



Technical Specifications in Construction Projects

UPR - Recinto Universitario de
Mayagüez

jueves, 2 de marzo de 2017

Objetivos

01. Relevancia e impacto de las especificaciones en la construcción
02. Formatos disponibles
03. Aplicaciones
04. Referencia futura



Agenda

01. ¿Que es una especificación?
02. Relación entre los planos (dibujos) y el Manual del Proyecto
03. Formatos
04. Métodos
05. Lenguaje
06. Divisiones
07. Usando *Master Guide*
08. Certificaciones
09. Referencias



01

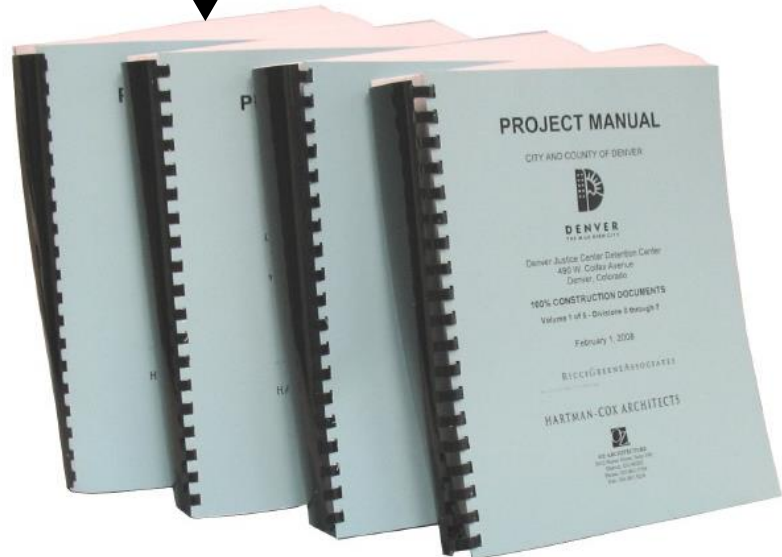
¿Qué es una especificación?

Latin *specificare*: “mencionar particularmente”

4 documentos en construcción

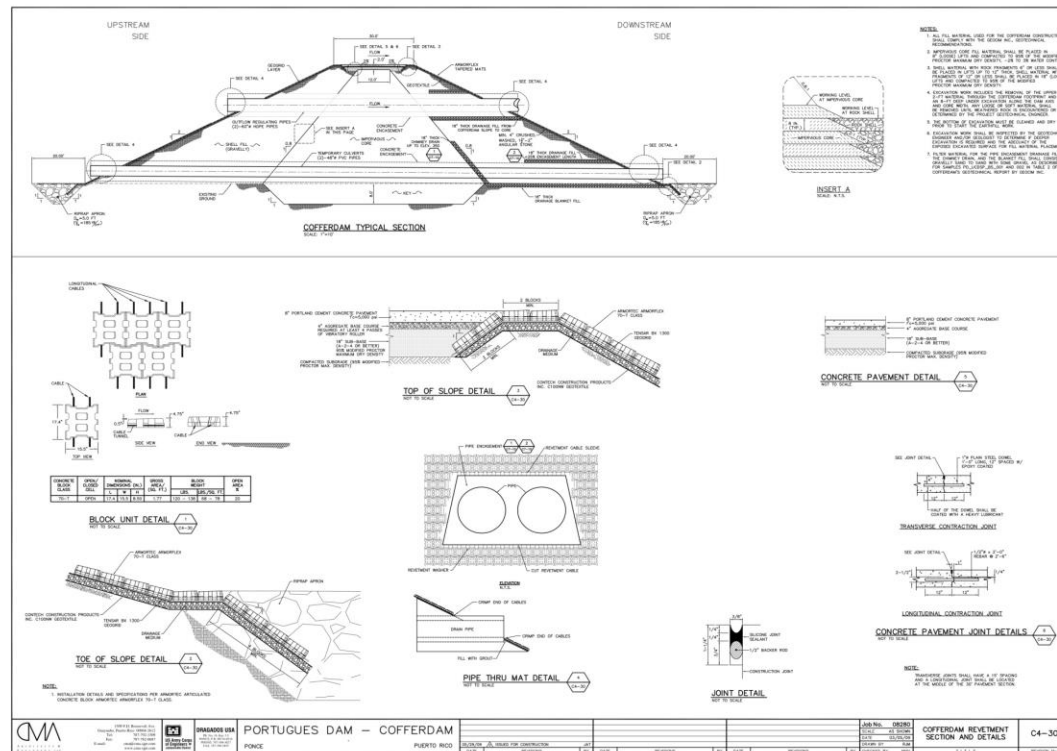
Todos son documentos legales:

1. Requisitos de licitación
2. Requisitos del contratación
3. **Especificaciones**
4. Planos (dibujos)



Planos (dibujos)

- Incluyen documentos gráficos y muestran la localización de productos, materiales y equipo.
- Describen los requisitos **cuantitativos** de construcción.



Las especificaciones



- Describen lo que se ha de construir, explicando el concepto e idea de una manera directa y fácil de entender.
- Proveen los requisitos **cualitativos** de construcción.



Un edificio colapsa y mata a una persona en Shanghai.

