equivalent to the size of County Line SD. If vendor responds to more than one option (e.g., leased lit fiber service as well as leased dark fiber), provide 3 references for each.

## SPECIFICATIONS FOR SELF-PROVISIONED FIBER

NOTE: Vendors may use existing SDR-11 conduit and hand holes to run new fiber-optic cable. Existing multimode fiber-optic cable that is being replaced should be carefully removed and turned over to County Line SD for possible future re-use.

## STANDARDS

All materials will be new and free from defects. Where applicable, material will comply with those standards as established by UL or NEMA and shall be commercial grade.

All due caution will be exercised in transporting and off-loading materials to prevent any damage during shipping or placement. Any damage to any materials after their initial receipt and inspection by the respondent will be the sole responsibility of the respondent, who will replace such damaged materials at no additional expense to the County Line SD

Specifications in this document 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. These specifications are not meant to supersede state law, existing state/local codes or industry standards. Respondents shall note in their response where their proposal does not follow the requested specification in order to comply with state law, existing state/local codes or industry standard.

As such, it is required that the respondent be thoroughly familiar with the content and intent of these references, standards, and codes and that the respondent 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 County Line SD.

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 these documents are modified over time, the latest edition and addenda to each of these documents is considered to be definitive.

BICSI CO-OSP	BICSI TDMM	BICSI TCIM	TIA/EIA 758
IEEE 802.3	NEC	NESC	OSHA Codes

Any warranties associated with the fiber and any other outside plant materials must revert to the County Line SD as the fiber owner upon completion of construction.

### AERIAL

Aerial installations shall be constructed and installed in accordance with industry-standard practice. Vendor is responsible for acquisition of rights to install County Line SD fiber on existing poles. Vendor is responsible for aerial load calculations and determination of suitability of existing available poles, and must adhere to pole owners' requirements for clearances, spans, grounding, guys and attachments. Any costs associated with these modifications to existing poles are the responsibility of the vendor and shall be included in the calculation of cost of construction.

Should there be any applicable acquisition or one-time pole attachment fees applied, the vendor should include them in the calculation of cost of construction. Additionally, if there are any monthly recurring or annual recurring pole attachment fees, vendor shall make note of these recurring costs in their proposal, and shall include the first year of any such recurring fees in the calculation of cost of construction. Within the pricing sheet(s) the vendor shall also note these recurring fees so that the district can be prepared to cover these costs in future years.

Vendor shall make all transitions to and from aerial according to established standards, and shall follow any applicable grounding/bonding requirements. All aerial runs shall be equipped with aerial service loops adequate to effect possible future repairs, and shall ensure that said service loops are properly secured using Opti-Loop® or similar storage devices.

### BURIED

Buried installations shall be constructed and installed in accordance with industry-standard practice. Vendor is responsible locating existing utilities prior to trenching operations. When trenching across existing utilities that are above the level of fiber installation, vendor shall hand-dig or hydro-vac as necessary in order to avoid damage to existing utilities.

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.



Buried fiber-optic cable shall be contained inside a minimum 2-inch SDR-11 HDPE roll-pipe conduit fitted with three-sleeve MaxCell® Innerduct, or larger HDPE roll-pipe conduit containing three HDPE corrugated Innerduct of sufficient size to each contain a ½ -in. diameter OSP fiber-optic cable. Alternately, multiple individual 1-¼ inch HDPE roll-pipe conduits may be installed in lieu of pipe with innerducts. All outside conduits NOT containing fiber-optic cable shall have all exposed ends capped with a County Line SD acceptable cap/plug that accommodates the mule tape in the empty conduit.

All direct burial of conduit via open trenching shall be at 36 inches, backfill shall be tamped appropriately during cleanup to minimize settling, and a warning tape indicating buried fiber-optic cable shall be placed at a depth of approximately 12 inches when trench is being filled back in.

Sidewalks and driveways should not be cut or broken during installation unless absolutely necessary. Any sidewalks or driveways that ARE cut or broken during installation shall be returned to their pre-construction condition as part of restoration.

