

TIMELINE

- December 17, 2018: Release of Request for Proposal to vendors and public notice in [local newspaper] and posted to the E-rate Productivity Center
- December 27, 2018: Questions must be submitted on or before this date to jkatsaris@pershing.k12.nv.us
- January 3, 2019: Answers to questions posted to the E-rate Productivity Center
- January 31, 2019: RFP responses are due

LOCATION OF SERVICES:

The goal of this RFP is to explore Internet access and Wide Area Network service options for service to the Pershing County Schools and the Pershing County Library Location in Lovelock, NV.

The School District and Library are seeking the most cost-effective solution to serve these locations and will consider all last mile leased lit fiber solutions that meet the jitter, packet loss, latency specifications outlined in the proposed service level agreements.

Respondents should outline in a network diagram the network that will serve each facility listed will be served. The respondent should also, with the requested level of detail, list the Monthly Recurring, the One-time special construction costs and any other one-time charges required to serve each facility.

The Consortium will also consider leased dark fiber solutions for these rural/remote schools and libraries. The school district and library have been a participant in the Pershing/Lovelock Broadband Action Committee (PBAC) which is focused on bringing more scalable and affordable broadband options to Community Anchor Institutions, Government facilities, businesses and residences in Pershing County. This RFP is stand-alone from the actions taken by the PBAC. It is anticipated that there will be additional business opportunities in the County, notably a Pershing County RFP for an upgraded County WAN and an RFP for Internet Services for Tribal Healthcare Clinic on Lovelock Indian Colony land.

While the PBAC effort is an important one, the Consortium will evaluate proposals to serve these rural/remote locations using E-rate guidelines for cost effectiveness.

The locations for which the Consortium is seeking service are as follows:

Lovelock Elementary School	1100 Harvard Way, Lovelock, NV 89419	Latitude: 40.181398/ Longitude: -118.482154
Pershing County Middle School	1295 Elmhurst Ave, Lovelock, NV 89419	Latitude: 40.182274/ Longitude: -118.477419
Pershing County Library	1125 Central Ave, Lovelock, NV 89419	Latitude: 40.180764/ Longitude: -118.476511
Pershing County High School	1215 Franklin Ave, Lovelock, NV 89419	Latitude: 40.182595/ Longitude: -118.478782
Pershing County District Central Office	1150 Elmhurst Ave, Lovelock, NV 89419	Latitude: 40.182794/ Longitude: -118.477414

For leased lit fiber without Internet Access Solutions and for leased dark fiber solutions, the connections from these locations should home to the Pershing County Schools District Hub in Lovelock. The hub location is

Pershing County	765 Western Avenue,	Latitude: 40.179833/
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Adult/Alternative Education Center	Lovelock, NV 89419	Longitude: -118.481309
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The school district's and library system's desire is to interconnect their facilities to a hub location within one of the existing buildings. This can be done via direct connection via leased dark fiber or leased lit fiber.

For fully managed Leased Lit Fiber (with or without Internet access) the consortium will follow the FCC recognized guidelines for bandwidth of WAN connections that were referenced in the E-rate Second Modernization Order. This recommendation is for 10 Mbps per student rounded up to the nearest common bandwidth for transport connections (100 Mbps, 1G or 10G).

For the library location, the minimum download bandwidth is suggested at 100 Mbps with as close to symmetrical upload service as possible, according to the FCC recognized guidelines established by the American Library Association.

SCOPE OF SERVICES

Section 1: Introduction

Pershing County, NV Schools and the Pershing County Library, hereafter referred to as Consortium, is requesting proposals for leased lit fiber and leased dark fiber services for delivery of wide area network (WAN) services to the district. Service is expected to originate at the district hub site and be delivered to the eligible service locations. All locations, with addresses and demarcation points, are listed in the attached pricing sheet. The new service is being planned to begin on July 1, 2019 which represents the expiration of the current leased WAN service.