SECTION 11 52 13 - ELECTRICALLY OPERATED PROJECTION SCREENS

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER AND MODEL - ELECTRICALLY OPERATED PROJECTION SCREENS

A. Vutec Corporation;

1. Flush Ceiling Mount Screens with Service & Trap Door; Model: Lectric II.
2. Motorized Screen for Wall; Model - Lectric I.

2.2 COMPONENTS - CEILING RECESSED PROJECTION SCREENS

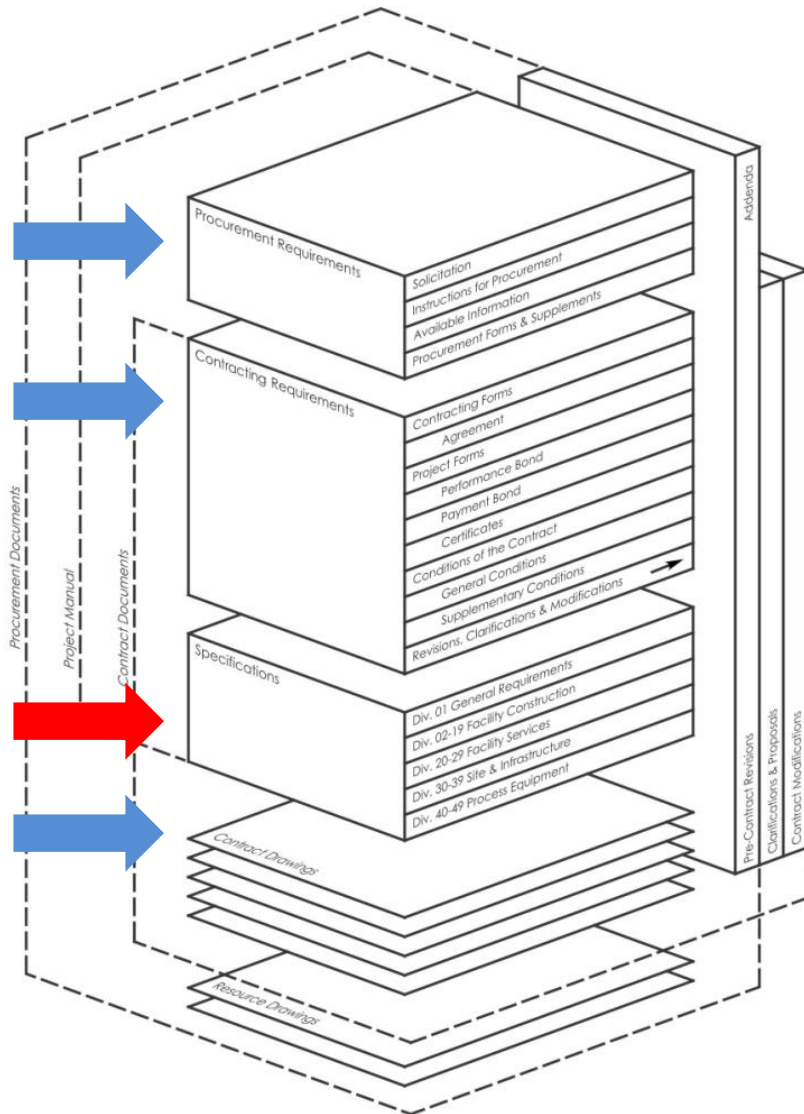
A. Ceiling Recessed Electrically Operated Projection Screens.

1. Screen Operation: Electrically operated, UL and ULC listed, retractable and with metal roller.
2. Motors: Housed inside metal roller and including automatic thermal overload protection, integral gears, capacitor and electric brake to prevent coasting.
 - a. Type: 3-wire with ground with quick connect male plug-in connector, permanently lubricated, quick reversal type designed for mounting inside roller.

02

Relación entre los planos (dibujos) y el manual del proyecto

¿Qué es un Manual del Proyecto?

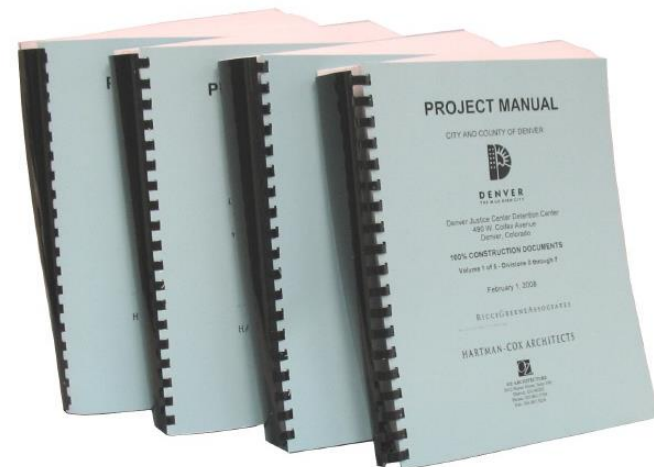
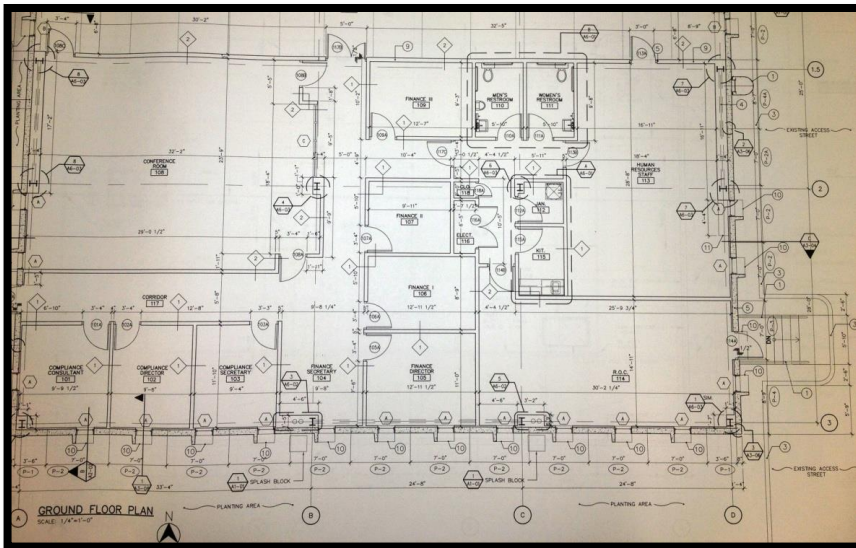


