Essentials of Data Center Projects

1st Edition

BICSI®

Essentials of Data Center Projects

1st Edition

We welcome all comments about this publication. If you have any questions about BICSI and its services, please contact our office at 800.242.7405 (USA/Canada toll free); +1 813.979.1991; fax +1 813.971.4311; e-mail bicsi@bicsi.org; website www.bicsi.org.

BICSI®, Tampa, FL 33637

First edition published 2019
First printing May 2019
Printed in the United States of America

ISBN (print) 978-1-928886-80-8
ISBN (Electronic) 978-1-928886-81-5

BICSI World Headquarters
8610 Hidden River Parkway
Tampa, FL 33637-1000 USA
Tel.: +1 813.979.1991 or
Tel.: 800.242.7405 (USA & Canada toll-free)
Fax: +1 813.971.4311
E-mail: bicsi@bicsi.org
Website: www.bicsi.org

This publication is not a single source document but a compendium of many sources of ICT industry-related terminology.

The information contained in this publication includes, but is not limited to, national and international codes, de jure and de facto standards, and industry-accepted best practices terminology.

BICSI recommended best practices are industry-established best practices and not specifically developed by BICSI. When necessary, BICSI will select and recommend widely used and acceptable methods for the performance of a particular task or process based on numerous factors, including, but not limited to, widespread field acceptance, manufacturer's recommended methods, and safety.

.

WARNING

It is the responsibility of the user of BICSI's *Essentials of Data Center Projects,* 1st edition, to determine the use of the applicable safety and health practices (e.g., in the United States, Occupational Safety and Health Administration [OSHA], *National Electrical Code*® [*NEC*®], *National Electrical Safety Code*® [*NESC*®]) associated with information and communications technology (ICT) installation and design practices. BICSI shall not be liable to the purchaser or any other entity with respect to any liability, loss, or damage caused directly or indirectly by application or use of this publication. No project is so important nor any completion deadline so critical to justify nonconformance to ICT industry standards. This publication does not address safety issues associated with its use. It is the ICT industry professional's responsibility to use established and appropriate safety and health practices and to determine the applicability of all regulatory issues.

About BICSI ... Advancing Information and Communications Technology

BICSI Vision Statement

BICSI® is the worldwide preeminent source of information, education, and knowledge assessment for the constantly evolving information and communications technology (ICT) industry.

BICSI Mission Statement

BICSI's mission is to:

- Lead the ICT industry with excellence in publications, education, and knowledge assessment.
- Advance our members' ability to deliver the highest quality products and services.
- Provide our members with opportunities for continual improvement and enhanced professional stature.

BICSI 2018-19 Board of Directors

President: Jeffrey Beavers, RCDD, OSP, CFHP

President-Elect: Todd W. Taylor, RCDD, NTS, OSP

Secretary: Carol Everett Oliver, RCDD, ESS

Treasurer: Robert "Bob" Erickson, RCDD, NTS, OSP, WD, RTPM

Global Region Director: Rick Giordia, RCDD, RTPM, DCDC, CT, PE

Canadian Region Director: Fernando Neto, RCDD

U.S. North-Central Region Director: Chris Scharrer, RCDD, NTS, OSP, CTS-D

U.S. Northeast Region Director: Matthew Odell, RCDD

U.S. South Central Region Director: Mark Reynolds, RCDD

U. S. Southeast Region Director: Lee Renfroe, RCDD, ESS, TECH

U.S. Western Region Director: Pat McMurray, RCDD, NTS, OSP, DCDC, PMP

BICSI Executive Director & Chief Executive Officer: John D. Clark Jr., CAE

Technical Publications

Become a member and you will receive substantial discounts on BICSI's highly acclaimed manuals and standards—long considered the definitive reference source of the industry. BICSI's manuals serve as valuable references and study tools for BICSI courses and exams. BICSI manuals and special ICT publications are based on global best practices that follow and, in many cases, exceed the requirements of recognized international codes, standards, and regulations.

Our most popular publications include the *Telecommunications Distribution Methods Manual* (*TDMM*), *Outside Plant Design Reference Manual* (*OSPDRM*), *Information Technology Systems Installation Methods Manual* (*ITSIMM*), *Telecommunications Project Management Manual (TPMM),* and many other ICT specialty publications.

