

BICSI G1-17

ICT Outside Plant Construction and Installation: General Practices



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TABLE OF CONTENTS

PREFACE	vii
1 Introduction	1
1.1 Purpose	1
1.2 Categories of Criteria.....	1
2 Scope	1
3 Required Standards and Documents	3
3.1 Standards	3
3.2 Regulatory Documents.....	3
3.2.1 United States Code of Federal Regulations (CFR).....	3
4 Definitions, Acronyms, Abbreviations, and Units of Measurement	5
4.1 Definitions	5
4.2 Acronyms and Abbreviations.....	13
4.3 Units of Measurement.....	14
5 General Safety Considerations.....	15
5.1 Underground and Buried Utilities Locates	15
5.1.1 Overview	15
5.1.2 American Public Works Association (APWA) Uniform Color Code (ANSI Z535.1)	15
5.2 Pre Mobilization Project and Safety Briefing.....	15
5.3 Initial Job Site Arrival Assessment.....	16
5.4 On Site Set Up.....	16
5.5 On Site Work Tasks	16
5.6 Site Conditions	16
5.7 Personal Protective Equipment (PPE).....	16
5.7.1 Hardhat	16
5.7.2 Hand and Foot Protection	16
5.7.3 Eye and Face Protection	16
5.7.4 Hearing Protection Type.....	16
5.7.5 Clothing or Non-conductive Covering	17
5.8 Confined Spaces.....	17
5.8.1 Requirements.....	17
5.9 Qualifications of Personnel.....	17
5.9.1 Overview	17
5.10 Energized Electrical Equipment	18
5.10.1 Approach Distances	18
5.10.2 Climbing Spaces	18
6 Tools	19
6.1 Overview	19
6.2 Tools – General.....	19
6.2.1 Digging.....	19
6.2.2 Hardware and Cable Installation.....	19
6.2.3 Power Tools.....	19

6.3	Commonly Used Tools for Aerial Plant	19
6.3.1	Pole Setting Tools	19
6.3.2	Hardware and Cable Installation	19
6.3.3	Guy, Messenger Installation	20
6.3.4	Cable Hanging and Lashing	20
6.3.5	Power Tools	20
6.4	Commonly Used Tools for Underground and Direct-Buried Plant Plant	20
6.4.1	Digging Equipment	20
6.4.2	Power Tools	20
6.4.3	Safety Equipment	20
7	Aerial OSP Installation	21
7.1	General Aerial Safety Considerations	21
7.1.1	Job Site Arrival Safety Size Up	21
7.1.2	On Site Set Up	21
7.1.3	On Site Work Tasks	21
7.1.4	Work Site Demobilization	21
7.2	Aerial Pathway Safety Considerations	21
7.2.1	Rigging	21
7.2.2	Bucket Truck, Auger Truck, Boom Truck	21
7.2.3	Pole Climbing	21
7.2.4	Ladders	22
7.3	Underground and Direct-Buried Pathway Safety Considerations	22
8	Bonding and Grounding	23
8.1	Overview	23
8.2	Grounding	23
8.2.1	Overview	23
8.2.2	Recommendations	23
8.3	Bonding	23
8.3.1	Overview	23
8.3.2	Requirements	23
9	Right of Way	25
9.1	Overview	25
9.2	Types of Right of Way	25
9.3	Verification	25
9.4	Permits	26
10	Drawings and Specifications (Construction Documents)	27
10.1	Overview	27
10.2	Elements	27
10.3	Requirements	27
Appendix A	One Call Center Information (Informative)	29
A.1	One Call Centers	29
A.2	Click Before You Dig	30
A.3	Locations Without a Once Call Center	30

Appendix B	Commonly Encountered AHJ Definitions (Informative)	31
B.1	Introduction	31
B.2	Code of Federal Regulations (CFR)	31
Appendix C	Related Documents (Informative)	45

INDEX OF TABLES

Section 5 **Communications Infrastructure**

Table 5-1	APWA Uniform Color Code (ANSI Z535.1).....	15
Table 5-2	Approach Distances to Exposed Energized Overhead Power Lines and Parts.....	18