Section 2: Bid Options

1. Consortium is seeking bids for 4 service options on its combined for the 7 instructional and library facilities listed on page 1 of the RFP. Respondents may bid one, all, or any combination of options). See Section 3 for requirements of each solution.
 - a. The first service is a fully managed, leased lit fiber solution **without Internet Access**. For Leased Lit Fiber without Internet Access, the provider should explain how the backhaul service to the Pershing County Schools hub in Lovelock will be provisioned
 - b. The second service is a leased dark fiber solution that includes fiber maintenance as part of the monthly lease cost.
 - c. The third service is for Category 1 network equipment to place any leased dark fiber solution into service. There are two options for this service.
 - i. The equipment can be either sold directly to the Consortium
 - ii. The equipment can be provided as part of an equipment managed service. Specifications for both a direct purchase and a managed Category 1 equipment service are provided in section 3. Respondents may bid one or both options under this service.
 - d. The Fourth service is Leased Lit Fiber with Internet Access delivered to the Pershing County Schools Hub (address listed below).

2. Network Design and Construction Routes
 - a. Consortium will consider traditional network designs (such as hub and spoke) or alternative proposals that are proposed by the respondent. The 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. The Consortium has, in accordance with E-rate guidelines, rated cost of service as the highest weighted factor in its decision criteria.

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

3. 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. The Consortium has worked closely with electric utility provider NV Energy. Please note that NV Energy has informed the district that aerial routes serving the school and library locations require substantial electrical pole replacement.
- d. 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.
 - ii. For leased dark fiber solutions, equipment required by the Consortium to light the fiber are not considered special construction.
- e. **Special Construction Payment Plan Option**
 - i. The Consortium requests that the respondents consider allowing Consortium to pay the non-discount share of special construction costs (portion of costs that are the responsibility of the applicant) to be paid in equal annual installments over four years from Funding Year 2019 to Funding Year 2022 inclusive. Responses must include agreement or non-agreement of this request.
- f. 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 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, Consortium 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 Appendix A as prepared by the State E-rate Coordinators' Alliance (SECA).

Section 3: Solution Specifications

1. Leased Lit Fiber (without Internet Access)-School District and Library WAN Solution

USAC has instructed that for funding year 2019, "Leased Lit Fiber (with or without Internet Access) or "Leased Dark Fiber and Leased Lit Fiber" is the E-rate Category 1 service option to choose when bidding point to point wide area network connections without Internet Access or when bidding dark fiber as an option respectively.

- a. For leased lit fiber without Internet Access Connections, the consortium must have dedicated, symmetrical bandwidth of either 100 Mbps, 1 Gbps or 10 Gbps between the remote facility and the hub
- b. Contract options are requested for 36, 60, or 120 months terms of service.
- 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.
 - 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 but the term remains the same.
- e. All solutions must adhere to the following Service Level Agreement (SLA) terms and the terms found in Section 4:
 - i. The provider will make all reasonable efforts to ensure 99.99% network availability of each circuit.
 - ii. .25% frame/packet loss commitment
 - iii. 15ms network latency commitment round trip on a transport circuit
 - iv. 10ms network jitter commitment
 - v. There is no right of provider to limit or throttle the capacity of the circuit at any time for any reason
 - vi. Vendor stated commitment is to respond to any outage within two (2) hours and a four (4) hour restoration of service (see schedule of service credits below).

2. Leased Dark Fiber

USAC has instructed that for funding year 2019, "Leased Dark Fiber and Leased Lit Fiber" AND "Maintenance and Operations" are the E-rate Category 1 service options to choose when bidding dark fiber point to point wide area network connections without Internet Access.

- a. Consortium must have two strands of single-mode fiber from the hub to each eligible entity location.
- b. The provider will home all leased dark fiber connections to the existing School District and Library Hub in Lovelock.
- c. Contract options are requested for 36 month, 60 month, and 120 month terms of service.
- d. Each respondent is required to complete the attached pricing sheet with this RFP.
 - i. Special construction and monthly recurring cost 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 and MRC rate in each pricing cell of the matrix.

