Facility Information Management
The Future of CSI

ICIS DA 2010

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Construction Specifications Institute
Outline

• How CSI Standards, Formats and Practice Guidelines are supporting the future of information management

• Formats
  – Update to UniFormat
  – New PPDFormat
  – New GreenFormat
  – Ongoing OmniClass development
  – Ongoing IFD Library development

• Goal for the Future
CSI’s Mission

“To advance the process of creating and sustaining the built environment for the benefit of the construction community by using the diversity of its members to exchange knowledge.”
Technology

“The rate at which technology is moving, it’s impossible to predict the next five years.”

David Richards, Australian Writer on Technology
The Realities

“Once a new technology rolls over you, if you’re not part of the steamroller, you’re part of the road.”

Stewart Brand, American Writer
The future of BIM

Building Information Modeling

Facility Information Management

CSI: Standards and guides for organizing construction related information.
Specifier’s Changing Role

Static

Specification Writer

Dynamic

Knowledge Manager
Project Information is distributed in multiple formats, and changes.
Performance Requirements

- Regulatory Requirements
- Building Codes
- Health, Safety, Welfare
- Limitations

- Functional Requirements
- Aesthetic Requirements

Limitations

Regulatory Requirements

Building Codes

Health, Safety, Welfare

Performance Requirements

Warranties
- Performance Criteria
- Reference Standards
- Testing & Certification
- Maintenance

Environmental Requirements

GreenSeal
CRI-Green Label
GreenGuard

3rd Party Auditing

UL
FM
ICC

3rd Party Labeling/Certifications

EPP

EPP – Environmental Product Declarations
- Product Category Rules

Life Cycle Assessment

MasterFormat
Page/Section Format

Environmental Design Requirements
- Green Building Standards
- LEED, GreenGlobes
- Reference Standards
  - ISO 14021
  - ASTM E2129

Sustainable Product Assessment Online Tool

CSI

3 Part Specifications

UL
FM
ICC

GreenFormat

Standardized Reporting Tool
www.GreenFormat.com

UL
FM
ICC

3rd Party Auditing

Recycled Content
- VOCs
- Local Materials

www.GreenFormat.com

- Recycled Content
- VOCs
- Local Materials

CSI

3 Part Specifications

UL
FM
ICC

Environmental Requirements
CSI Formats, Standards and Practice Guidelines
## PROJECT DESCRIPTION

### A SUBSTRUCTURE
- **A10** Foundations
- **A20** Basement Construction

### B SHELL
- **B10** Superstructure
- **B20** Exterior Enclosure
- **B30** Roofing

### C INTERIORS
- **C10** Interior Construction
- **C20** Stairs
- **C30** Interior Finishes

### D SERVICES
- **D10** Conveying
- **D20** Plumbing
- **D30** Heating, Ventilating, and Air Conditioning (HVAC)
- **D40** Fire Protection
- **D50** Electrical

### E EQUIPMENT AND FURNISHINGS
- **E10** Equipment
- **E20** Furnishings

### F SPECIAL CONSTRUCTION AND DEMOLITION
- **F10** Special Construction
- **F20** Selective Demolition

### G BUILDING SITWORK
- **G10** Site Preparation
- **G20** Site Improvements
- **G30** Site Civil/Mechanical Utilities
- **G40** Site Electrical Utilities
- **G90** Other Site Construction

### Z GENERAL
- **Z10** General Requirements
- **Z20** Contingencies

For additional detail and information, refer to UniFormat™.
**A1030 Slabs on Grade:** Assigned to Michael White, Bob Johnson.

Includes slabs as well as fine grading, base courses, soil treatment, vapor retarders, under-slab waterproofing, under-slab insulation, under-slab drainage.

**Performance Criteria:**

- **Criteria:** Load capacity
  - Units of Measure: Pounds Per Square foot (PSF).
  - Standard: ----

- **Criteria:** Thermal Resistance.
  - Units of Measure: R-Value.
  - Standard: ASTM E 1155.