Appendix B **Commonly Encountered AHJ Definitions (Informative)**

Table B-1	Terms from Title 29 - Labor, Part 1910 - Occupational Safety and Health Administration	31
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PREFACE

Revision History

December 20, 2017 First publication of this standard, titled BICSI G1-17, *ICT Outside Plant Construction and Installation: General Practices*

Continuous Revision Notice

This standard has been placed under continuous revision. Comments and proposals for additions, changes and deletions of the contents of this standard can be submitted for consideration by the consensus body of this standard. Comments and proposals can be submitted by email to standards@bicsi.org, or mailed to the attention of the BICSI International Standards Program at 8610 Hidden River Parkway, Tampa, FL 33637, USA.

Translation Notice

This standard may have one or more translations available for the convenience of its readers. As translated text may contain inconsistencies when compared to the original text, if differences between the translation and the published English version exist, the English text shall be used as the official and authoritative version.

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1 Introduction

1.1 Purpose

This standard is part of a series of standards written to provide a common methodology for the construction and installation of telecommunication and data cabling used within the outside plant (OSP) environment, for varying applications, jurisdictions and projects.

This standard is intended primarily for, but not limited to:

- OSP cable installers
- OSP project designers and managers
- Construction and installation companies performing OSP work
- Authorities having jurisdiction (AHJ)

1.2 Categories of Criteria

Two categories of criteria are specified - mandatory and advisory.

- Mandatory criteria generally apply to protection, performance, administration, and compatibility; they specify the absolute minimum acceptable requirements.
- Advisory or desirable criteria are presented when their attainment will enhance the general performance of OSP infrastructure in all its contemplated applications.

Mandatory requirements are designated by the word *shall*; advisory recommendations are designated by the words *should*, *may*, or *desirable*, which are used interchangeably in this standard. When possible, recommendations and requirements were separated to aid in clarity.

2 Scope

This standard applies to the construction and installation of telecommunications facilities (e.g., cabling, support infrastructure) within aerial and underground pathways. The general practices defined within are applicable to communication media (e.g., balanced twisted-pair, optical fiber media) and the necessary supporting infrastructure.

The material found within this standard may not cover all requirements specific to the site or project requirements. This standard does not address electrical power system construction in an OSP environment.

Note: All references to standards, codes and guidelines within this manual are essentially US based. We advise that the reader, reference the relevant standards, codes, and guidelines in their own geographical area.

NOTICE: While this standard may include reference to applicable safety practices, this standard does not purport to address all safety issues associated with its use. It is the responsibility of the users of this standard to identify regulatory requirements and to establish necessary safety and health practices.

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3 Required Standards and Documents

3.1 Standards

The following standards and documents contain provisions that constitute requirements listed within this standard. Unless otherwise indicated, all standards and documents listed are the latest published version prior to the initial publication of this standard. Parties to agreement based on this standard are encouraged to investigate the possibility of applying a more recent version as applicable.

Where equivalent local codes and standards exist, requirements from these local specifications shall apply. Where reference is made to a requirement that exceeds minimum code requirements, the specification requirement shall take precedence over any apparent conflict with applicable codes.

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE C2, *National Electrical Safety Code*

National Fire Protection Association (NFPA)

- NFPA 70®, *National Electrical Code® (NEC®)*

Telecommunications Industry Association (TIA)

- ANSI/TIA-758-B, *Customer Owned Outside Plant Telecommunications Infrastructure Standard*

3.2 Regulatory Documents

The following are commonly encountered regulatory documents, and is not intended to be a complete list of all applicable regulatory documents for a particular site.