- Las especificaciones están en el **Manual del Proyecto**.
- El Manual del Proyecto también incluye documentos de licitación y contrato.

Planos vs. Especificaciones

Comunicación continua y coordinación de la información entre miembros del Equipo del Proyecto para:

- Reducir errores
- Omisiones
- Duplicaciones
- Inconsistencias entre el Manual del Proyecto y los Planos.



Planos vs. Especificaciones



En las especificaciones:

company official. Manufacturer's warranty is in addition to, and does not limit, other rights Owner may have under Contract Documents.

B. Warranty: Commencing on date of Substantial Completion.

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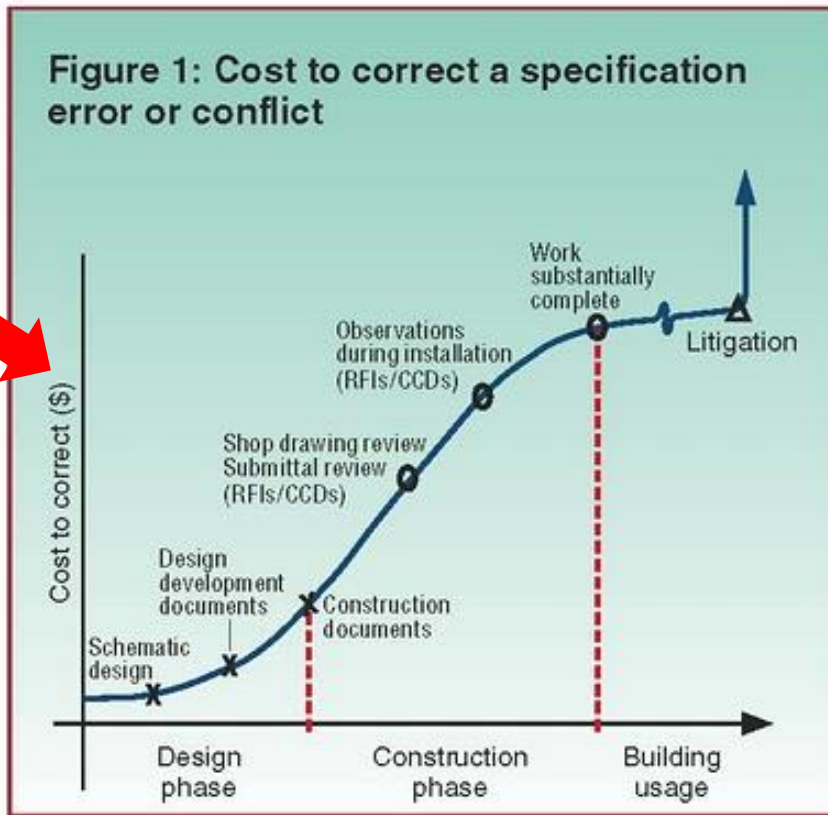
En los planos:

⑦ COORDINATE OPENINGS IN GYPSUM BOARD WALL WITH MECH. DWGS. No. H2-01 & H2-02 FOR TRANSFER GRILLES, PLENUM OPENING ETC PROVIDE OPENINGS NOT SHOWN WHERE IT IS REQUIRED FOR MECHANICAL FIXTURES. PENETRATIONS THRU FIRE WALLS TO MAINTAIN FIRE RATING INTEGRITY AT POINTS OF PENETRATIONS.

⑧ AUDIOVISUAL EQUIPMENT TO BE SUPPLIED BY TENANT AND INSTALL BY GENERAL CONTRACTOR. EXCEPT ELECTRICALLY OPERATED PROJECTION SCREENS THAT SHALL BE FURNISHED AND INSTALLED BY GENERAL CONTRACTOR REFER TO SECTION 11 52 13

La falta de coordinación es costosa

- Los dibujos y especificaciones se complementan.
- “Say it once and only once.”



Graph from "Using Spec Writers Properly"

by Derek B. McCowan, PE

June 2010 issue of Consulting-Specifying Engineer



03

Formatos

Hay 4 Formatos



New Symphony Hall, Santurce, P.R.