All splice points will be contained in an accessible manhole<sup>2</sup>, with at least 50 feet of service loop for each cable entering the manhole to facilitate any future splicing or splice repairs. Service loops in manholes are to be neatly coiled or properly secured to cable management in the manhole. All other pull points may be in smaller hand holes<sup>2</sup>, and hand holes may be buried 12-18 inches below grade so long as they are locatable.

Vendor shall provide and place tracer wire in conduits containing fiber optic cable. Tracer wire must be minimum #12 solid copper wire type TW, THW, RHW, or USE. In any manhole or hand hole where grounding and/or bonding is required, sufficient tracer wire will be pulled into the manhole or hand hole to allow connection to the ground rod without interfering with access to fiber-optic cable for pulling, splicing or repairs.

Where cable route crosses roads, the cable shall be placed at a minimum depth of 48" below the pavement or 36" below any parallel drainage ditch, whichever is greater, unless the controlling authority required additional depth, in which case the greatest depth will be maintained.

## DIRECTIONAL BORING

Directional bores shall be constructed and installed in accordance with industry-standard practice. Vendor is responsible for acquisition of rights to install County Line SD fiber. Vendor must adhere to requirements for clearances, and alignments as specified by relevant authorities in each area bored. All existing utilities will be physically located using hydro-vac (pot-holing) prior to any directional boring.

All boring should be at 60 inches or deeper if needed to avoid obstacles. **In no cases should conduit be bored above existing utilities.** At any 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.

Vendors shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn. 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.

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<sup>2</sup> See size requirements for manholes and hand holes in the section labeled HAND HOLES AND MANHOLES

Crossings under RR tracks will comply with all requirements of controlling Railroad. All railroad crossings shall be within an appropriately sized steel casing when directional boring is used, and at the depth specified by railroad authorities.

All state DOT roadway crossings shall be within an appropriately sized steel casing when directional boring is used. 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.

## HAND HOLES & MANHOLES

Hand holes in this document are defined as an in-ground box, approximately 18" x 24" x 36" or larger, and capable of being used as a cable pull point without exceeding fiber minimum stress bend radius. Hand holes may be installed level with ground or buried 12-18" below grade. Hand hole must meet load bearing requirements for the location and the lid must be secured using pentagonal bolts or other anti-tamper devices. For buried hand holes, they must be locatable. Immediately after placement, the soil around (and over) the hand hole will be tamped and compacted. Should any washouts occur, the respondent will be responsible for correcting the problem immediately without additional cost to County Line SD.

Manholes in this document are defined as larger in-ground boxes (upright cylindrical manholes are acceptable), approximately 36" x 36" x 48" or larger, and capable of being used to pull cable through, but also to contain a splice canister as well as 100'+ of service loop. All manholes must meet vehicular load bearing requirements, and lid must be secured using pentagonal bolts or other anti-tamper devices. Immediately after placement, the soil around the manhole will be tamped and compacted. Should any washouts occur, the respondent will be responsible for correcting the problem immediately without additional cost to County Line SD.

Hand holes and manholes should be floorless with a gravel bed (minimum 6 inches) installed below the bottom for drainage.

Manholes should be used at splice points and places where direction of route changes dramatically (+/- 90°). Whether hand holes or manholes, pull point locations must be no more than approximately 1/3 mile apart. Vendor shall supply manufacturer, model/part number, and cut sheet for hand holes and manholes being proposed.

Where grounding is required, hand holes or manholes will include an 8-foot, 5/8 inch diameter copper ground rod, which shall be driven into the ground leaving approximately 4 inches of ground rod exposed, and install a ground lug on the ground rod for attachment of the tracer wire.

## SIGNAGE

Vendors should include in their proposal pricing the cost to procure and install appropriate signs and/or tags to identify fiber ownership, and to alert contractors working in the area to call before they dig. Signs may include metal signs mounted on posts, nail-up signs on poles (with pole-owner's permission), DomedPost™ or similar signs, and/or tags for aerial fiber.

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. Markers shall always be located so that they can be seen from the location of the cable.

Vendor should coordinate with County Line SD to finalize wording on signage before procurement. Vendor should also include spare signs for future replacement of damaged signs in the amount of approximately 10% of installed signage.