- e. The provider will make all reasonable efforts to ensure 99.99% network availability of all leased fiber strands.
- f. All solutions require maintenance as part of the MRC subject to the following terms and the terms found in Section 4:
 - i. Respondent shall maintain the applicable fiber seven days per week, twenty-four hours per day.
 - ii. In the case that maintenance is subcontracted out to a 3rd party, the respondent must hold and manage the subcontract and is ultimately responsible for the SLA.
 - iii. 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 the Consortium fiber segments versus overall network maintenance.
 - iv. Vendor stated commitment is to respond to any outage within two (2) hours and thereafter proceed to correct the malfunction with reasonable diligence.

Service credits for a greater than 2-hour response will accumulate as follows:

Length of Service Outage	Credit is the follow percentage of Monthly Fiber Maintenance Fee
Less than 2 hours	No Credit
Two (2) hours to four (4) hours	5%
Greater than four (4) hours and less than eight (8) hours	10%
Greater than eight (8) hours and less than twelve (12) hours	15%
Greater than twelve (12) hours and less than sixteen (16) hours	20%
Greater than sixteen (16) hours and less than twenty-four (24) hours	35%
Greater than twenty-four (24) hours	50%

- v. The respondent should include an overview of maintenance practices including:
 - o Routine maintenance and inspection
 - o Scheduled maintenance windows and scheduling practices for planned outages
 - o Marker and handhole inspection and repair
 - o Handling of unscheduled outages and customer problem reports
 - o What service level agreement is included and what alternative service levels may be available at additional cost
 - o What agreements are in place with applicable utilities and utility contractors for emergency restoration

- Repair of fiber breaks
- Mean time to repair
- Replacement of damaged fiber
- Post repair testing
- Replacement of fiber that no longer meets specifications
- Policies for customer notification regarding maintenance
- Process for changing procedures, including customer notification practices
- Process for moves, adds, and changes
- Process for responding to locate requests

3. Category 1 Network Equipment for Leased Dark Fiber -Consortium Purchase of Equipment

USAC has instructed that for funding year 2019, "Network Equipment" as the E-rate Category 1 service option to choose when bidding for Category 1 networking hardware.

- a. Consortium requires network equipment to place circuits into service at 1Gbps or 10Gbps once leased dark fiber is available.
 - i. Network equipment should be Cisco / Ubiquiti or equivalent.
 - ii. For Individual School Sites: Cisco / Ubiquiti
 - 1. 48 Port
 - 2. POE, SFP
- b. Each respondent is required to complete the attached pricing sheet with this RFP.
- c. Network equipment for leased dark fiber may be bid as a stand-alone service by anyone, even if they are not bidding on any fiber service.

4. Leased Lit Fiber with Internet Access (Delivered only to the district Hub)

USAC has instructed that for funding year 2019, Leased Lit Fiber (with or without Internet Access) is the E-rate Category 1 service option to choose when bidding point to point wide area network connections with Internet Access.

- a. Consortium must have dedicated, symmetrical transport and ISP service of 500 Mbps, 1G, 10G to delivered only to the district hub.
- b. Contract options are requested for 12 month, 36 month and 60 month terms of service.
- 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.
 - 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.
- e. All solutions must adhere to the following Service Level Agreement (SLA) terms and the terms found in Section 4:
 - i. The provider will make all reasonable efforts to ensure 99.95% network availability of each circuit.
 - ii. .50% frame/packet loss commitment
 - iii. 45ms or less roundtrip network latency commitment for the connection to closest Internet Network Access Point
 - iv. 50ms network jitter commitment

- v. There is no right of provider to limit or throttle the capacity of the circuit at any time for any reason
- vi. Vendor stated commitment is to respond to any outage within two (2) hours and a four (4) hour restoration of service (see schedule of service credits below).