- Organizan de una manera estandarizada toda la información.
- Pueden ser usados en diferentes aplicaciones.
 - UniFormat
 - MasterFormat
 - SectionFormat
 - PageFormat

UniFormat™

- Se basa en sistemas y ensamblajes:

Project Description

Introduction

A Substructure

B Shell —————> **B10 Superstructure**
B20
B30

C Interiors

D Services

E Equipment and Furnishing

F Special Construction and Demolition

G Building Site Work

Z General



Pfizer 103 Bldg. Barceloneta, P.R.

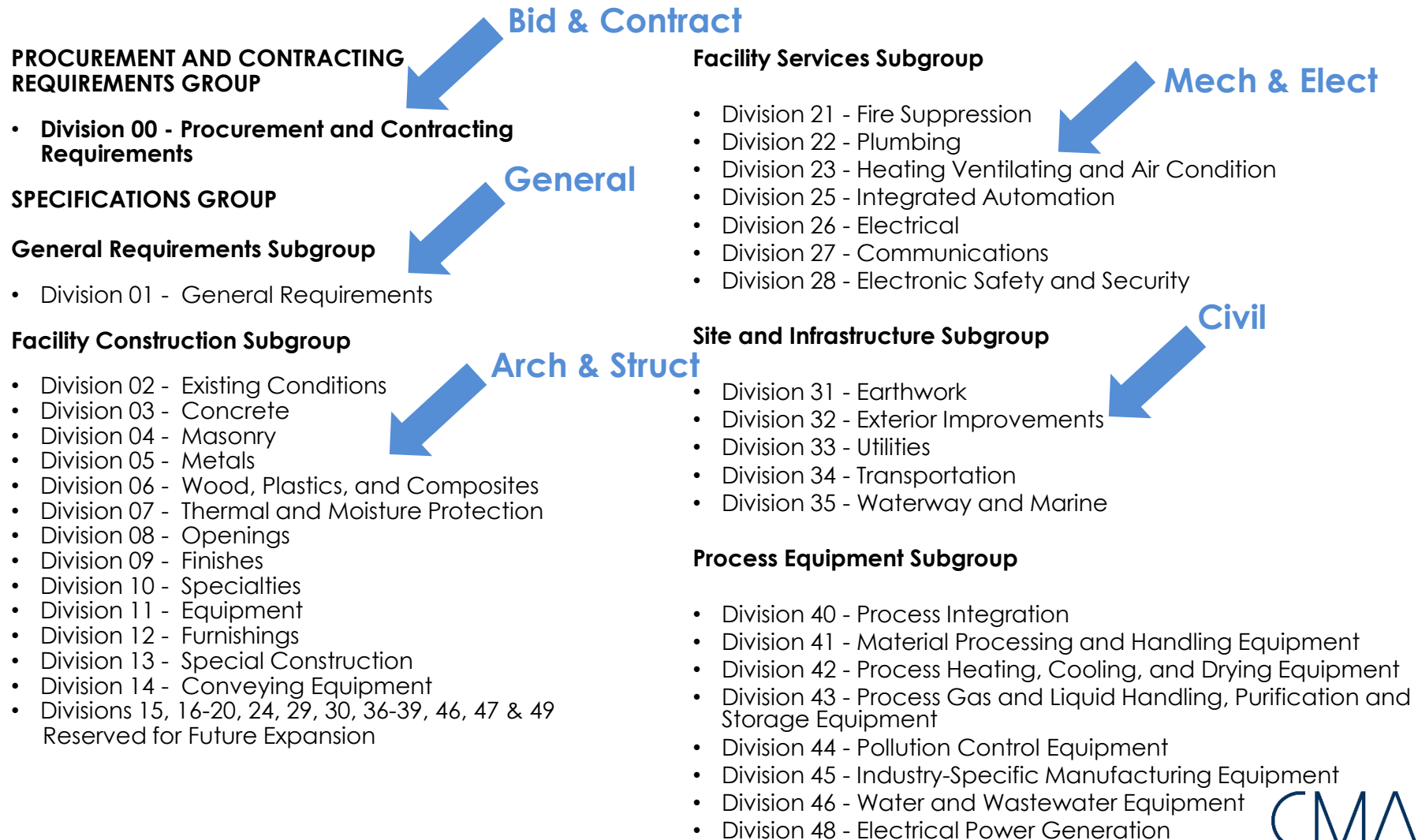
MasterFormat™

- Se basa en las actividades de construcción
- Se divide 2 grupos:
 - *Procurement and Contracting Requirements*
 - *Specifications*
- En total son **48 divisiones**
- Establecido por *Construction Specifications Institute* (CSI)

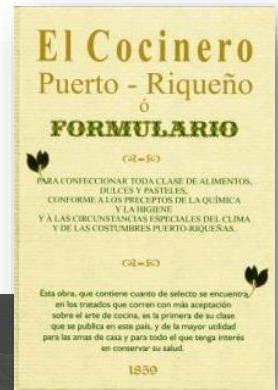


Museo de Arte de Ponce Annex Building: Project Management

MasterFormat™ 2004



Cada división usa **SectionFormat™**



PART 1 – GENERAL

1.1 Article

1.1.1 Paragraph

1.1.1.1 Subparagraph

PART 2 – PRODUCTS

2.1 Article

2.1.1 Paragraph

2.1.1.1 Subparagraph

PART 3 – EXECUTION

3.1 Article

3.1.1 Paragraph

3.1.1.1 Subparagraph



WWTP Expansion Guanica

PageFormat™ es la presentación

Top and Bottom margins: 1/2-inch

Owner
San Juan, Puerto Rico

Project Name

Size: 12 cpi

PART 2 - PRODUCTS

2.1 ACCEPTANCE MANUFACTURER - HYDRAULIC CEMENT UNDERLAYMENT

A. Ardex Engineered Cements, Inc., Type: Ardex K-15. Self-Leveling Underlayment Concrete.

1. Underlayment: Cementitious based mix.

2. Primer: Ardex P-51 primer.

a. Primer shall have a VOC Content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D.