All signs should be properly installed and poles/posts should be level and plumbed.

## CONDUIT

Conduit inside of a building – unless otherwise specified, anywhere a conduit is required inside of a building it shall fire rated and shall be large enough to hold the fiber-optic cable(s) specified to be installed into the conduit based on National Electric Code. 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. Sufficient pull points shall be installed along the pathway so as to facilitate any future repairs or cable replacement.

Conduit outside of a building– unless otherwise specified, anywhere a conduit is requested outside of a building it shall consist of a smooth wall, minimum 2-inch SDR-11 HDPE roll-pipe conduit fitted with three-sleeve MaxCell® Innerduct, or larger HDPE roll-pipe conduit containing three HDPE corrugated Innerduct of sufficient size to each contain a ½ -in. diameter OSP fiber-optic cable. Alternately, multiple individual 1-¼ inch or larger HDPE roll-pipe conduits may be installed in lieu of pipe with innerducts. All outside conduits NOT containing fiber-optic cable shall have all exposed ends capped with a County Line SD acceptable cap/plug that accommodates the mule tape in the empty conduit. All outside conduits containing fiber-optic cable shall have all exposed ends capped with a County Line SD acceptable cap/plug that accommodates the fiber-optic cable.

An exception would be any conduit used to bring underground cable up an exterior building wall in order to penetrate into the building above the suspended ceiling. In these cases, the vendor shall use appropriately sized galvanized rigid steel (GRS) pipe needed to accommodate the underground HDPE roll pipe. See diagram in section BUILDING ENTRANCES.

Vendor shall supply manufacturer, model/part number, and cut sheet for SDR11 roll pipe, commercial pipe caps being proposed.

## TRACER WIRE

Tracer wire shall be placed with all conduit installed unless armored or traceable cable is used. The vendor 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.

For direct burial, tracer wire shall be #12 AWG or larger, conductor shall be solid copper or copper clad steel (break load 450 Lb.), with minimum 30 mil orange HDPE coating. For directional boring, tracer wire shall be #12 AWG or larger, conductor shall be solid copper or copper clad steel (break load 1,150 Lb.), with minimum 45 mil orange HDPE coating.

Tracer wire is required to be one solid piece in the SDR conduit, but installer may mechanically connect two pieces of tracer wire at any manhole, so long as the cable is traceable end-to-end.

Trace wire installation shall be performed in a manner that allows proper access for connection of line tracing equipment, proper locating of tracer wire without loss or deterioration of low frequency signal for distances in excess of 1,000 linear feet. Tracer wire must be installed as a continuous single wire. No looping or coiling of wire is allowed.

## BUILDING ENTRANCES

Vendors using existing SDR conduit, hand holes and building entrance for new fiber-optic cable can skip this section.