Service credits for a greater than 2-hour response will accumulate as follows:

Length of Service Outage	Credit is the follow percentage of Monthly Fiber Maintenance Fee
Less than 2 hours	No Credit
Two (2) hours to four (4) hours	5%
Greater than four (4) hours and less than eight (8) hours	10%
Greater than eight (8) hours and less than twelve (12) hours	15%
Greater than twelve (12) hours and less than sixteen (16) hours	20%
Greater than sixteen (16) hours and less than twenty-four (24) hours	35%
Greater than twenty-four (24) hours	50%

Section 4: Service Level Agreement for Leased Lit Fiber without Internet Access and Leased Lit Fiber With Internet Access

For all Leased Lit Fiber service proposals, and for all Category 1 Network Equipment Managed Service solutions. The respondent 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 detail trouble reporting, escalation and

- resolution plan will be provided to the district.
- f. Measurement: for leased lit fiber and a reasonable restoration of service for leased dark fiber. 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 Applicant.
 - j. Service outage credit: The respondent must agree to the following or a more stringent schedule of service outage credits

Length of Service Outage	Credit is the follow percentage of MRC
Less than 2 hours	No Credit
Two (2) hours to four (4) hours	5%
Greater than four (4) hours and less than eight (8) hours	10%
Greater than eight (8) hours and less than twelve(12) hours	15%
Greater than twelve (12) hours and less than sixteen (16) hours	20%
Greater than sixteen (16) hours and less than twenty-four (24) hours	35%
Greater than twenty-four (24) hours	50%

Section 5: General Terms for All Proposals

- a. Failure to include any requested information noted as required by the respondent is grounds for disqualification.
- b. Description of Proposal
 - i. Respondent's proposal should include all sites for the option bid. If the respondent bids leased dark fiber or leased lit fiber – all sites must be included in the bid. Failure to include all sites in a bid option could be considered ground for disqualification.
 - ii. Respondent will provide a description of their proposal for all services and solutions.

- iii. Description will include an overview of the proposal, any deviations from the requested architecture, design or requirements, assumptions made, and other detail Consortium may find useful or necessary (or could differentiate the solution from a competing proposal).
- c. Timeline
 - i. For each response, respondents must include a timeline for all bringing all sites online.
 - ii. Proposals requiring little to no special construction should be able to bring all sites online by the July 1 start of the funding year.
 - iii. For solutions requiring special construction, a schedule of bringing sites online should be included with an explanation of how this timeline shifts if the date of the E-rate funding commitment shifts.
- d. Demarcation
 - i. All solutions must terminate service or infrastructure in the demarcation point at each address specified in the pricing sheet.
 - 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.
- e. Network Diagram
 - i. For each response, respondents must include a network diagram displaying the paths to be used to serve each endpoint.
- f. References
 - i. For each response, respondent must provide 3 references from current or recent customers (preferably K-12) with projects equivalent to the size of Applicant.
 - ii. If respondent responds to more than one option (e.g. leased lit fiber service as well as leased dark fiber), provide 3 references for each.
- g. E-rate Program Integrity Assurance (PIA) Review (**Note that respondents must confirm their compliance with this request in their response. Failure to do so may result in disqualification of the respondent's proposal by the district.**)
 - i. If their solution is chosen, respondents are required to promptly provide Consortium with any information being requested as part of PIA review.
 - ii. Vendors may assist applicants with preparing funding requests or responding to PIA questions and may speak directly with PIA reviewers.
 - iii. For all responses that include special construction, the respondent agrees to, by submitting its bid to produce all construction labor, construction materials and other cost information requested during PIA review.
- h. Required Notice to Proceed and Funding Availability
 - i. Consortium will follow the purchasing policies of the Consortium Board and 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.
 - ii. The implementation of any associated contracts resulting from this competitive bid process will be dependent on the district's' issuance of a written Notice to Proceed.
 - iii. E-rate funding notification alone will not signify Notice to Proceed. The district will have the right to allow the contract to expire without

implementation if appropriate funding (including any state matching funds for special construction projects) does not come available.

