

Humboldt County School District FY2023 Leased Lit Fiber RFP

TIMELINE

- September 21, 2022: Release of Request for Proposal
- October 12, 2022: Virtual Bidder workshop (included in the State Facilities RFP) ([Zoom Link](#))
- October 14, 2022 (1-2PM PT): Virtual Technical Assistance Workshop-- NV Energy to discuss terms of the potential use of NV Energy facilities in proposed solutions ([Zoom Link](#))
- October 19, 2022: Deadline for questions regarding RFP: highspeedNV@gov.nv.gov
- November 1, 2022, 2022: Answers to RFP questions posted by OSIT
- December 19, 2022: All RFP responses due at 5 PM PT: highspeedNV@gov.nv.gov

SERVICE LOCATIONS

The service locations are listed in Appendix C Humboldt County School District locations provided as an Excel spreadsheet.

SCOPE OF SERVICES

Section 1: Introduction

Humboldt County School District, hereafter referred to as HCSD, together with the Office of Science, Innovation and Technology (OSIT) is requesting proposals for Leased Lit Fiber Point to Point Transport service or Transport and Internet access bundled for its school locations listed in Appendix C.

HCSD will seek E-rate reimbursement for all eligible equipment and services. HCSD is seeking to connect its Northern, rural sites with fiber optics to provide high-speed broadband connectivity for students and staff. They are seeking bids for both/either leased lit fiber without Internet (fiber transport only, WAN) and leased lit fiber with bundled Internet access. In keeping with E-rate program guidance, HCSD will not specify a network design or route. HCSD requests that respondents design cost-effective solutions that minimize downtime and support the district's educational needs.

If significant new fiber construction is involved in the awarded Broadband Service Provider's (BSP) proposal, HCSD will be held to a strict timeline for delivery dates for portions of the WAN. The successful BSP will work with HCSD and the E-rate program to adhere to service delivery deadlines even if these are spread over several E-rate cycles. The BSP should include a proposed schedule for delivery of infrastructure and commencement of services to each HCSD site. HCSD will work with the BSP through the E-rate process to allow for multi-year build schedule.

Section 2: Service Requests

1. **Applicant is seeking proposals for leased lit fiber to five of its Northern, rural schools. Bidders may provide bids to each site either a fully managed, bundled Internet access solution or a fully managed data transport circuit back to the district hub.**
2. In accordance with guidance from USAC, the district's intent is not to limit responses to only "lit fiber" and that "lit fiber" in this, and all related RFP documents should be understood

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to represent all methods of delivery that are equivalent to lit fiber quality and reliability and meets the SLAs detailed in this RFP.

3. Network Design and Construction Routes

a. Applicant leaves point of presence (PoP) location and fiber routes up to respondent. However, due to current and future bandwidth needs, designs are encouraged to provide dedicated infrastructure to Applicant. This includes little to no aggregation or third-party equipment between Applicant site and PoP.

b. Applicant 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.

c. Respondents should clearly illustrate proposed network design and construction routes.

d. Applicant's stated decision criteria (outlined in the RFP) will be used to determine if an award is made as-a-result of this RFP. Applicant has, in accordance with E-rate guidelines, rated cost of service as the highest weighted factor in its decision criteria.

4. Special Construction

a. 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.

i. 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.

b. Special construction charges eligible for Category One support consist of three components:

i. construction of network facilities

ii. design and engineering

iii. project management

c. If no new fiber is being installed, then any installation costs are considered standard non-recurring costs (NRC).

i. For leased lit fiber solutions requiring special construction, this means that the costs associated with building the fiber are considered special construction and the costs associated with the equipment required to activate the service are a standard NRC.

d. Excess fiber strands for special construction projects

i. To the extent that the winning service provider installs additional strands of fiber for future business ventures, the winning service provider assumes full responsibility to ensure those incremental costs are allocated out of the

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special construction charges to the district in accordance with FCC rules and orders.

ii. If, after the issuance of the FCDL, USAC or the FCC determines that the winning service provider did not cost allocate those charges associated with the additional strands, Applicant will not be responsible for reimbursing the winning vendor and the winning vendor will assume all responsibilities deemed ineligible by USAC.

iii. For examples of cost allocation, please see document in Attachment B as prepared by the State E-rate Coordinators' Alliance (SECA).