- **Criteria:** Water Vapor Transmission Resistance.
  - Units of Measure: Perms.
  - Standard: ASTM E 96.
### Preliminary Project Description and PPDFORMAT

#### B SHELL

<table>
<thead>
<tr>
<th>B10</th>
<th>Superstructure</th>
</tr>
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<tbody>
<tr>
<td>B1010</td>
<td>Floor Construction</td>
</tr>
<tr>
<td>A.</td>
<td>Floor System: Two-hour fire-rated, composite steel beam, steel deck, and concrete slab system in 6100 mm (20 feet) by 7600 mm (25 feet) bay dimensions capable of supporting 3.6 kPa (75 psf) live load.</td>
</tr>
</tbody>
</table>

| B1020 | Roof Construction |
| A. | Roof System: Two-hour fire-rated, composite steel beam, steel deck, and concrete slab system in 6100 mm (20 feet) by 7600 mm (25 feet) bay dimensions capable of supporting 1.5 kPa (30 psf) live load. |

<table>
<thead>
<tr>
<th>B20</th>
<th>Exterior Enclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td>B2010</td>
<td>Exterior Walls</td>
</tr>
<tr>
<td>A.</td>
<td>Masonry Cavity Wall Construction:</td>
</tr>
<tr>
<td>1.</td>
<td>Modular facing brick installed in running bond with tooled concave joints.</td>
</tr>
<tr>
<td>2.</td>
<td>Extruded polystyrene board installed between continuous joint reinforcing.</td>
</tr>
<tr>
<td>3.</td>
<td>Bituminous dampproofing applied over concrete masonry units.</td>
</tr>
<tr>
<td>4.</td>
<td>Load-bearing concrete masonry units with galvanized continuous joint reinforcing.</td>
</tr>
<tr>
<td>5.</td>
<td>Concrete masonry unit lintel units over openings; concrete masonry unit bond beams at top of wall.</td>
</tr>
<tr>
<td>B.</td>
<td>Loose galvanized steel lintels over brick openings with 203 mm (8 inches) minimum bearing on each side of opening.</td>
</tr>
<tr>
<td>C.</td>
<td>Elastomeric masonry flashing at sills, lintels, and other cavity interruptions.</td>
</tr>
<tr>
<td>D.</td>
<td>Open weepholes in brick masonry at flashing locations on 600 mm (24 inches) centers.</td>
</tr>
</tbody>
</table>

| B2020 | Exterior Windows |
| A. | Windows: Commercial-grade, aluminum double-hung windows with clear anodized finish and clear insulating glass. |

| B2030 | Exterior Doors |
| A. | Doors and Frames: Insulated, exterior flush steel doors set in steel frames. |
| B. | Hardware: Ball bearing butts, closers, locksets, thresholds, and weatherstripping. |
Preliminary Project Description (PPD)

- Written descriptions of Schematic Design organized by systems and assemblies
- Written descriptions that provide sufficient information for cost estimating without making final design decisions
- Documentation of qualitative requirements for the project appropriate to the phase
- Organized using *UniFormat*

*PPDFormat* provides guidance for writing PPDs
Figure 1

UF Number  | Element Name [BIM Object]  | Functional Requirements
---|---|---
Component 01 Name | MF Number | Attribute a  
Attribute b  
Attribute c
Component 02 Name | MF Number | Attribute a  
Attribute b  
Attribute c
Component 03 Name | MF Number | Attribute a  
Attribute b  
Attribute c

Requisites for the element as a whole

Examples:
Code Requirements  
Assembly U-Value  
Service Life  
Operation  
Warranties

Examples:
Appearance  
Delegated Design  
Field Quality Control  
Single Source Responsibility

Performance Requirements  
Design Requirements

Examples:
Design  
Requirements  
Performance  
Requirements

Examples:
Code Requirements  
Assembly U-Value  
Service Life  
Operation  
Warranties

Examples:
Appearance  
Delegated Design  
Field Quality Control  
Single Source Responsibility
# Tabular Format - Sample

