

- b. Horizontal clearance
- (1) Minimum horizontal clearance from overhead wireline crossings to railroad infrastructure.
    - i 300 feet (91.44 meters) from the near edge of any railroad bridge or culvert.
    - ii 50 feet (15.24 meters) from the near edge of any switch or other railroad infrastructure as required by the railroad.
  - (2) Minimum horizontal clearance from the centerline of the nearest track, measured perpendicular to the centerline of track, to near face of the wireline support structure.
    - i Structures supporting wirelines with voltage equal to or greater than 34.5 kilovolts must be located off railroad right-of-way.
    - ii 50 feet (15.24 meters) for tracks other than industry tracks.
    - iii 30 feet (9.14 meters) for industry tracks.
    - iv Unguyed support structures.
      - 1 From railroad signal and communication lines located above and below grade shall be located a minimum distance equal to the height of the wireline structure above the groundline.
      - 2 From centerline of near track shall be located a minimum distance equal to the height of the pole above the groundline plus 10 feet (3.05 meters).
    - iv In curved track the above clearances shall be increased either 6 in. (0.15 meters) total or 1.5 in. (0.04 meters) for every degree of curve, whichever is greater.
- c. Guy wires
- (1) Guys shall be placed in such a manner as to keep the pole from leaning or falling in the direction of the tracks.

## SECTION 5.6 GUIDELINES FOR FIBER OPTIC “ROUTE” CONSTRUCTION ON RAILROAD RIGHT OF WAY

### 5.6.1 SCOPE (2014) R(2017)

These general requirements and technical details are provided only as a guideline for the successful completion of fiber optic installation. This shall include parallel and crossings on railroad right-of-way by railroads or outside communication companies that enter into agreements with railroads. All railroads shall reserve the right to change these recommendations as needed, and are not to be taken as authority to construct without prior review and approval by each of the participating railroads. Any items not covered specifically herein are to be in accordance with American Railway Engineering and Maintenance-of-Way Association (AREMA) recommended practices, subject to the approval of the participating railroad's Engineering Department. All railroads shall reserve the right to change these recommendations as needed without prior notice. The term "Engineer" as used herein means chief engineer of the railroad company, or the authorized representative. A glossary of terms used in this document follows in Article 5.6.7. Dimensions are given in English with metric units in parentheses.

## **5.6.2 PLANNING (2014) R (2017)**

**5.6.2.1 Coordinate the engineering criteria, from the preliminary route inspection through the actual route design, with railroad representative.**

**5.6.2.2 When planning a fiber system project.**

- a. Identify and note on maps any wetlands any potential impact to the railroad track structure or right-of-way.
- b. Note vegetation, property uses and topography not indicated on maps.
- c. Note cuts and fills.
- d. Identify potential track crossings, particularly under-track bores.
- e. Call the State 1-CALL utility locate system (811) and the railroad for signal, fiber optic, and other underground utility locations. The ticket number shall be provided to the Railroad.

**5.6.2.3 Fiber Optic installations are governed by unique rules and regulations. It is the responsibility of the Fiber Optic Company that these be adhered to during planning, including preliminary investigations and route surveys on the railroad's right-of-way.**

**5.6.2.4 Special permission is required for the use of all vehicles, including ATV's, on the railroad's right-of-way. Obtain permission to occupy the property or right-of-way of landowners other than the railroad.**

**5.6.2.5 It is the fiber optic company's responsibility to obtain any permits, including but not limited to right-of-entry, NPDES, Corps 404, and local jurisdictional permits. Permits must be onsite for inspection.**

## **5.6.3 DESIGN (2014) R(2017)**

**5.6.3.1 Conventional Build General Requirements (See Paragraph 5.6.3.5 for Railplow)**

**5.6.3.1.1 Detail all fiber facilities including lines, repeater sites, junctions, and structures.**

**5.6.3.1.2 Design the fiber system, if practical, to run near the outer limits of the railroad's right-of-way. Keep the fiber system running line as straight as possible while maintaining a consistent distance from track centerline.**