3.2.1 United States Code of Federal Regulations (CFR)

Department of Labor; Occupational Safety and Health Administration (OSHA)

- 29 CFR Part 1910.67, Vehicle-mounted Elevating and Rotating Work Platforms.
- 29 CFR 1910 Subpart I, Personal Protective Equipment
- 29 CFR Part 1910.146, Permit-required Confined Spaces
- 29 CFR Part 1910.268, Telecommunications
- 29 CFR Part 1910.269, Electric Power Generation, Transmission, and Distribution
- 29 CFR Part 1910.303, Electrical, General Requirements
- 29 CFR Part 1926, Safety and Health Regulations For Construction

Department of Transportation, Federal Highway Administration (FHA)

- 23 CFR Part 655, Traffic Operations
- *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)*

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4 Definitions, Acronyms, Abbreviations, and Units of Measurement

4.1 Definitions

For the purposes of this document, the following terms and definitions apply. Some terms and definitions may also be represented by an acronym as listed in Section 4.2

CAUTION: The definitions presented within Section 4.1 are written to provide a general definition. Some AHJs (e.g., US Occupational Safety and Health Administration) may have a different definition for a term that includes additional conditions or requirements. While Appendix C contains a listing of common AHJ definitions, it is the user's responsibility to verify the exact definition being used to define applicable AHJ requirements.

acceptable entry conditions	The conditions that must exist within a space to allow entry and to ensure that employees involved with a space entry can safely enter into and work within the space. NOTE: Acceptable entry condition may vary because of the type of space (e.g., permit-required, confined).
acceptance test	A test or set of tests performed to demonstrate satisfactory completion of a predetermined task or group of tasks on which project acceptance is dependent.
access provider	The operator of any facility that is used to convey telecommunications signals to and from a customer premises.
administration	The method for labeling, identification, documentation and usage needed to implement moves, additions and changes of the telecommunications infrastructure.
aerial cable	Telecommunications cable installed on aerial supporting structures (e.g., poles, sides of buildings, other structures).
aerial entrance	An entrance facility where the cables providing service to a building are placed overhead, and the entry point is located above the ground level.
aerial plant	The components of aerial infrastructure, including poles, strand, guys, anchors, cables, pole line hardware, etc.
air terminal	A lightning strike termination device that is a point receptor for attachment of flashes to the lightning protection system. A typical air terminal is formed from a tube or solid rod. An air terminal also may be known as a lightning rod.
all dielectric self-support	A type of aerial optical fiber cable that is nonconductive / nonmetallic, and requires no messenger strand for installation.
alternate entrance	A supplementary entrance facility into a building using a different routing to provide diversity of service, and for the assurance of service continuity.
alternate route	A secondary communications path used to reach a destination. Also see diverse route.
anchor	A device designed to be used with elements that can be placed under tension (e.g., wire, guys) or compression (e.g., beams, poles) to support or securely hold equipment or structures in place. Ground anchors are typically used within the OSP environment.
anchor rod	In an outside plant (OSP) environment, the portion of an anchor assembly (typically a rod having a connecting eye) that extends from anchor assembly below ground level to a point above ground level.
attachment	The physical connection of a communications cable to a pole or in an underground conduit.