Section 3: Solution Specifications

1. Leased Lit Fiber with Bundled Internet access

a. Applicant must have dedicated, symmetrical bandwidth.

b. The solution must be scalable to 1 Gbps.

d. Each respondent is required to complete the attached pricing sheet with this RFP.

i. Special construction, monthly recurring cost, and any additional non-recurring costs are required to be broken out and listed separately.

ii. Respondents are free to propose alternate pricing terms provided they have also included pricing in the requested format.

iii. No increased pricing will be allowed during the term of the quoted special construction, NRC, and MRC rate in each pricing cell of the matrix.

e. If an increase in bandwidth is requested during the contract period, the contract does not renew; the existing agreement may be modified to allow the change.

f. All solutions must adhere to the Service Level Agreement (SLA) terms in Section 4.

2. Wide Area Network

a. For Leased Lit Fiber Transport Only service, the applicant must have dedicated, symmetrical transport bandwidth between the designated endpoints.

b. The solution must be scalable to 1 Gbps.

c. Each respondent is required to complete the attached pricing sheet with this RFP.

i. Special construction, monthly recurring cost, and any additional non-recurring costs are required to be broken out and listed separately.

ii. Respondents are free to propose alternate pricing terms provided they have also included pricing in the requested format.

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- iii. No increased pricing will be allowed during the term of the quoted special construction, NRC, and MRC rate in each pricing cell of the matrix.
- d. If an increase in bandwidth is requested during the contract period, the contract does not renew; the existing agreement may be modified to allow the change.
- e. All solutions must adhere to the Service Level Agreement (SLA) terms in Section 4.

Section 4: Service Level Agreement

1. Proposed services must me the following specifications:

- a. The provider will make all reasonable efforts to ensure 99.99% network availability of each circuit.
 - b. .25% frame/packet loss commitment
 - c. 3ms network latency commitment
 - d. 4ms network jitter commitment
 - e. There is no right of provider to limit or throttle the capacity of the circuit at any time for any reason
 - f. Vendor stated commitment is to respond to any outage within two (2) hours and a four (4) hour restoration of service.
- 2. Network operations center: Solution will provide customer support functions including problem tracking, resolution and escalation support management on a 24x7x365 basis. Customer has the right and is encouraged to call concerning any problems that may arise relative to its connection with vendor provided services.**
- 3. Trouble reporting and response: Upon interruption, degradation or loss of service, Customer may contact Vendor by defined method with a response based on trouble level. Upon contact from the Customer, the Vendor support team will initiate an immediate response to resolve any Customer issue. Customer will receive rapid feedback on trouble resolution, including potential resolution time.**
- 4. Escalation: In the event that service has not been restored in a timely manner, or the Customer does not feel that adequate attention has been allocated, the Customer can escalate the trouble resolution by request. A list of escalation contacts will be provided when implementation schedule is completed.**
- 5. Resolution: The Customer will be notified immediately once the problem is resolved and will be asked for verbal closure of the incident.**
- 6. Trouble reporting, escalation and resolution: A detailed trouble reporting, escalation and resolution plan will be provided to the district.**

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7. Measurement: Time starts from the time the Customer contacts vendor and identifies the problem. Credits for outages of a certain duration or longer will be identified.

8. Reports: Upon request, an incident report will be made available to the Customer within five (5) working days of resolution of the trouble.

9. Link performance per segment: The service will maintain the proposed link performance throughout the term of the contract.

10. Historical uptime: Provide aggregate uptime statistics for your proposed service in the geographic area encompassing Applicant.

Section 5: Detail for Leased Lit Fiber Transport Service and Leased Lit Fiber with Bundled Internet Access Service

For all proposals, the BSP must agree to the following service specifications:

- a. Network operations center: Solution will provide customer support functions including problem tracking, resolution and escalation support management on a 24x7x365 basis. Customer has the right and is encouraged to call concerning any problems that may arise relative to its connection with vendor provided services.
- b. Trouble reporting and response: Upon interruption, degradation or loss of service, Customer may contact Vendor by defined method with a response based on trouble level. Upon contact from the Customer, the Vendor support team will initiate an immediate response to resolve any Customer issue. Customer will receive rapid feedback on trouble resolution, including potential resolution time.
- c. Escalation: In the event that service has not been restored in a timely manner, or the Customer does not feel that adequate attention has been allocated, the Customer can escalate the trouble resolution by request. A list of escalation contacts will be provided when implementation schedule is completed.
- d. Resolution: The Customer will be notified immediately once the problem is resolved and will be asked for verbal closure of the incident.
- e. Trouble reporting, escalation and resolution: A detailed trouble reporting, escalation and resolution plan will be provided to the district.
- f. Measurement: for leased lit fiber outage time starts from the time the Customer contacts vendor and identifies the problem. Credits for outages of shortage will be identified.
- g. Reports: Upon request, an incident report will be made available to the Customer within five (5) working days of resolution of the trouble.
- h. Link performance per segment: The service will maintain the proposed link performance throughout the term of the contract.
- i. Historical uptime: Provide aggregate uptime statistics for your proposed service in the geographic area encompassing the area of the HCSD facility.
- j. Service Outage Credits are listed in section 3.1.e.vi (for Leased Lit Fiber (with Internet Access)).