**5.6.3.1.3 Design the fiber system to run on the field side of all railroad structures, including bridges, signal facilities, buildings and platforms.**

**5.6.3.1.4 If the fiber system has to be placed under an existing signal or communication structure, place the system a minimum of 10 feet (3.05 meters) under natural ground. This extra depth may also be required in "signal sensitive areas" such as interlocking or control plants.**

**5.6.3.1.5 If the fiber system has to be located under existing signal or communication wires, a minimum 2 feet (0.61 meters) of separation is required.**

**5.6.3.1.6 Fiber optic cable must not be installed within 5 feet (1.52 meters) of underground power or signal lines, unless suitably insulated.**

**5.6.3.1.7 If the fiber system is designed within 30 feet (9.14 meters) of a track centerline or structure of any type, excavations within this area may require shoring designed to include train or structure surcharges.**

In such cases, submit shoring plans with calculations, stamped by a licensed professional engineer, to the railroad for approval prior to construction. See 5.6.3.2, Trenches and Excavations. Refer to Figure 1-5-13.

**5.6.3.1.8 Do not design fiber system components that create stumbling hazards on the railroad's right-of-way.**

**5.6.3.1.9 Design the fiber system to be installed a minimum of 42 inches (1.07 meters) below natural ground, except as noted herein. See Figure 1-5-8.**

**5.6.3.1.10 In the event local ground conditions prohibit the placement of the fiber system at a depth of at least 42 inches (1.07 meters), the fiber system must be encased, and specific approval by the railroad is required.**

**5.6.3.1.11 Compact all backfill in excavations and trenches to 95% maximum density as defined in ASTM Standard D698. Use clean, suitable backfill material.**

**5.6.3.1.12 Design the fiber system to be buried a minimum of 60 inches (1.52 meters) below the bottom of all culverts on the railroad's right-of-way, or around the end of the culvert (field side) and 60 inches (1.52 meters) below the bottom of the flow line. This minimum depth must be maintained a minimum of 20 feet (6.10 meters) each side of the culvert centerline. Only after specific evaluation by the railroad will any system be allowed to be placed over the top of any culvert. See Figure 1-5-8.**

**5.6.3.1.13 Locate and identify buried utilities and other potential obstructions.**

**5.6.3.1.14 Do not attach the fiber system to railroad bridges to cross waterways, highways, etc., unless no other feasible alternative exists. Fully explore the burying alternative before submitting requests to the railroad for attachment of the fiber system to a bridge, and provide appropriate documentation, detailing the reasons why an attachment is necessary.**

- a. Submit bridge attachment designs, for railroad approval prior to construction. Include details at and around the bridge back walls.
- b. Design bridge attachments that will not interfere with nor delay future repair, replacement, inspection and other construction to take place on or near the bridge (superstructure and substructure).
- c. Include in the design extra cable in a protected facility near the bridge so the bridge can be raised if necessary, and prevent delay to railroad operations.
- d. Design the fiber system so it does not obstruct the bridge bearings. See Figure 1-5-7.
- e. If practical, design the fiber system to be installed on the downstream side of the bridge.
- f. Fiber system must not be attached to a timber bridge, nor to the handrails of bridges.
- g. Fall protection is required for work performed on all bridges and above ground installations. Work on all bridges and structures on the railroad's right-of-way is governed by the most restrictive of OSHA (29 CFR Parts 1910 and 1926), FRA Bridge Worker Safety Regulations (49 CFR Part 214), or state regulations.
- h. Contractors performing work on bridges and above ground facilities on or over railroad property must submit written documentation certifying their employees have received proper training in fall protection prior to engaging in work on railroad property. The contractor must further satisfy the railroad representative that proper equipment and compliance with these standards will be adhered to on the job site.