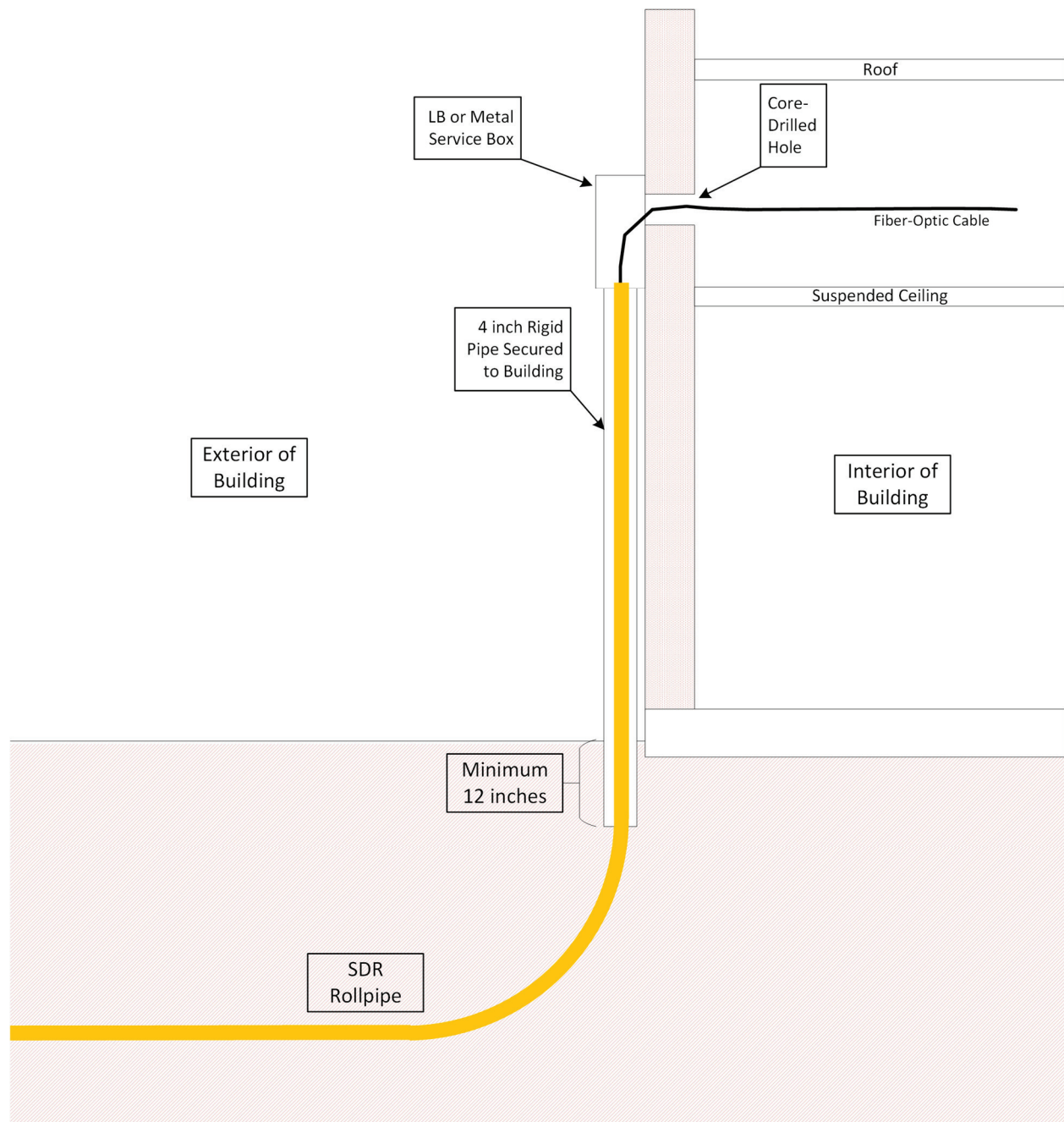
Underground cables - Unless otherwise specified, anywhere a Building Penetration is requested it will consist of an appropriately sized galvanized rigid steel (GRS) pipe. GRS pipe will be attached to the outside of the exterior wall of the building. The GRS pipe will extend down at least 12 inches below grade, and up to the height necessary such that an LB or Metallic service box (minimum 12"x12"x6", but large enough so as not to exceed cable manufacturer recommendation for bend radius) connected to the top will allow fiber-optic cable passing through the LB (or the back of the service box) to enter the building above the suspended ceiling (see diagram on next page). SDR11 roll pipe will enter this rigid metal pipe at the bottom, providing a pathway from the underground conduit into the building. The GRS pipe, and any service box, will be mechanically secured to the exterior wall. The opening through the exterior wall shall be core drilled, sleeved if appropriate, and sealed after fiber-optic cable is installed.

In locations where an existing underground conduit leading to the demarcation point is accessible from the outside, an existing or new hand hole will be used to transition from the HDPE roll pipe to the existing conduit.

Aerial cables – Aerial cables may be transitioned to underground at the property line, or may be run to the building aerially. Aerial cables running directly to the building shall be secured to the building using the messenger cable. A drip loop of cable will remain outside, and the fiber cable will penetrate the building at an appropriate height to enter above any suspended ceiling. Any penetrations to the exterior wall will be properly sealed by vendor.