Left and Right Margins: 1-inch

3.3 PRIMING - CONCRETE SUBSTRATES

A. Primer for standard absorbent concrete subfloors:

1. Mix ARDEX P-51 1:1 with water and apply evenly with a soft pushbroom.

2. Do not leave any bare spots.

3. Remove all puddles and excess primer.

Page No.

Hydraulic Cement Underlayment
CMA Architects & Engineers LLP

03 54 16-3

Issued for Construction - Rev. 0
November 8, 2012

Date

Otros formatos



PR-22 Autopista Jose de Diego

- Gobierno federal, estatal y municipios usan **MasterFormat™** y **SectionFormat™**
- Los números de las divisiones, títulos y formatos pueden variar.



Ejemplo: ACT



Commonwealth of Puerto Rico
DEPARTMENT OF TRANSPORTATION
AND PUBLIC WORKS

PUERTO RICO HIGHWAY AND
TRANSPORTATION AUTHORITY

STANDARD SPECIFICATIONS
FOR
ROAD AND BRIDGE CONSTRUCTION

2005

CONSTRUCTIONS SPECIFICATIONS

150	Survey and Stake-Out	108
151	Mobilization	113

EARTHWORK (SERIES 200)

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203	Excavation and Embankment	130
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BASE COURSES (SERIES 300)

301	Subbase Course	223
304	Aggregate Base Course	231
305	Lean Concrete Base	238

http://www.dtop.gov.pr/carretera/det_content.asp?cn_id=271

04

Métodos

¿Como describo lo que quiero?

Existen 4 métodos:

- **Descriptive**
- **Performance**
- **Reference Standard**
- **Proprietary**



Ejemplo: un generador eléctrico



Diesel Electrical Generator:
900 kVA, 50 Hz, 720 kW, 400 Volts

Electrical Generator Unit:
720 kW, Green Power, Hybrid

Diesel Electrical Generator:
With insulation per AS 1359 & ISO 1356

Diesel Electrical Generator:
Caterpillar; model CAT 3412C; 720 kW.

Descriptive

- Materiales y métodos
- No incluye manufactureros
- Requiere conocimiento técnico

Performance

- Criterio de cumplimiento
- El contratista presenta opciones
- Fomenta la innovación

Reference Standard

- Productos o procesos establecidos por estándares reconocidos
- Edite con cuidado

Proprietary

- Nombre de marcas y modelos específicos
- No hay lugar a substituciones

?

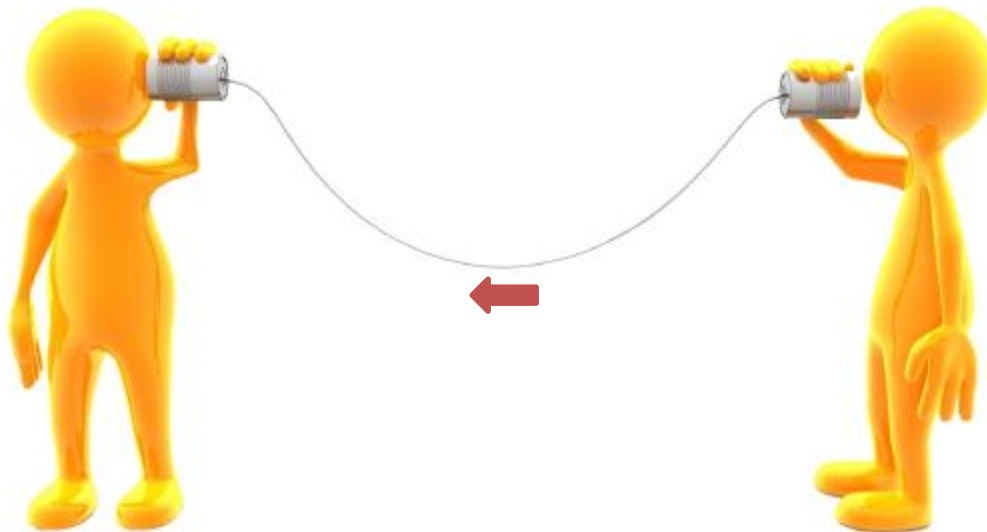
abiertas o cerradas

05

Lenguaje

Las 4'Cs para ser efectivo

- **Clear**
- **Concise**
- **Correct**
- **Complete**



Tramita claramente la directriz

Indicative

En voz pasiva, usa el “shall” en casi todas las oraciones. Crear oraciones largas y monótonas.

- ✗ Adhesive shall be spread with notched trowel.
- ✗ Equipment shall be installed plumb and level.
- ✗ Two coats of paint shall be applied to each exposed surface.

Imperative

Empieza con el verbo, que claramente define la acción. Es conciso y directo.