Section 6: Fiber Construction Plan

For all proposals asking for construction cost support, the BSP must provide the following information:

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- a. The BSP project manager who will oversee the fiber construction
- b. A list of the permits and regulatory approvals necessary to complete the fiber build and the BSPs approach to securing these permits and approvals
- c. The engineering firm that will design the fiber network
- d. The construction firm or firms that will construct the fiber
- e. A detailed construction narrative and timeline outlining the engineering, design, project management and construction of the project. The narrative should address:
 - 1. A Diagram showing the proposed network topology and the specific fiber routes (can be marked as confidential) proposed to serve the HCSD locations
 - 2. Outline of the buried and/or aerial portions of the fiber routes. HCSD advises that buried fiber affords more network resilience.
 - 3. Outline for the aerial sections the process the BSP will follow to secure pole attachment rights from pole owners. HCSD advises that buried fiber affords more network resilience.
 - 4. The current anticipated turn by turn overview of the route
 - 5. The anticipated number of crews that will be used to construct the route
 - 6. The process for order, receipt, inspection and storage of all outside plant materials
 - 7. Any permitting, supply chain, labor or other challenges that the BSP anticipates could delay the construction of the route
- f. The plan to extend the fiber to serve nearby residential and business customers

Section 7: General Terms for All Proposals

- a. If the BSP objects to any terms or conditions listed in the RFP, the BSP list the BSPs proposed amendments on a separate summary page.

If the BSP complies to any terms or conditions listed in the RFP, the BSP must indicate such in their bid response.

- b. The pricing schedule is Appendix C. Here are instructions for completing the pricing schedule.
 - i. A BSP must bid all facilities in order qualify for consideration for an award
 - ii. A BSP does not have to bid both leased lit fiber transport and leased lit fiber with bundled Internet access to a facility to be considered for an award. A BSP may choose to bid only one service option for a facility
 - iii. A BSP **must bid all bandwidth levels and all terms for a facility in a leased lit fiber transport and leased lit fiber with bundled IA bid**
- c. Failure to include any requested information noted as required by the respondent is grounds for disqualification.
- d. Description of Proposal
 - i. BSP will provide a description of their proposal for all services and solutions.
 - ii. The BSP must be able to provision leased lit fiber service that are dedicated to the HCSD WAN. The fiber system from which the HCSD WAN is provisioned can serve other customers, but the portion of the fiber system that serves HCSD must be dedicated.
 - iii. Description will include an overview of the proposal, any deviations from the requested resiliency, assumptions made, and other detail the HCSD may find useful or necessary (or could differentiate the solution from a competing proposal).
- e. Timeline
 - i. For each response, respondents must include a timeline for bringing each

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- site online.
 - ii. For solutions requiring new construction, a schedule of bringing each HCSD facility online should be included
 - iii. HCSD will work with the BSP to devise a schedule that aligns with E-rate requirements. The successful BSP will work with HCSD and the E-rate program to adhere to service delivery deadlines even if these are spread over several E-rate cycles.
 - f. Demarcation
 - i. All solutions must terminate service or infrastructure in the demarcation point at each address.
 - ii. Solutions bringing service to the property line but not to the demarcation point are not acceptable.
 - iii. Respondent must specify specific demarcation setup included in base fees, e.g. wall mounted CPE and CAT6a handoff, rack mount patch panel, etc.
 - g. Network Diagram
 - i. For each response, respondents must include a network diagram displaying the paths to be used to serve each endpoint.
 - h. References and Resumes
 - i. For each response, respondent must provide 3 references from current or recent customers with projects similar to the HCSD WAN RFP
 - ii. If respondent responds to more than one option (e.g. leased lit fiber transport service or leased dark fiber), provide at least 1 reference for each type of solution.
 - iii. Please include resumes of at least 3 employees who will be involved in the project, including the project leader.
 - i. E-rate Review
 - i. If their solution is chosen, respondents are required to promptly provide HCSD with any information being requested as part of the E-rate program (Federal Communications Commission) review of the project.
 - ii. For all responses that include new construction, the respondent agrees to, by submitting its bid, to produce all construction labor, construction materials, and other construction cost information as part of its bid and for E-rate Program Review.
 - j. Required Notice to Proceed and Funding Availability
 - i. HCSD will follow the purchasing policies of HCSD and the E-rate program requirements
 - ii. A formal HCSD notice to proceed is required for the project to commence. An E-rate-issued Funding Commitment Decision Letter (FCDL) is not a notice to proceed.
 - k. **Moves, Additions, Closures and Changes**
 - a. BSP agrees not to charge cancellation or move fees for facility closures, facility moves and for circuit upgrades or downgrades