**5.6.3.1.15 Design hand holes, splice boxes and manholes for appropriate loading conditions. In general, locations within 30 feet (9.14 meters) of track centerline should be designed for a Cooper E80 surcharge, while all other installations should withstand AASHTO H-20 highway loading requirements, in addition to**

soil-pressures. If a future main track is anticipated, the installation must be designed to handle surcharge loadings.

**5.6.3.1.16 Show the location of fiber system marker signs on the design drawings, and submit a detail of the sign, including it's color, for railroad approval. This also applies to aerial marker signs. Additional signing may be required by the Engineer where above signs are not readily visible from the track.**

### **5.6.3.2 Trenches and Excavations**

**5.6.3.2.1 Use shoring conforming to the most restrictive of state, OSHA, or AREMA standard in all excavations where required. Refer to OSHA standard in 29 CFR XVII Paragraph 1926.650. Submit shoring plans involving the railroad's track or structures for approval prior to construction. See Figure 1-5-13.**

**5.6.3.2.2 All excavations and trenches will be attended or protected. Fence, fill or guard each site prior to leaving. Monitor shored trenches and excavations continuously during work for signs of instability and failure.**

### **5.6.3.3 Trenchless Installation of Fiber Systems**

**5.6.3.3.1 Submit plans for all bores that impact railroad's right-of-way for approval. This includes both under-track bores and parallel-to-track bores. Detail the following on the plans:**

- a. Boring methods and equipment.
- b. Depth(s) of the fiber system.
- c. Locations of bore pits relative to track centerline.
- d. Casing specifications.
- e. Excavation supports at bore pits.

**5.6.3.3.2 An extensive geotechnical analysis may be required to verify that railroad tracks will not be affected by the proposed bore. It is the responsibility of the fiber optic company or its contractor to provide such an analysis at the railroad's request.**

**5.6.3.3.3 All bores are subject to railroad, federal, state and/or local requirements.**

**5.6.3.3.4 Ultimate approval of the boring process rests with the railroad. The railroad has the authority to delay the operation or establish additional requirements based on site characteristics.**

**5.6.3.3.5 Generally accepted dry bore installation methods for under-track or parallel-to-track bores include:**

- a. Jacking the casing through the subgrade.
- b. Dry auger boring.
- c. Dry mini-directional boring.
- d. Other methods will be considered on a case-by-case basis. Wet bores are not allowed for installing fiber systems on the railroad's right-of-way. Wet bores in this context refer to the use of liquids to displace soil.

**5.6.3.3.6 Under-track dry bores are subject to the following requirements:**

- a. Keep track bores under main line tracks to a minimum.

- b. Locate the fiber system a minimum of 66 inches (1.68 meters) below the base of rail or natural ground, whichever is greatest.
- c. Encase in galvanized steel pipe or black iron pipe [Specified Minimum Yield Strength of 30,000 psi (206,843 kPa) or above] all fiber system lines under tracks in a single casing. For depths greater than 15 feet (4.57 meters) below the natural ground, Schedule 80 PVC pipe may be used in lieu of steel pipe or black iron pipe. Extend the casing a minimum of 30 feet (9.14 meters) from centerline of nearest track, measured perpendicular to the track, or longer, to stay out of cuts and/or fills. Multiple duct installations must use a single Schedule 80 or better casing for the bore. The crossing angle shall not be less than 45 degrees. The ends of the casing must be sealed.
- d. If practical, design track bores to be greater than 150 feet (45.72 meters) from the nearest bridge, culvert, track switch (see Figure 1-5-12), building or other major structure.
- e. Design bore pits to be a minimum of 30 feet (9.14 meters) from centerline of nearest track when measured at right angles to the track. See Figure 1-5-9. Do not locate bore pits in the slope of a cut or fill section of the roadbed. Keep the bore pit size to a minimum. Location of crossings shall be in an area that does not require extensive shoring. See 5.5.3.2 Trenches and Excavations. Refer to Figure 1-5-13.
- f. Keep bore pits and other excavations to the minimum size necessary.