- ✓ Spread adhesive with notched trowel.
- ✓ Install equipment plumb and level.
- ✓ Apply two coats of paint to each exposed surface.

Vocabulario



Pfizer, Barceloneta

- **Furnish, Install, and Provide**
- **Replace** and **Provide New**
- **Shall** and **Will**
- No use: 
 - “Must”
 - Abreviaciones
 - Negrilla (“bold”)

¿Qué mas no va?



- **No use “underlines”**
- **No use estos símbolos:**
 - % for percent
 - ° for degree
 - + for plus
 - - for minus
 - / for per
 - @ for at
 - “”
 - (...)
- **Ni estos artículos:**
 - Any
 - All
 - Such
- **No use estas frases:**
 - As allowed
 - As appropriate
 - As approved
 - As directed
 - As indicated
 - As necessary
 - As required
 - Etc.
 - To the satisfaction of the Architect/Engineer
 - As per
 - In a workmanlike manner
 - Also
 - Shall function as intended

Términos con mayúscula

- Engineer
- General Conditions
- Government
- Owner
- Paragraph
- PART
- Project
- Project Manual
- Agreement
- Architect
- Article
- Change Order
- Contract
- Contracting Officer
- Contractor
- Division
- Drawings
- ROOM NAMES
- Section
- Shop Drawings, Product Data, and Samples
- State or Commonwealth
- Supplementary Conditions
- Work

Lenguaje con el gobierno

- Las agencias de gobierno requieren **especificaciones no restrictivas**.
- La mayoría prohíbe la inclusión de manufactureros o modelos específicos.

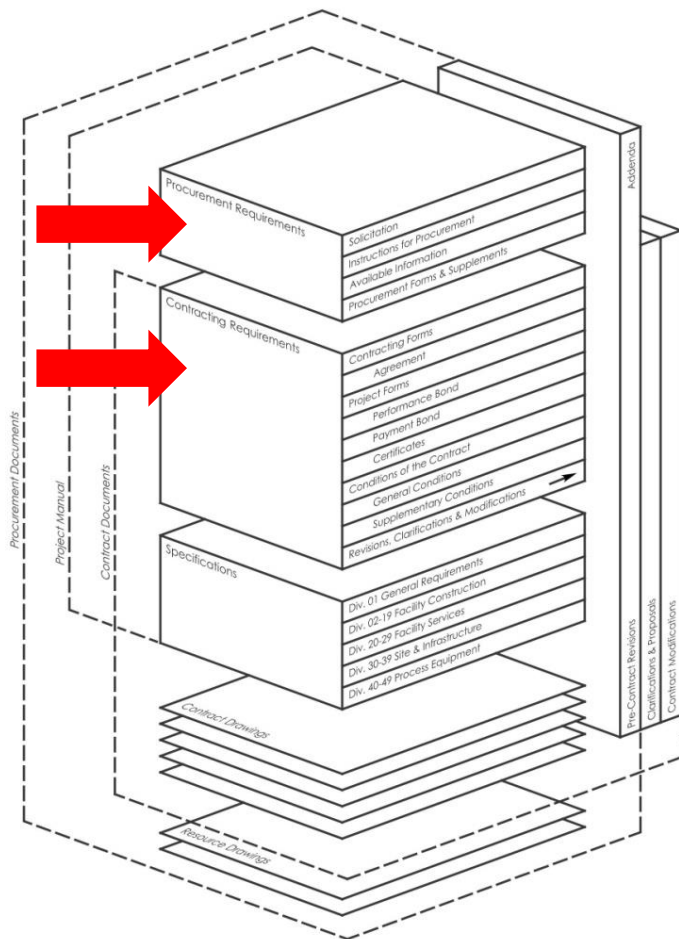


06

Divisiones

División 00

- Se edita con información provista por el dueño



00 01 01
00 01 05
00 01 10
00 01 15

Project Tile Page
Certifications Page
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Information

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SOLICITATION
Advertisement for Bids
Invitation to Bid
INSTRUCTIONS FOR PROCUREMENT
Bid Forms
Proposal Forms