Section 8: Checklist of items to include with all proposals: In addition to addressing all technical requirements in the RFP, interested BSPs should include content to address the following in their proposal.

Item	Included
Provide a brief background of the BSP. Include information about the company's history and presence in Nevada.	Yes or No

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Describe in detail the history of the BSP serving school districts through the E-rate program.	
Describe the history of the BSP undertaking projects of similar size and scope in other markets to the one proposed here.	
Provide a technical narrative overview of the proposed solution, including engineering, construction, permitting, equipment installation.	
Provide a network diagram displaying the network topology and the fiber routes used to connect HCSD facilities (can be marked as confidential)	
Provide a detailed timeline in a table format that includes all key milestones and dates from start to finish	
Describe the planned cadence and content of updates from the BSP to HCSD and OSIT during the construction phase of the project	
Describe the planned cadence and content of updates from the BSP to HCSD once the network is operational. Include the proposed dashboard of network operations statistics that the BSP will share with HCSD on a monthly basis including: <ul style="list-style-type: none"> ● Number of service tickets opened ● Mean time to resolution of tickets ● Statistics to track the performance of the network against the SLA standards <ul style="list-style-type: none"> ○ Uptime ○ Latency on all links ○ Jitter ○ Packet loss ● Service impacting outages ● Time to resolution of service impacting outages 	
Provide a list of staff with the provider with resumes (we can borrow the format State Purchasing uses)	
If any engineering and/or construction work is required and will not be performed by the BSP, provide the names and company backgrounds of the firms that the BSP will use. Provide resumes in the same format. Note, a preference exists for the use of Nevada-based firms and Nevada workers where feasible.	

Section 9: Evaluation Criteria

1. Leased Lit Fiber Transport Service and Leased Lit Fiber with Bundled IA Service

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Criteria	Weight
Recurring and one-time costs (E-rate Eligible Costs)	25%
Demonstrated performance in comparable projects	20%
Expertise and availability of key personnel and key contractors	20%
Proposed solution meets requirements of RFP (includes technical requirements, terms/conditions of HCSD)	20%
Thoroughness of bid submission. Are plans explained in enough detail to understand the plan for service delivery and implementation.	15%

2. Criteria Explanation

1. **Recurring and One Time Costs (Includes E-rate Eligible One-Time and Recurring Costs):** the total cost of ownership for the components of the proposed service. Total cost of ownership takes into account all one-time and recurring costs.
2. **Demonstrated Performance in Comparable Projects:** Understanding the BSPs performance on past projects within the State of Nevada and outside the State. HCSD will research and evaluate the BSPs performance in meeting the needs of similarly sized projects/customers inside and outside of the State. The BSP should list these similarly sized projects/customers as references or as benchmark projects. The projects/customers can be similarly sized school districts, government customers or enterprise business customers.
3. **Expertise and availability of key personnel and contractors:** In their proposal does the BSP clearly outline who will work on this project, both the BSP's full time employees and contractors. Does the experience and work history of these personnel and companies provide confidence of successful project delivery.
4. **Ability to support requirements of this RFP:** The proposed solution clearly meets HCSD's requirements and needs and shows the BSP's willingness to agree to the HCSD's service and contractual terms and conditions.
5. **Complete bid submission:** Bids concisely address HCSD's requirements, as set forth in the RFP, and do not contain a significant amount of corporate boilerplate marketing information

Appendix A: E-rate Special Construction Cost Allocation Guidance

**E-rate Special Construction
Excess Strands - Cost Allocation Scenarios
Funding Year 2018**

Prepared by the [State E-rate Coordinators' Alliance](#)
October 23, 2017

I. LEASED LIT FIBER AND LEASED DARK FIBER

A. 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.

B. 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.

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Example 1 from Funding Year 2018 USAC Fiber Training Slides applies:

COST-ALLOCATION: FIBER EXAMPLES

- **Example 1:** Leased lit fiber or leased dark fiber provider installs 12-strands in fiber run to a large school district hub and wants to add 36 additional strands for its own ineligible use, resulting in additional labor costs (e.g., splicing) and plant costs (e.g., larger termination boards, additional handholes).