Standards include ANSI/BICSI 001*, Information and Communication Technology Systems Design and Implementation Best Practices for Educational Institutions and Facilities;* ANSI/BICSI 002*, Data Center Design and Implementation Best Practices;* ANSI/BICSI 003*, Building Information Modeling (BIM) Practices for Information Technology Systems;* ANSI/BICSI 004*, Information Communication Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities;* ANSI/BICSI 005*, Electronic Safety and Security (ESS) System Design and Implementation Best Practices;* ANSI/BICSI 006*, Distributed Antenna System (DAS) Design and Implementation Best Practices;* ANSI/BICSI 007*, Information Communication Technology Design and Implementation Practices for Intelligent Buildings and Premises;* ANSI/BICSI 008*, Wireless Local Area Network (WLAN) Systems Design and Implementation Best Practices;* BICSI 009*, Data Center Operations and Maintenance Best Practices;* ANSI/BICSI N1*, Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure;* ANSI/BICSI N2*, Practices for the Installation of Telecommunications and ICT Cabling Intended to Support Remote Power Applications;* BICSI G1*, ICT Outside Plant Construction and Installation: General Practices; and* BICSI G2.2*, ICT Outside Plant Construction and Installation: Aerial Cable Installation.*

For a complete list of member benefits, visit www.bicsi.org.

Join BICSI Today!

BICSI membership is open to individuals and corporations serving the ICT and building industries. Join BICSI and combine your expertise with your colleagues in the network of ICT professionals. Complete BICSI information is available upon request. For a membership application or other information, contact:

Membership
8610 Hidden River Parkway
Tampa, FL 33637-1000 USA
Tel.: 800.242.7405 (USA/Canada toll-free)
Tel.: +1 813.979.1991
Fax: +1 813.971.4311
E-mail: bicsi@bicsi.org
Website: www.bicsi.org

Acknowledgments

BICSI's Technical Information and Methods (TI&M) Committee serves to coordinate the information within all of BICSI's technical publications. BICSI officers, membership, and Technical Publications and Design staff wish to thank the TI&M Committee and its many volunteer contributors who helped in the development of the first edition of BICSI's *Essentials of Data Center Projects* (*EDCP*).

A data center can be described as a room with several servers, but the reality is that a data center is a complex facility, with interdependencies on multiple disciplines, systems, and equipment. As the complexity of a data center continues to increase, so does the project that enables its construction.

The following dedicated TI&M Subject Matter Experts (SMEs) provided the key expertise required for the development of this publication's technical content:

TI&M Chair:	**Michael Collins**, RCDD, RTPM; *AT&T*
TI&M Vice-Chair:	**Robert B. Herring, Jr.**, RCDD, OSP; *Parsons Transportation Group*
***EDCP* 1st Edition SMETL:**	**Phil Janeway,** RCDD; *JDH Contracting*
***EDCP* 1st Edition Contributors:**	**Richard S. Anderson**, RCDD, CDT, CDCT, CIBET; *Rosendin Electric Inc.*
	Jonathan Jew, *J&M Consultants*
	Sue LeMay, RCDD; *ComNet Communications*
	John Romanski, OSP, WD, ESS, RTPM, DCDC; *Precision Contracting Services, Inc.*
	Jeff Silveira, RITP, CAE, *BICSI Director of Standards*

The following BICSI Professional Development staff members produced this publication at BICSI World Headquarters, Tampa, FL:

Vice President of Professional Development:	Gail Moore-Swaby
Director of Publications:	Clarke Hammersley
Director of Standards:	Jeff Silveira
Technical Editors:	Allen Dean Jeff Giarrizzo Clarke Hammersley Jeff Silveira
Design and Production:	John Fitzek, Senior Publications Designer

BICSI Policy for Numeric Representation of Units of Measurement

BICSI technical manuals primarily follow the modern metric system, known as the International System of Units (SI). The SI is intended as a basis for worldwide standardization of measurement units. With the exception of conduit and plywood measurements, units of measurement in this publication are expressed in general and approximate SI terms, followed by an equivalent imperial (U.S. customary) unit of measurement in parentheses (exceptions are listed below):

In general, approximate (soft) conversions are used in this publication and are denoted with the approximate symbol (≈) in front of the metric number. Approximate conversions are considered reasonable and practicable; they are not precise equivalents, but are considered as "industry friendly." Example: ≈15 m (50 ft), not the hard conversion of ≈15 m (49.2 ft).