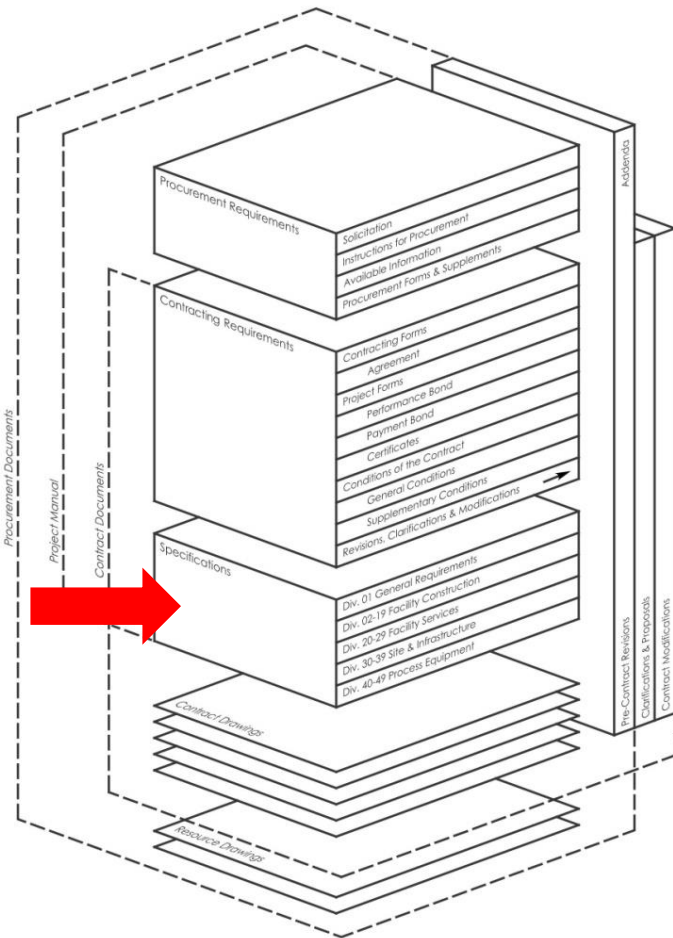
Procurement
Requirements

00 50 00
00 52 00
00 72 00
00 73 00

CONTRACTING FORMS AND SUPPLEMENTS
Agreement Forms
General Conditions
Supplementary Conditions

Contracting
Requirements

División 01



DIVISION 01 - GENERAL REQUIREMENTS

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01 20 00	Price and Payment Procedures
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01 50 00	Temporary Facilities and Controls
01 60 00	Product Requirements
01 73 00	Execution and Closeout Requirements
01 74 19	Construction Waste Management and Disposal
01 80 00	Permits, Fees and Notices
01 81 13	Sustainable Design Requirements - LEED for Commercial Interiors
01 91 13	General Commissioning Requirements

01 01 00 - Summary of Work

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- Determina el trabajo, restricciones y utilidades disponibles

01 02 00 - Price and Payment

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- 01 21 19 Testing and Inspecting Allowances
- 01 21 23 Installation Allowances

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- 01 26 63 Change Orders

01 29 00 Payment Procedures

- 01 29 73 Schedule of Values
- 01 29 76 Progress Payment Procedures

AIA® Document G701™ – 2001

Change Order

PROJECT (Name and address):	CHANGE ORDER NUMBER:	OWNER: ☐
	DATE:	ARCHITECT: ☐
TO CONTRACTOR (Name and address):	ARCHITECT'S PROJECT NUMBER:	CONTRACTOR: ☐
	CONTRACT DATE:	FIELD: ☐
	CONTRACT FOR:	OTHER: ☐

THE CONTRACT IS CHANGED AS FOLLOWS:
(Include, where applicable, any undisputed amount attributable to previously executed Construction Change Directives)

The original Contract Sum was	\$	0.00
The net change by previously authorized Change Orders	\$	0.00
The Contract Sum prior to this Change Order was	\$	0.00
The Contract Sum will be increased by this Change Order in the amount of	\$	0.00
The new Contract Sum including this Change Order will be	\$	0.00
The Contract Time will be increased by Zero (0) days.		
The date of Substantial Completion as of the date of this Change Order therefore is		

01 40 00 - Quality Requirements

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01 70 00 - Execution and Closeout

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- 01 86 00 Facility Services Performance Requirements
- 01 87 00 Equipment & Furnishings Performance Requirements
- 01 88 00 Other Facility Construction Performance Requirements
- 01 89 00 Site Construction Performance Requirements

01 90 00 Life Cycle Activities

- 01 91 00 Commissioning
- 01 92 00 Facility Operation
- 01 93 00 Facility Maintenance
- 01 94 00 Facility Decommissioning



07

Usando *MasterGuide*

Especificaciones con MasterGuide

- Dos maneras de escribir especificaciones:
 - “*From scratch*”
 - Con texto pre-escrito llamado MasterGuide
- MasterGuide Specifications sirve de guía e incluye sugerencias para editar. Es el método mas usado por firmas A/E.
 - “*Office Master*”
 - Producto comercial \$
-  • No use especificaciones de otros proyectos como base, si no tiene precaución.

MasterSpec®

- El producto MasterSpec® se basa en “**Master Guide Specifications**”.
- La compañía ARCOM creó MasterSpec® en coordinación con el *American Institute of Architects (AIA)*.



Usando MasterSpec®

- MasterSpec® ofrece texto **pre-escrito y editable**.

Tips



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SECTION 033000 - CAST-IN-PLACE CONCRETE

TIPS:

To view non-printing **Editor's Notes** that provide guidance for editing, click on Masterworks/Single-File Formatting/Toggle/Editor's Notes.

To read **detailed research, technical information about products and materials, and coordination checklists**, click on Masterworks/Supporting Information.

Revise this Section by deleting and inserting text to meet Project-specific requirements.

This Section uses the term "Architect." Change this term to match that used to identify the design professional as defined in the General and Supplementary Conditions.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.3 DEFINITIONS

Retain definition remaining after this Section has been edited.

Definition in paragraph below refers to those materials that make up the cementitious component of the water-cementitious materials ratio.

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

"Product Data for Credit IEQ 4.3" Subparagraph below applies to LEED-NC, LEED-CI, and LEED-CS; coordinate with requirements selected in Part 2.

- 2. Product Data for Credit IEQ 4.3: For **[liquid floor treatments]** **[and]** **[curing and sealing compounds]**, documentation including printed statement of VOC content.