When fiber-optic cable enters buildings, vendors must comply with all fire codes and other applicable codes. If outdoor cable will run 50 feet or more inside the building, it must meet indoor cable rating. This can be accomplished by fusion splicing an indoor rated cable. Another option is to use an indoor/outdoor rated cable and to remove the outdoor jacket at or near the building entrance point to expose the indoor rated sheath for the remainder of the run inside the building. Vendors may propose any other solution that meets NEC and local codes. Vendor will specify in their proposal how they intend to meet the indoor cable rating at any locations where this will be an issue.

## Building Penetration Illustration



## PERMITS, TRAFFIC CONTROL & ENGINEERING

Vendors are responsible for obtaining all permits prior to construction. This includes any drawings (engineered or otherwise) necessary to obtain permission/permit. Additionally, vendors are expected to conduct route assessments to determine the most cost effective route(s). During route assessments, vendors are expected to consider right-of-way access and/or easement requirements as well as cost effectiveness in making their decisions. During PIA review by USAC, it is anticipated that USAC will request information on other routes that were considered, and how the determination that the route selected for construction is the most cost effective.

Proposal cost must include all costs for engineering work, surveying, construction costs, materials, and labor to provide a turn-key solution. County Line SD should be able to plug the self-provisioned fiber into their routers/modulating equipment and connect to their schools from the NOC.

For inground installations, vendors will locate underground lines of third parties in cable route area and verify their location by hand-digging or using hydro-vac prior to trenching or boring in order to avoid damage to third party cables.

Vendors 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.

Vendor will 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 and railways. Pre-survey shall be done prior to each job.

Vendor will secure right-of-way access, access to poles needed for aerial runs, and access permit to bore under the RR lines as needed.

All traffic control, in accordance with local, state, county, or permitting agency laws, regulations, and requirements, will be the Vendor's responsibility. The Vendor's construction schedule will take into consideration sufficient time for the development and approval of a traffic control plan.

## FIBER

Fiber must be ITU-T G.652.C or G.652.D compliant single-mode cable, and meet or exceed the following attenuation standards:

- Maximum Attenuation @ 1310nm: 0.35 dB/km
- Maximum Attenuation @ 1385nm: 0.35 dB/km
- Maximum Attenuation @ 1550nm: 0.25 dB/km

All fiber-optic cable must be loose-tube, gel-free and shall be appropriate for the installation conditions e.g. outdoor and suitable for in-ground installation for buried and bored applications, or self-supporting (figure-8 or other) for aerial installation.

Vendor shall supply manufacturer, part number, and cut sheet for fiber-optic cable and splice enclosures being proposed.

County Line SD would prefer that, with the exception of necessary fusion splices, all efforts be made to minimize splices. Vendors shall disclose in their proposal the number of splices and proposed locations for this installation.



Vendor shall ensure that during the installation, the fiber-optic cable is not subject to bending that exceeds manufacturer specifications. Additionally, vendor shall use appropriate equipment to guarantee that the pull tension applied to the fiber-optic cable does not at any time exceed manufacturer specifications.

## TERMINATIONS

Vendor is responsible for termination of the fiber in the designated demarcation location identified in SERVICE LOCATIONS. Unless otherwise directed, all terminations will be Duplex LC. At each termination, service provider will leave a 20-foot service loop secured to the wall, ladder-rack, or other location as directed by County Line SD.

The termination itself will be in a vendor provided, rack-mounted fiber patch panel or Light Interface Unit (LIU), and vendor shall supply a suitable LC patch cable to reach County Line SD equipment.

## SPLICING

All fiber-optic splicing, including mid-span taps, must be accomplished using fusion splices. Barrel connectors, mechanical splices, or other means of splicing the cables will not be considered.

All fusion-splices and mid-span taps must be contained in an appropriately sized splice-enclosure with splice-tray organizer and shall be able to accommodate splices of all strands of the largest cable entering the manhole (or splice cannister in the case of aerial). Splice enclosures must be water-proof and properly sealed to preclude water intrusion if immersed. Splice enclosures must be able to be opened and resealed for repairs and additional splicing in the future.