**5.6.3.3.7 All boring methods are subject to the following conditions:**

- a. The machine operator follows all railroad standards and OSHA regulations, including the use of grounding mats and other safety measures.
- b. The machine operator has control over the direction of the boring tool.
- c. Pull back methods use mandrels up to two inches (50.8 millimeters) larger than the diameter of the casing, up to a casing diameter of 8 inches (203.2 millimeters).
- d. Shallow bores, misdirected bores, or other unsuccessful bores are abandoned and filled at the discretion of the railroad.
- e. If a bore is unsuccessful, future attempts are made only with the approval of the railroad.
- f. Auger heads are not allowed more than six inches (152.4 millimeters) ahead of the casing being inserted.
- g. Any parallel-to-track bore that is made in either a cut back or fill section will be located a minimum of 60 inches (1.52 meters) below the toe of the ballast section or natural ground, whichever is lower. See Figure 1-5-14 & Figure 1-5-15.

**5.6.3.3.8 Trenchless horizontal directional bores (HDD) will be considered for under-track and parallel-to-track bores on a case-by-case basis, subject to these additional constraints.**

- a. Under-track bores must be installed a minimum depth of 12 feet (3.66 meters) below the base of rail or five feet (1.52 meters) below the natural ground line, whichever is greater.
- b. An approved slurry must be kept to a minimum and only used for head lubrication and/or spoils return. Calculate anticipated slurry use and monitor slurry use during the bore operation to determine slurry loss into the surrounding soil. A bentonite slurry should be used to seal the hole with a minimum of 95% return. Should excessive slurry loss occur, operations must cease immediately.
- c. Maximum size of the finished hole is 10 inches (254 millimeters).
- d. Submit complete specifications for the machine to be used, including:
  - (1) Operating and maximum pressures of liquid at the drilling head;
  - (2) Water volume;

- (3) Source of water;
  - (4) Power supply;
  - (5) Type of reamer or cutting tool, number and size of holes/nozzles on the head, and method of head control;
  - (6) Volume of anticipated spoils removal.
- e. Bore stems and cutting heads may have to be left in the ground if they can not be retrieved through the bore hole. Open excavation to retrieve the parts may not be possible.

**5.6.3.3.9 Special conditions such as rock drilling that require the use of high-pressure air or water are subject to all of the conditions of this section and will be evaluated as they occur. Blasting is not allowed.**

**5.6.3.3.10 Installation of fiber cable on pole lines within the railroad right-of-way will be considered on an individual basis.**

**5.6.3.3.11 Any overhead crossing of the track by the fiber system must at least adhere to AREMA Clearances and National Electric Code (NEC) Standards.**

### **5.6.3.4 Repeater Stations (Regens)**

**5.6.3.4.1 Submit the regen design with the running line plan. Indicate all details of the site, such as building size, building access, concrete pad depth, soil removal and method conforming to environmental requirements, power supply, distance from track centerline, fences, all appurtenances, and distances from all road crossings.**

**5.6.3.4.2 Include with the power supply detail the following: voltages, distances relative to the mainline and other structures, overhead clearances and below ground dimensions.**

**5.6.3.4.3 Locate regens a safe distance from the nearest grade crossing. The governing minimum distance is the most stringent of either:**

- (1) Local, state, FRA, or AASHTO clear sight distance requirements for grade crossings, or
- (2) 500 feet (152 meters). See Figure 1-5-10. These requirements could vary due to train and vehicle speeds at the crossings.