Retain subparagraph below if fly ash, ground granulated blast-furnace slag, silica fume, or other materials are used as portland cement replacements for LEED Credit ID 1.1. To achieve this credit, replacement materials must be substituted for at least 40 percent of the portland cement that would otherwise be used.

- 3. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements, and for equivalent concrete mixtures that do not contain portland cement replacements.

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1. Portland Cement: ASTM C 150, [Type I] [Type II] [Type I/II] [Type III] [Type V], [gray] [white]. [Supplement with the following:]

Retain supplementary cementing materials from first two subparagraphs below if permitted. Ready-mix concrete manufacturer blends these materials with portland cement. Fly ash, slag, or pozzolanic materials may slow rate of concrete strengthening and affect color uniformity. Availability of Class F fly ash predominates over Class C fly ash.

- a. Fly Ash: ASTM C 618, [Class F] [Class F or C].
- b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

Retain subparagraph below if factory-blended hydraulic cement is permitted; verify availability of options before specifying. Fly ash, slag, or pozzolanic materials in the nonportland cement part of blended

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08

Certificados



Certificado CDT



Como **CDT** “*Construction Document Technologist*”, tiene entendimiento conceptual del proceso de construcción:

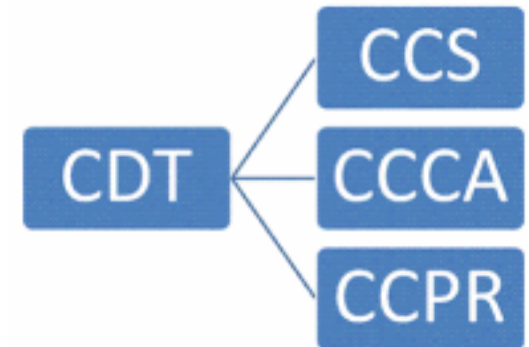
- Desarrollar y administrar documentos de construcción
- Escribir y aplicar especificaciones
- Investigar productos
- Comunicarse con equipos de diseño y construcción

CSI tiene 3 programas más



Ser CDT es pre-requisito para obtener las siguientes:

- **CCS** Certified Construction Specifier
- **CCCA** Certified Construction Contract Administrator
- **CCPR** Certified Construction Product Representative



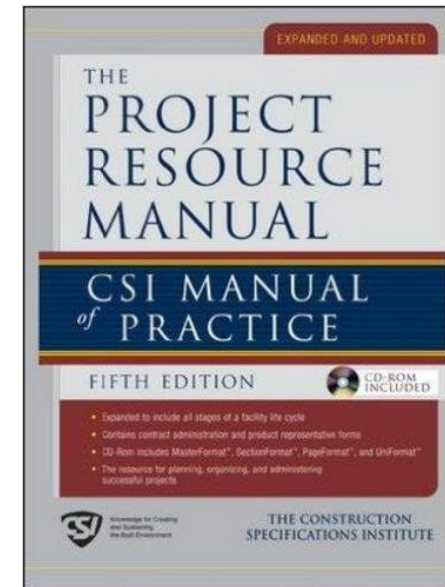
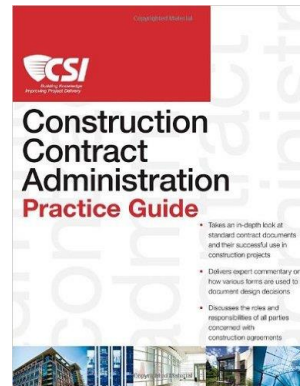
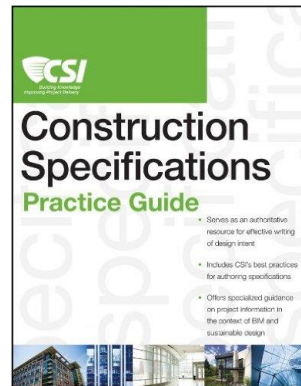
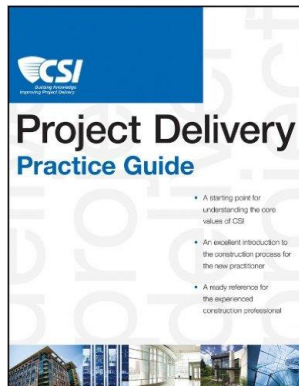
Más información: csinet.org

09

Referencias

Libros publicados por CSI

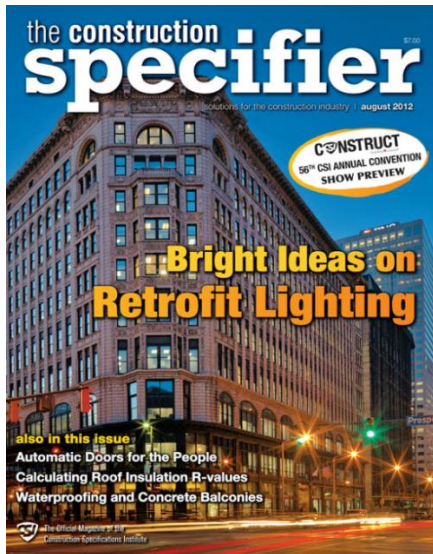
- Project Resource Manual (PRM)
- Practice Guides in 2008
 - Project Delivery
 - Construction Specifications
 - Contract Administration



Revistas y otras referencias



www.wbdg.org



www.fhwa.dot.gov



www.bsdsoftlink.com



Preguntas

thank you!

Gracias