attachment agreement	An agreement that allows one party to share pole space and the pathway between the poles, when the pole is owned by another party. These agreements may describe responsibilities for items such as maintenance, sharing of costs, fees, and space/position allocation. For aerial outside plant, this may also be referred to as a joint-use agreement.
attendant	An individual stationed outside one or more spaces who monitors the authorized entrants and who performs all attendant's duties assigned according to employer, site, and AHJ 's requirements on spaces.
authorized entrant	Personnel who are authorized to enter a space according to employer, site, and AHJ 's requirements.
backfill	The earth or other approved materials placed in cable or conduit trenches, holes, or voids around poles to return the disturbed area back to grade level (earth line) and a finished state.
bend radius	The maximum radius of curvature that a media can bend without signal degradation. For example, optical fiber cabling exceeding the cables' bend radius, determined by the cables construction and contents, may cause excess attenuation due to light leaking from the core.
bending moment	The totality of forces acting perpendicular to a pole, tending to cause the pole to bend. Bending moments are usually caused by unbalanced horizontal tension loads, often caused by the changes in direction of the cable run(s). This load can be calculated as the algebraic sum of the moments above the neutral axis of any cross section of the pole.
berm	A mound or wall of earth, narrow shelf, path, or ledge, or the stabilized or paved area of a road shoulder.
bonding	The permanent joining of metallic parts to form an electrically conductive path that will ensure electrical continuity and the capacity to conduct safely any current likely to be imposed.
bonding conductor	A conductor used specifically for the purpose of bonding.
breaking load	The tension (load) that causes fracture in a tensile, compression, flexure, or torsion test. Also called breaking strength.
bucket lift	A personnel lift composed of a large bucket mounted on the end of an extendable arm in which the user stands.
building entrance	The point of emergence of unlisted OSP cabling media into the interior of a building or premise.
buried marker ball	A sealed passive electronic device that activates and transmits when it receives a locating signal. It comes in several configurations (e.g., ball, cylinder, disk, surface marker) and is color coded to indicate a particular utility transmit frequency.
cable	(1) An assembly of one or more insulated conductors or optical fibers within an enveloping sheath. (2) An assembly of one or more cable units of the same type and category in an overall sheath. It may include overall screen. (3) The act of installing cable.
cable dip	The aerial cable that is transitioned down a utility pole and placed below grade, typically occurring at the pole closest to the building. Also called a pole dip.
cable head	The end of a cable attached to the pulling device.
cable marker post	An aboveground stake or post with an attached sign indicating the existence of underground facilities in the area and the direction of the facilities.

cant hook	A hand held hook on a handle, used for turning wood poles to align predrilled holes in the pole into the correct position relative to the direction of the line.
catenary wire	See support strand (messenger).
concrete-encased grounding electrode	An electrode encased in concrete that is in direct contact with the earth. Also called an <i>Ufer ground</i> .
conduit	(1) A raceway of circular cross section. (2) A structure containing one or more ducts.
cone	A safety marker, typically brightly colored, may be orange or green in color, that is used to designate a secure off-limits area for non-workers.
confined space	A space that is large enough and so configured that an employee can fully enter and perform assigned work, but has limited or restricted access. Confined spaces are not designed for continuous employee occupancy. NOTE: Examples of confined spaces include: building crawl spaces, vaults, maintenance holes, trenches, and pits.
control point	A physical location on a feeder route located by precise surveying that is used to measure existing facilities as well as present and future requirements. These control points are based on design judgment, which usually involves cable size changes.
corrosion area	A space that is subject to a high degree or risk of deterioration to elements.
crimp	The act of permanently clamping connectors to a conductor or optical fiber cable.
crossover	The junction unit at the point of intersection of two cable support strands, cables, raceways, or conduits (pathways) on different planes.
cut	An excavation or the removal of earth across a roadway, driveway, parking lot, etc.
cut sheet	(1) A listing of optical fiber strands or copper cable pair assignments used to specify desired circuit connections in a splice or cross-connect. This listing also can serve as the as-built of a splice or cross-connect field. (2) A cable documentation that shows the existing cable plant, new cable plant, and cross-connects that will be added or relocated during cutover. (3) A document that provides product specifications. Typically provided by product manufacturers and may include product drawings. Also called a specification sheet (spec sheet).
deadend	A type of clamp attachment that is used in outside plant (OSP) aerial cabling at the end of an OSP cable run or when the pull on a corner exceeds 15 m (50 ft.). Deadends and corners in pole lines usually require guying to support the cable or wire facility.
demarcation point (demarc)	The point where a utility or service (e.g., public switched telephone network) are connected to a customer's premises infrastructure (e.g., wires, cabling)
direct-buried cable	A telecommunications cable designed to be installed under the surface of the earth in direct contact with the soil.
down conductor	A metallic conductor running vertically from an air terminal or equalizing conductor to the ground. Down conductors are mounted on the exterior of the structure supporting the air terminal or equalizing conductor.
down guy	A steel messenger (strand) that connects the suspension strand, span guy, or other items of aerial plant to an anchor and rod.
drip loop	The length of cable, usually on the exterior of a building, placed above the entry hole of the building, extended to below the entry hole, and looped back up to the entry hole of the structure, intended to impede moisture infiltration.