**5.6.3.4.4 Do not locate regens under signal, communication, or power lines.**

**5.6.3.4.5 Locate regens a minimum of 50 feet (15.24 meters) from centerline of the nearest track to the nearest element of the regen facility, and avoid placement adjacent to track curves. See Figure 1-5-10.**

**5.6.3.4.6 Do not place regens where vision will be obstructed or interfere with railroad operations. Train signals must be clearly visible.**

**5.6.3.4.7 Regens may have to be located on private property to meet the requirements of this section.**

**5.6.3.4.8 Access to regens shall not foul the tracks and overhead wires, and must have railroad approval.**

### **5.6.3.5 Railplow Design**

5.6.3.5.1 Routes that will utilize an on-track plow shall be designed approximately 11 feet (3.35 meters) from the centerline of track or beyond the toe of ballast line.

5.6.3.5.2 The running line shall not be permitted between centerline of tracks. Hand holes and pull boxes shall be no closer than 30 feet (9.14 meters) to the centerline of track.

5.6.3.5.3 Signal plants should be avoided by trenching behind the facility.

5.6.3.5.4 The depth of the installation shall be 42 inches (1.07 meters) or greater. Other considerations may apply depending on the specific code.

5.6.3.5.5 The distance to centerline of track for bores and other excavations will be a minimum of 30 feet (9.14 meters) to accommodate railplow design and construction. Excavations in these areas must not violate train and structure surcharges.

## 5.6.4 CONSTRUCTION (2014) R(2017)

5.6.4.1 Call the State 1-CALL utility locate system (811) and the railroad for signal, fiber optic, and other underground utility locations. The ticket number shall be provided to the Railroad.

5.6.4.2 A complete set of approved construction documents must be maintained at the project site.

5.6.4.3 Complete arrangements must be made for safety training and protection of construction operations prior to any construction activity.

5.6.4.4 Obtain approval from the railroad for any deviation to the construction drawings and indicate such changes to the construction drawings.

5.6.4.5 Avoid the slope of cut or fill sections.

5.6.4.6 If the fiber system has to be located in the ditch, place the system a minimum of 60 inches (1.52 meters) beyond the toe of the slope and a minimum of 60 inches (1.52 meters) below the bottom of the flowline. The fiber optic company may want to consider placing the fiber system at extra depth to allow for ditch cleaning.

5.6.4.7 Stabilize any waterways that have been plowed or cut. Use rip-rap or other approved erosion control methods.

5.6.4.8 Use OSHA and railroad approved shoring procedures on all trenches and excavations. See 5.6.3.2, Trenches and Excavations.

5.6.4.9 Backfill, cover or fence all excavations when unattended.

5.6.4.10 No equipment is allowed on any track ballast section.

5.6.4.11 Do not foul the track ballast with dirt or other foreign materials.

5.6.4.12 Do not store or place equipment, supplies, materials, tools, or other items within 25 feet (7.62 meters) of the nearest track centerline, or within 500 feet (152.4 meters) of road crossing.

**5.6.4.13 Start cleanup and restoration of the railroad's right-of-way immediately after the fiber system installation in each construction area and continue on a daily basis as the project progresses until complete. Ensure that any stumbling hazards are removed immediately.**

**5.6.4.14 Take care not to foul the ballast, block ditches, culverts, or otherwise impede drainage. If chipping is approved, remove any brush or items that can not be chipped to 1 inch (2.54 centimeters).**

**5.6.4.15 Bridge attachments are generally not permitted. The fiber optic company must provide written justification prior to applying for permission to attach to the railroad bridge. Detailed drawings prepared by a registered structural engineer must be prepared for review and approval by the railroad. Install only railroad approved bridge attachments incorporating the following:**