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, OTDR and WDM testing is required. See section on TESTING for more detailed information.

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 required to transition to indoor cable within 50' of entering a building will be fusion spliced at a location to be coordinated with County Line SD and terminated at County Line SD's rack.

## RESTORATION

When completed, the work areas shall be returned to as near their original undisturbed condition as possible, to include, but not limited to backfill and tamping of dirt after excavation, leveling dirt, removal of excess dirt and replanting of grass over open trench work and around manholes as necessary. Any concrete or asphalt broken or removed during construction/installation must be properly repaired/replaced as necessary. All restoration and clean-up will be to the satisfaction of the district and any permitting agencies. Vendor will be responsible for any restoration complaints arising within one year after the district's final acceptance.

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.

Debris from clearing operations will be properly disposed of by the respondent/subcontractors as required by County Line SD, permitting agencies or the railroad. Railroad ties, trees, stumps or any foreign debris will be removed, stacked, or disposed of by the respondent 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.

Vendor 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 beginning.

## TESTING

Fiber shall be tested on each reel upon delivery from the manufacturer/supplier using a bare fiber test for attenuation to ascertain that the fiber is within specifications for attenuation based on the manufacturer's rated loss per km and the length of the fiber on the reel. A copy of the test results will be supplied to County Line SD after this testing is completed, and will also be included in the final documentation packet.

Fiber shall be tested on each reel upon just prior to installation using a bare fiber test for attenuation to ascertain that the fiber did not suffer any attenuation loss due to damage between acceptance from the manufacturer/supplier and the time of installation. A copy of the test results will be supplied to County Line SD after this testing is completed, and will also be included in the final documentation packet.

In addition to splice loss testing, selected respondent 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.

Fiber shall be tested after installation using an OTDR tester. All fiber strands must be tested bi-directionally, end-to-end after installation. Line loss of 0.15dB per fusion splice and manufacturer specified dB loss per Km of cable are acceptable. A copy of the test results for all strands on each leg shall be provided, and shall include:

- Power Meter documentation, with:
  - Total link loss of each fiber
  - Wavelengths tested and measurement directions
  - Manufacturer, model, serial number, and date of last calibration for all equipment used
- OTDR documentation with:
  - Individual fiber traces for complete fiber length paper and computer disk records of all traces)
  - length of the leg
  - number and locations of fusion splices on the leg
  - Losses of individual splices
  - Total attenuation loss
  - Anomalies
  - Wavelength tests (1310 nm and 1550 nm for WDM) and measurement directions

- Manufacturer, model, serial number, and date of last calibration of OTDR

Tracer wire testing shall consist of locating wire using typical low frequency (512Hz) line tracing equipment, witnessed by County Line SD. Continuity testing in lieu of actual line tracing shall not be accepted.

The vendor shall supply all tools, test equipment, consumables, and incidentals necessary to perform quality testing.

## DOCUMENTATION AND WARRANTIES

After installation, vendor will provide detailed as-built drawings of exact location of fiber, as well as differentiating on the drawing which runs are aerial, which runs are buried, and which runs are bored. In addition to as-built drawings, as-built documentation will include: permit drawings and Date of installation.

Documentation for fiber will include:

- Installed cable length
- Cable Manufacture
- Cable type and diameter
- Jacket type
- Fiber core and cladding diameter
- Fiber attenuation per kilometer
- Fiber bandwidth and dispersion
- Index of refraction
- Optical fiber assignments at patch panels
- Optical fiber assignments at splice locations
- Fiber reel tests upon receipt of fiber from manufacturer
- Fiber reel tests just prior to installation
- Full fiber test results of installed fiber