Section 6: Evaluation Criteria

1. Leased Lit Fiber and Leased Dark Fiber Solutions

% Weight	Criteria
35%	E-rate eligible recurring and one-time circuit costs¹
15%	Complete bid submission
10%	Ability to support requirements of this RFP ³
25%	Proposed contract terms and conditions ⁴
5%	E-rate ineligible recurring or one-time costs ⁵
10%	Respondent references ⁶

2. Category 1 Network Equipment and Category 1 Network Equipment Managed Service

% Weight	Criteria
50%	E-rate eligible costs¹
10%	E-rate ineligible costs ⁵
40%	Compatibility with existing network infrastructure ⁷

3. Criteria Explanation

1. E-rate eligible costs: the total cost of ownership for the eligible components of the proposed service. Total cost of ownership takes into account all one-time and recurring costs. Note that E-rate eligible costs refers to the pre-discount cost of the solution, not the post-discount portion of costs that are the responsibility of the Applicant. This criterion must be the highest weighted per E-rate program rules.
2. Complete bid submission: Bids concisely address Applicant’s requirements, as set forth in the RFP, and do not contain a significant amount of corporate boilerplate marketing information
3. Ability to support requirements of this RFP: proposed solution clearly meets Applicant’s requirements and needs
4. Proposed contract terms and conditions: Proposed contract has flexibility and terms desired by Consortium
5. E-rate ineligible costs: Any costs of the proposed service that are not eligible for E-rate funding. This does not refer to the post-discount portion of eligible costs that are the responsibility of the Applicant.

6. Provider references: response included K12 references that were similar in size and scope
7. Compatibility with existing network infrastructure: proposed equipment is easily compatible with the existing equipment used by the Applicant.

**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 Consortium 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 Consortium 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 Consortium in the future, and if the Consortium cannot show that it is not more cost effective than buying the exact number of fiber strands being lit in the first year, the Consortium 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 Consortium 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.

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.

Applicant's 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 Consortium are ineligible and the service provider should not include such costs in their special construction billing to the Consortium but should be prepared to show

evidence during PIA review that it did not charge the Consortium 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

Appendix B: OSP Installation Specifications

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 EMT (Electrical Metallic Tubing) multi-duct with at least three innerducts. EMT fitting shall be gland or set screw type, and each conduit shall be equipped with a graduated pull tape or rope.
- If a buried proposal, unless specified by right-of-way owner, crossings will be two conduits, PVC-Sch 40 or better.
- If a buried proposal, the exact requirements for location and type of conduit within the building shall be verified with building owner.
- If a buried proposal, all Hand Holes shall be 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:
 - TU-T G.652.C/D compliant
 - Maximum Attenuation @ 1310nm: 0.34 dB/km
 - Maximum Attenuation @ 1385nm: 0.31 dB/km
 - Maximum Attenuation @ 1550nm: 0.22 dB/km
- 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, 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 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 36" along roadways and 24" 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 required additional depth, in which case the greatest depth will be maintained.
 - Where cable crosses existing sub-surface pipes, cables, or other structures: at foreign object crossings, the cable will be placed to maintain a minimum of 12" clearance from the object or the minimum clearance required by the object's owner, whichever is greater.

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

- All crossings of state or federal highways and railroads right-of-way shall be made by boring and placing a pipe casing. The cable shall be placed through the pipe casing. Country road and other roadways shall be bored, trenched, or plowed as approved by the appropriate local authority.
- All work performed on public right-of-way or railroad right-of-way shall be done in accordance with requirements and regulations of the authority having jurisdiction there under.
- 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.

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 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 any permitting agencies, and/or the district.
 - Site clean-up will include the restoration of all concrete, asphalt, or other paving materials to the satisfaction of the other interested permitting agencies, and/or the district.

Documentation (both buried and aerial)

As-built drawings will include:

- Fiber cable routes
- Drawings, site drawings, permit drawings, and computerized design maps and electronically stored consolidated field notes for the entire route must include:
 - Verification of as-built and computerized maps
 - Splicing locations
 - Optical fiber assignments at patch panels
 - 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:
 - 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.

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.