- a. The Fiber Optic Company is to install extra cable in a protective facility near the bridge so the bridge can be raised if necessary and without delay to railroad operations.
- b. Install the fiber system so as not to obstruct the bridge bearings. See Figure 1-5-7. The conduit should not be placed on top of the deck unless clearances can be obtained to stay outside the track structure for normal maintenance. Place the conduit on the outside of the superstructure by supporting it from the concrete deck, curb and/or walkway. Tie maintenance must not be impeded.
- c. Exercise care in trenching between the toe of the roadbed slope and bridge backwalls, typically by hand-digging or dry boring.
- d. Torch cutting or welding of bridge members is not allowed. Drill holes, if approved, are required for bracket attachment and specify high strength bolts (ASTM A325) for any brackets. Provide an expansion joint in detail.
- e. If brackets must be removed from the bridge, do not torch cut bolts. After removing the bracket, insert a bolt in the open hole and paint with galvanized paint. If the bridge is concrete, cut the bolt flush with the concrete surface.
- f. Touch-up any scratched galvanized bridge surfaces, including bracket attachments, with galvanized paint, including those areas of bridge steel that are to be covered by the brackets. The painted area should extend at least 2 inches (5.08 centimeters) beyond the contact surface.

**5.6.4.16 Fall protection conforming to all Federal Railroad Administration and OSHA regulations is required for work performed on all bridges and above ground installations.**

**5.6.4.17 Install marker posts, hand holes, splice boxes and manholes at the outer limits of the railroad right-of-way, not less than 30 feet (9.14 meters) from the centerline of the tracks. Install them so as not to create a stumbling hazard or to interfere with railroad operations.**

**5.6.4.18 The marker posts or signs should be placed at intervals that will permit viewing from any direction, not to exceed 500-feet (152.39 meters), as approved by railroad. The signs must also be placed at each change of direction, handholes, and grade crossings. Each adjacent sign should be visible from one sign to the next in each direction. Lateral crossings should have a steel, or approved railroad material, sign at the right-of-way line. Additional signing may be required by the Engineer where above signs are not readily visible from the track.**

**5.6.4.19 Railroad signal personnel will locate, remove, and replace all guy wires on railroad pole lines, if permitted.**

**5.6.4.20 Overhead Fiber Optic Work**

- a. Coordinate work on railroad poles with the railroad.
- b. Follow applicable National Electric Codes (NEC) for all pole work.



- c. Obtain approval for all wire drops and splice locations from the railroad prior to construction.
- d. Ensure all power lines on the poles have been de-energized. Check the poles for structural integrity before climbing.

Use climbing equipment conforming to OSHA regulations. In addition, comply with federal, state, and local laws and regulations.

#### **5.6.4.21 Do not throw trash into any excavations.**

**5.6.4.22 Contain all construction-generated waste material and remove it to an approved disposal site. This includes, but is not limited to, excavated foundations, old dump sites, debris, concrete or masonry obstructions, organic matter, rocks and boulders.**

**5.6.4.23 Remove all abandoned fiber optic cable systems from the right-of-way. Coordinate the method of removal with the railroad. If any of the fiber optic cable system is not removed, maintain records of the location of abandoned facilities.**

**5.6.4.24 Regrade and clean construction sites to the condition they were before the project began. Reseed disturbed areas with indigenous grass species. Perform clean-up and restoration as the project progresses.**

**5.6.4.25 Repair or replace any disturbed fencing and gates to equal or better condition. Immediately repair and/or monitor fences and gates used to contain livestock. Ensure that livestock are not released onto the railroad's right-of-way.**

**5.6.4.26 Do not operate heavy equipment on railroad's paved roads located on the right-of-way without prior approval of the railroad. Use a protective covering over paved roads when crossing them with heavy equipment. Repair roads damaged or cut through. Coordinate such moves with the railroad.**

**5.6.4.27 When installing cable on top of cuts, do not operate equipment or install cable within 5 feet (1.52 meters) of the top of the slope, or the interceptor ditch. (See Figure 1-5-15.)**

**5.6.4.28 Comply with all applicable federal, state and local environmental laws and regulations.**

**5.6.4.29 Where Public Utilities Commission requirements meet or exceed the requirements of the Railroad, those requirements will apply. This would include but not be limited to, safety, clearances and walkways.**