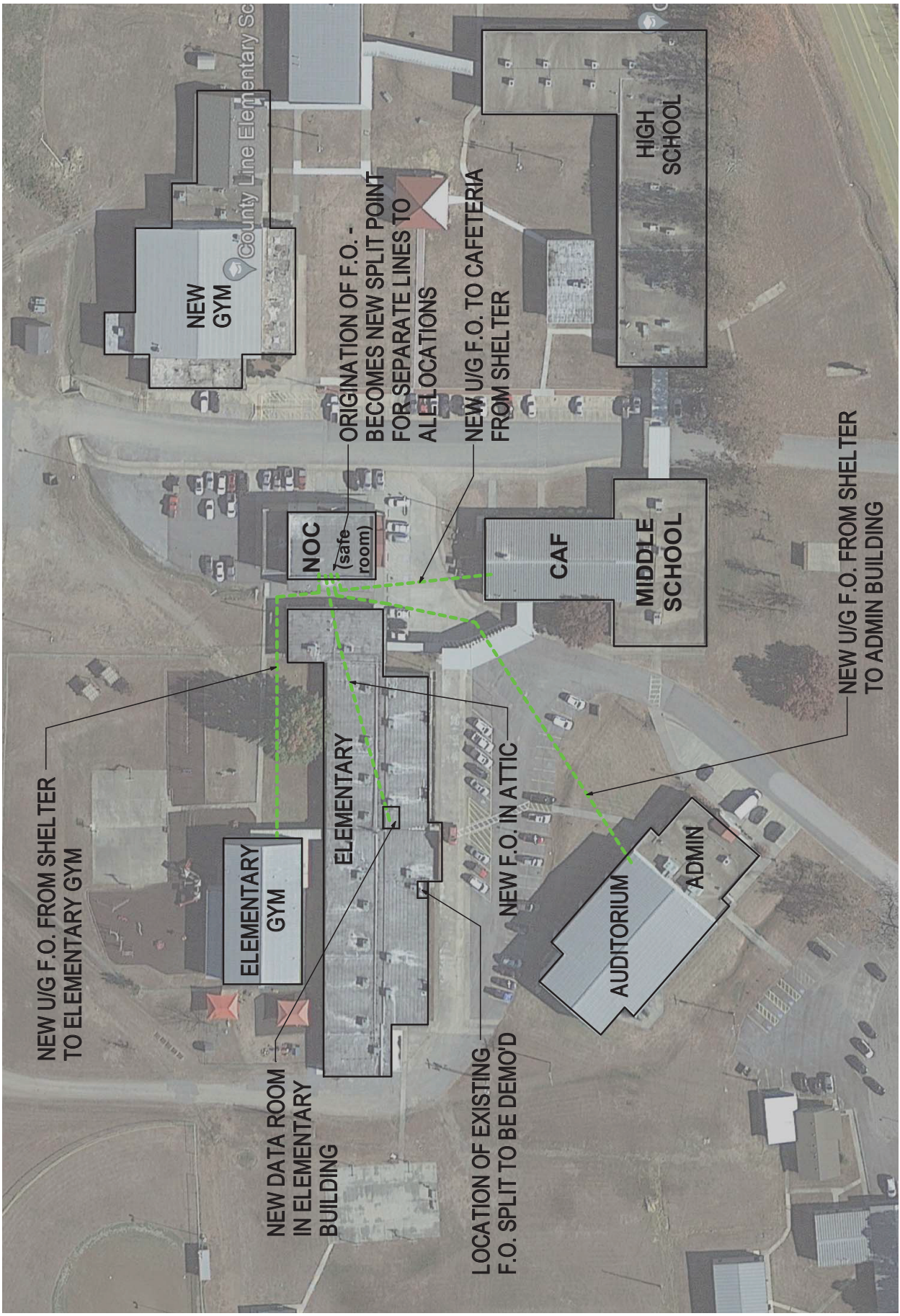
For aerial runs, locations of splice cases and service loops will be annotated. Additionally, documentation on the aerial fiber runs will include:

- Pole attachment inventories
- Pole attachment applications
- Pole attachment agreements between respondent and other utilities
- GPS points of reference for utility poles
- Photo images of poles to which fiber is attached