In some instances, equivalents (hard conversions) may be used when it is a:

- Manufacturer requirement for a product (e.g., conduit, plywood sizes).
- Standard or code requirement.
- Safety factor.

- In general, approximate SI units of measurement are converted to an imperial unit of measurement and placed in parentheses. Exception: When the reference material from which the value is pulled is provided in imperial units only, the imperial unit is the benchmark.
- For metric conversion guidelines, refer to IEEE/ASTM SI 10, American National Standard for Metric Practice.
- Trade size is approximated for both metric and nonmetric purposes. Example: ≈100 metric designator (4 trade size).
- In some instances (e.g., optical fiber media specifications), the physical dimensions and operating wavelengths are designated.

Comments? More Information?

We welcome your comments about BICSI's *Essentials of Data Center Projects,* 1st edition. To do so, simply complete the Reader's Comment Form on the last page of this Preface, attach your comments to the form, and return it to BICSI. Our goal is to make BICSI publications the most important design and reference tools in your office.

You can also contact us directly by calling, faxing, or e-mailing us at:

BICSI World Headquarters
8610 Hidden River Parkway
Tampa, FL 33637-1000 USA
Tel.: 800.242.7405 (USA/Canada toll-free)
Tel.: +1 813.979.1991
Fax: +1 813.971.4311
E-mail: bicsi@bicsi.org

Reader's Comment Form

Essentials of Data Center Projects, 1st Edition

You may use this form to communicate your comments about this publication, its organization, or the subject matter. Your comments will be sent to BICSI's Technical Information and Methods (TI&M) Committee for review and action, if any is deemed appropriate. Please attach a separate page containing your comments.

Please complete the following information:

last name	first name	middle initial	date
company name			
mailing address			
city	state/province	zip/postal code	country
daytime phone	fax	e-mail	

Thank you for your comments.

Send to: Attn: BICSI's *Essentials of Data Center Projects*, 1st Edition
User Response
BICSI
8610 Hidden River Parkway
Tampa, FL 33637-1000 USA

or fax to: +1 813.971.4311

or scan and e-mail to: chammersley@bicsi.org

Office Use Only

Response from TI&M Committee:

Class A ☐ Class B ☐ Class C ☐

TI&M Committee chair signature — date

TI&M Manual SMETL signature — date

Table of Contents

Figures

Chapter 1: Data Center Concepts

Chapter 2: Project Planning

Chapter 3: Project Implementation

Chapter 4: Project Management Essentials

Chapter 5: Project Documentation

Tables

Chapter 1: Data Center Concepts

Chapter 4: Project Management Essentials

Chapter 1
Data Center Concepts

Chapter 1 introduces the BICSI Class methodology for creating the preliminary concept of a data center for most applications. Use of multiple data centers and a data center outsourcing model are also provided as considerations for addressing potential owner or client needs.

Chapter 2
Project Planning

Chapter 2 describes the planning phase of a data center build, which includes the activities from the request for proposal (RFP) through the design phase.

Chapter 3
Project Implementation

Chapter 3 supplies information related to data center project implementation, beginning with the bidding process, moving through construction and commissioning, and leading to project closeout.

Chapter 4
Project Management Essentials

Chapter 4 provides a summary of project management concepts and elements that are part of a data center project. Content includes project management fundamentals, project management tools, and stakeholder relations.

Chapter 5
Project Documentation

Chapter 5 provides an overview of the applicable elements of project documentation. It includes descriptions of construction documents (e.g., drawings, specifications) and other documentation, such as logs, submittals, and forms that are used during the execution of a project.

Glossary

This Glossary provides concise and up-to-date terminology pertaining to data center projects. It includes specific definitions, terminology, and acronyms used in the execution of these projects.