**5.6.4.30 Maintain all existing facilities used to protect the public and/or railroad employees. Install additional facilities when needed to protect the public and/or railroad employees.**

### **5.6.5 DOCUMENTATION (2014) R(2017)**

**5.6.5.1 Construction drawings must have proper railroad engineering stationing ties, to result in acceptable As Built drawings. If construction plans are approved without the proper ties, it is the fiber optic company's responsibility to provide them prior to As Built drawing approval. See Figure 1-5-6. Methodology for Equating Fiber Optic Cable Locations to Railroad Track & Right-of-Way Maps.**

**5.6.5.2 Include the following information on all construction plans and final As Built drawings:**

- a. Alignment of the cable with railroad engineering stationing at each running line change or PI (point of intersection) including handholes, signs, and markers.
- b. Include datam reference, basis of bearing, benchmarks, scale factor, and geoid.

- c. Depth of the cable, cable elevations, and natural ground elevations shown on plan & profile.
- d. Bridges (the railroad engineering stationing shown is measured from the inside backwall of a bridge). See Figure 1-5-7. Show the bridge milepost designation.
- e. Bridge attachments and their details.
- f. Culverts.
- g. Signals, signal houses, and other signal facilities.
- h. All grade crossings, overhead viaducts and overpasses, including name of the street (public or private) and railroad mile marker designation.
- i. All utility crossings (both underground and overhead), and all parallel utilities.
- j. Rivers, fences, and polelines.
- k. Railroad right-of-way limits.
- l. Railroad time table station names and mile markers.
- m. All mainline track, sidings, spur tracks and turnouts.

**5.6.5.3 Include a separate detailed drawing for each regen station. Show all details of the site referenced to the mainline track, such as:**

- a. Table of contents or list of drawings.
- b. Building size and distance building is from all road crossings.
- c. Distance the regen building is from centerline of all adjacent tracks.
- d. Power supply required for the regen building, including locations relative to the mainline, voltages, above and below ground dimensions.
- e. Building access.
- f. Any other facility pertinent to the project.
- g. Location of fencing around the regen site, complete with dimensions.

**5.6.5.4 Include the following additional information on construction drawings submitted to the Railroad:**

- a. General notes along with the symbols and their meanings.
- b. A sheet showing all the special details.
- c. Small scale maps showing the overall cable route.
- d. Schematic showing regen sites.
- e. Sheet showing various methods of erosion control.
- f. Sheet showing details for backhoe trenching below a ditch, trench below a stream, direct burial for a ditch or creek crossing (plan and profile view).
- g. Sheet showing detail for placement of conduit in rock, including provisions for protecting Railroad ballast where it may be fouled by rock sawing operations.

- h. Include all boring and casing details. This includes, but is not limited to, dimensions, bore pit locations, and casing specifications.

**5.6.5.5 Show all measurements of each of the above from and at right angles to the centerline of the nearest mainline track. Show on the drawing the distance to the next facility as measured along the centerline of the main track.**

**5.6.5.6 Note: Mile markers found in the field are representative of actual mileposts found on railroad right-of-way maps. These are intended to provide general locations of facilities for location by railroad personnel. These mile markers are not accurately located on railroad maps and should not be used to establish railroad stationing. Show them on your drawings for reference only.**

**5.6.5.7 Submit As Built no later than 90 days after the completion of the installation of the fiber system on the Railroad's right-of-way.**

## **5.6.6 MAINTENANCE (2014) R(2017)**

### **5.6.6.1 Emergency Maintenance**

In the event emergency work is required, the following procedures apply:

- a. Call the railroad for emergency approval. The railroad will determine inspector/flagger needs based on site conditions.
- b. Call the State 1-CALL utility locate system (811) and the railroad for signal, fiber optic, and other underground utility locations.
- c. Perform emergency work only when appropriate flagging/inspection personnel are on site.
- d. Following the completion of emergency repairs to restore the fiber system to service, permanent restoration of the fiber system falls under the conditions of the following section.