Result: Cost of 36 additional fiber strands and all associated incremental increases in costs (e.g., the additional labor/outside plant costs) above what would be incurred if only the 12-strands of fiber were installed must be allocated out of the applicant's special construction funding request.

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Applicants should seek documentation from the provider which outlines the added incremental costs attributable to designing, managing, and constructing a fiber system with a 48-strand cable instead of a 12-strand cable. Such costs should include (but are not limited to):

- **Splice Labor.** If any fibers over The Applicant'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.

Note that the costs associated with installing a larger cable strand than what is required by the Applicant are ineligible and the service provider should not include such costs in their special construction billing to the Applicant but should be prepared to show

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evidence during PIA review that it did not charge The Applicant for these incremental costs.

Figure 1: Here is a table outlining some possible incremental costs:

Item	12 Strand cable construction	48 strand cable construction	Cost Allocation Amount that service provider should remove from the special construction request
Fiber Cable	38 cents per foot	\$1.04 per foot	66 cents per foot
Design and Engineering	\$2.12 per foot	\$2.42 per foot	30 cents per foot to depict additional splices at A and Z locations
Project Management	\$1.18 per foot	\$1.18 per foot	0
Splice labor*	\$11.00 per splice	\$11.00 per splice	\$11 per splice over 12 splices at any splice site
Splice enclosures**	\$205 per enclosure	\$205 per enclosure	\$205 per enclosure for every enclosure over 12
Fiber Patch Panel	\$71.43 per panel	\$218.60 per panel	\$147.17 per panel
Conduit and other structured materials	1.25" conduit required \$1.95 per foot Handhole (40,000 lb rated) \$2695 per unit Fiber Marker \$30 per unit	1.5" conduit required \$2.35 per foot Handhole (40,000 lb rated) \$2695 per unit Fiber marker \$30 per unit	40 cents per foot No cost difference for handhole No cost difference per marker
Fiber Installation Labor ***	25 cents per foot	28 cents per foot	3 cents per foot
Structured Materials Installation (conduit, markers, handholes)****	\$2.85 per foot	\$3.10 per foot	25 cents per foot
Markers	Place every 500'	Place every 500'	No cost difference
Handholes	Place every 1000'	Place every 1000'	No cost difference

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Appendix B. Fiber Construction Standards

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.
- Selected contractor and its subcontractors will provide all material management to ensure that the project remains on track according to the project milestones,
- All due caution will be exercised in transporting and off-loading all 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 hand holes at no additional expense to the district.
- If a buried proposal all buried conduit shall be PVC conduit of the BSP's choice
- 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 Nevada 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.
 - BSP 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 HCSD or the leased lit fiber solution to be approved for provisioning by HCSD.
- Connector types should be LC unless otherwise specified by the district.
- Any warranties associated with the fiber and any other outside plant materials must revert to the district as the fiber owner upon completion of construction,

Specifications

Survey

- Comply with all ordinances and regulations. Where required, vendor will 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.
- If a buried proposal, respondent will locate underground lines of third parties in cable route area

Permits and Traffic Control

- The respondent must adhere to all applicable laws, rules and requirements and must apply for permits to place infrastructure per specification per county or city ordinance

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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 respondent's responsibility. The respondent'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 respondent 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 following 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 requires 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.
- Respondent 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.

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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. Special 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 respondent 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 minimum of 100' 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 respondent must adhere to pole owners' requirements for clearances, spans, grounding, guys and attachments.

Testing Cable (both buried and aerial)

- The respondent 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.
- Respondent assumes responsibility for the cable after testing. This responsibility covers all fibers in the cable.
- The respondent 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 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

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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.
- Respondent 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.
- Respondent 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 respondent/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 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 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
 - Optical fiber assignments at splice locations
 - Installed cable length
 - Date of installation
 - Aerial installation documents should 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
 - Underground installation documents should include
 - Conduit design and detailing
 - Manhole detailing
 - Preparation of all forms and documentation for approval of conduit construction and/or installation,
- Fiber details will include:

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- 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 shall be tested bi-directionally from endpoint to endpoint.
 - Each span's traces shall be recorded and mapped. Each splice loss from each direction and the optical length between splices as well as any of the information required by Span Map.
 - Reel acceptance
 - Individual fiber traces for complete fiber length
 - Paper and computer disk records of all traces
 - 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. Respondents 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 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 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.

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Table 1 — References, Standards, and Codes

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.