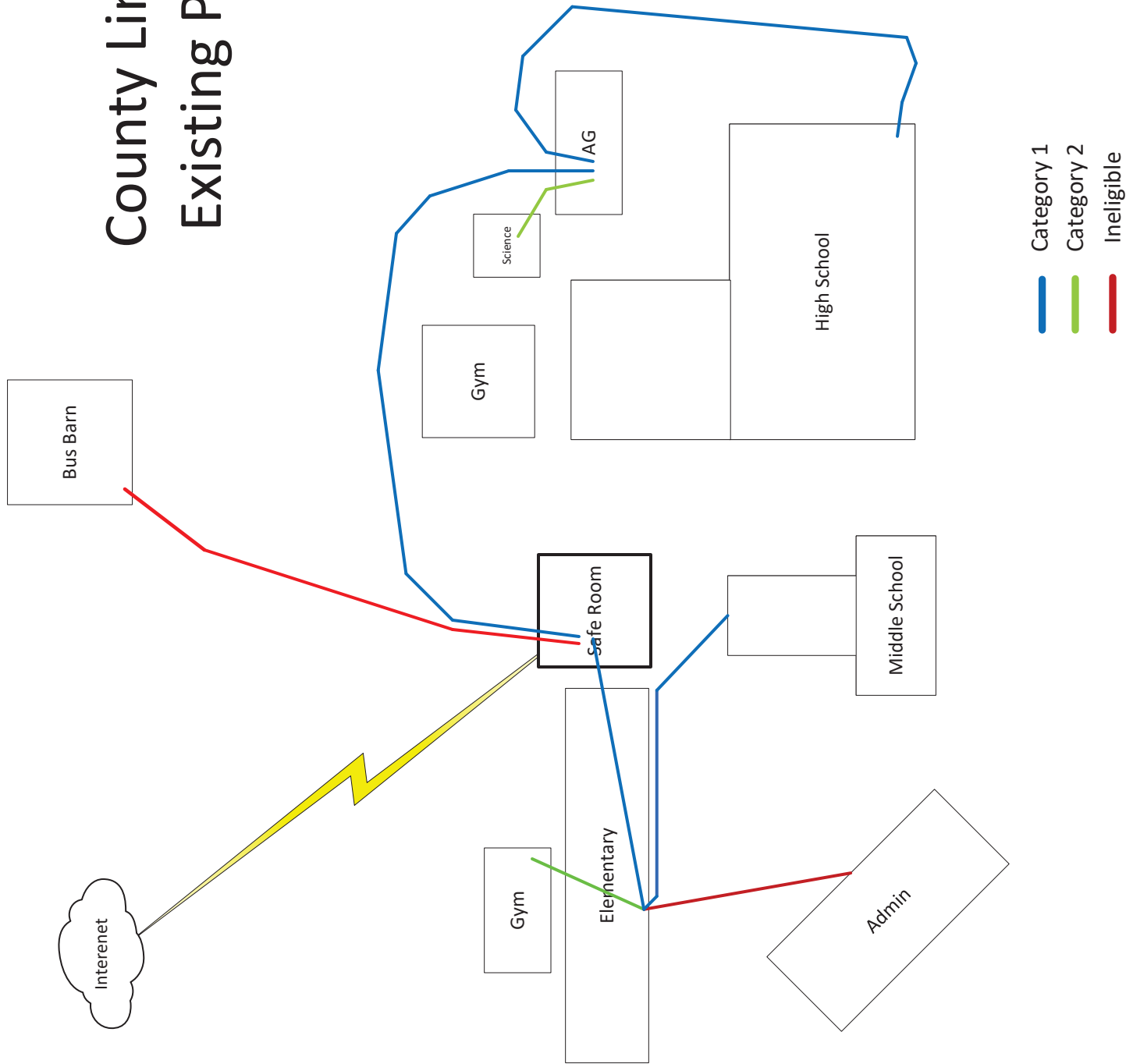
For buried and directionally bored runs, depth of burial or bore at (minimum) 50-foot intervals, as well as location of all splice cases, hand holes and manholes will be annotated. As-build drawings will also include references to location of fiber with regard to distance from property line and/or back of curb measurements. Additionally, documentation on the in-ground (buried and bored) fiber runs will include:

- Conduit design and detailing
- Manhole detailing
- Forms and documentation for approval of conduit construction and/or installation,





# County Line SD Existing Paths



# County Line SD Proposed Paths