### **5.6.6.2 Regular Maintenance**

**5.6.6.2.1 Notify the railroad prior to entering the railroad's right-of-way to repair or maintain the fiber system.**

**5.6.6.2.2 Call the State 1-CALL utility locate system (811) and the railroad for signal, fiber optic, and other underground utility locations.**

**5.6.6.2.3 The methods and procedures of all maintenance and repair work are subject to the consent and approval of the railroad. Submit to the railroad for approval plans for any work not previously detailed in the approved Construction Plans. Include (as applicable) drawings showing the plan, elevation, details, Railroad engineering stationing and methods of the proposed construction, installation, maintenance, repair, replacement or other work.**

**5.6.6.2.4 Fiber optic company crew locations and the number of crews may be restricted depending on railroad flagger availability, job site access and adequate radio communications.**

**5.6.6.2.5 Ensure that all representatives and employees of the fiber optic company and its contractor have been safety trained.**

**5.6.6.2.6** Follow the construction guidelines in Article 5.6.4 Construction (2014) R(2017) for any repair or maintenance work involving alteration of the fiber system.

**5.6.6.2.7** Never allow work to disrupt rail operations, including but not limited to, train operations, facilities maintenance and communications.

**5.6.6.2.8** Do not store or place equipment, supplies, materials, tools, or other items within 25 feet (7.62 meters) of the nearest track centerline unless the railroad approves such placement.

**5.6.6.2.9** Begin clean-up and restoration immediately upon completion of maintenance operations. Restore the railroad's right-of-way to the same condition as prior to the maintenance being performed.

**5.6.6.2.10** Remove abandoned fiber optic cable, see Article 5.6.4 Construction (2014) R(2017). If any of the fiber optic cable system is not removed, maintain records of the location of abandoned facilities.

### **5.6.7 DEFINITIONS (2014) R(2017)**

**Aerial Marker Sign:** A large sign, typically in the shape of a “V” that can be observed from the air, used for aerial location and inspection of the fiber system.

**As Built:** A drawing, depicting the actual location of the fiber cable in relation to the Railroad, having proper documentation for approval by the Railroad.

**Ballast:** The rock that supports the track and ties. This rock is groomed to keep the track in place, drain water away from the track and distribute the weight of trains to surrounding soil. **Do Not Disturb!**

**Branchline:** A secondary route to the Railroad that, for safety reasons, should be treated as a primary line.

**Bridge Attachment:** A Railroad approved method of affixing the fiber system to one of the Railroad's bridges.

**Bridge Backwall:** The topmost portion of an abutment above the elevation of the bridge bearing, functioning primarily as a retaining wall for the roadbed.

**Bridge Bearing:** The contact area and/or physical connection between bridge girders and bridge abutments or piers (Figure 1-5-7).

**Casing:** A secondary, independent, rigid covering used to protect the fiber system and the roadbed when installed under the Railroad's tracks.

**Car:** Any vehicle that can move on the track structure and is not self-propelled.

**Centerline of Track:** An imaginary line, that runs down the center of the two rails of a track.

**Conduit:** An independent tube or duct system used to house one or more fiber optic cables.

**Contractor:** Any fiber optic company authorized worker, other than a railroad employee, who is working on railroad property as a fiber optic company representative or agent.

**Cut:** A section of earth that has been excavated to allow construction of the Railroad's track where an embankment remains on one or both sides of the track.

**Directional Bore:** A method that controls the direction of boring and eliminates conventional bore pits allowing for a longer bore length than conventional methods.

**Dispatcher:** A Railroad employee responsible for authorizing all track use, including train movements and maintenance.

**Drawings:** A graphic representation of proposed fiber routes, detailed construction plans, or As Built.

**Dry Bore:** A method that utilizes conventional bore pits without using a liquid to displace soil.