<table>
<thead>
<tr>
<th>B20</th>
<th>EXTERIOR ENCLOSED</th>
</tr>
</thead>
</table>
| B2010 EXTERIOR WALLS | **Thermal Performance:** Minimum assembly U-value of 0.06 per International Energy Conservation Code.  
**Aesthetic Requirements:** Match appearance of existing building. |
| Exterior Wall Exterior Skin | Aluminum-faced composite metal panel cladding system with face sealed joints; 4 mm thickness, factory-applied fluorocarbon coating in metallic color.  
**Sealant:** Medium modulus silicone. |
| Exterior Wall Construction | 8-inch deep cold formed metal framing with glass-fiber faced gypsum sheathing. |
| Exterior Wall Vapor Retarders, Air Barriers, and Insulation | **Insulation:** 2-inch thick continuous extruded polystyrene insulation in drainage cavity, 3-1/2-inch fiberglass batts in stud cavities.  
**Weather Barrier:** Liquid-applied vapor permeable air and water barrier membrane. |
| Exterior Wall Interior Skin | Gypsum board, painted finish. |
| Exterior Louvers | Aluminum louvers, drainable storm-proof blades, welded construction, factory-applied fluorocarbon finish that matches metal cladding panels. |
| Exterior Soffits | Direct-applied exterior finish system (DEFS) on gypsum sheathing over CFMF framing with 8-inch unfaced fiberglass batt insulation. |
Outline Format - Sample

B2010 EXTERIOR WALLS

B2010.01 Masonry Veneer Walls

A. Description: Face brick veneer with architectural precast concrete trim, insulated cavity, air and water barrier membrane, sheathing, and cold-formed metal framing back-up.

B. Functional Requirements:
1. Thermal Performance: Minimum assembly U-value of 0.06 per International Energy Conservation Code.

C. Components:
1. Brick: Match existing jumbo size brick.
2. Precast Trim: Match existing. Portions will have decorative moldings with multi-color painted finish to match existing building.
3. Cavity Insulation: Extruded polystyrene, R-10
5. Sheathing: Glass-mat faced gypsum sheathing.
6. Framing: 4-inch cold-formed metal framing, delegated design.
7. Framing Space Insulation: R-13 unfaced fiberglass batts.
A Structured Format for Reporting Sustainable/Green Product Attributes

LCA In GreenFormat

A Template for Product Manufacturers to meet Environmental Information Needs

www.greenformat.com
Section 1: Background Information

General information organized by MasterFormat number, manufacturer name, product type, product or trade name

Brief description of product and its use

Designers can search by MasterFormat number, manufacturer name, or product type keyword search
Section 2: Product Details – Standards and Certifications

Section 2.1: Standards and Certifications

Which regulatory sustainable criteria and standards the product meets; yes/no answers with date verified/accepted.

Included are:

Federal evaluation tools such as Energy Star, USDA Bio-based Compliant, USDA Organic, etc.

State and local/regional criteria including state-funded EPP programs and local/regional standards like the South Coast Air Quality Management District (SCAQMC)

Other questions include international sustainable standards
Section 2: Product Details – Performance and Composition

Section 2.2: Performance Criteria

Section 2.3: Composition of Product

These categories, which collect certification, performance and product composition information, include questions relevant to three of the four methods of specifying products:

– Reference Standards
– Performance
– Descriptive specifications

Proprietary specs would use Sections 1 & 2.
Section 3: Product Usage

Section 3.1: Life Cycle Analysis
Section 3.2: Material Extraction and Transportation
Section 3.3: Manufacturing Phase
Section 3.4: Construction Phase
Section 3.5: Facility Operations Phase
Section 3.6: Deconstruction and Recycling
Section 4 and 5: Additional Information and Authorization

Additional manufacturer information re: transparency of information

Listings with other organizations such as BGI GreenSpec

Authorization/Self-Certification by the manufacturer or an authorized agent that the information provided is true and correct
# Find a Product

**Interface FLOR carpet tiles**

**INTERFACEFLOR** manufacturer details and additional products (5)

## BACKGROUND
- Product image
- Product description
- Contact information

## PRODUCT DETAILS

### 2.1 SUSTAINABLE STANDARDS AND CERTIFICATIONS

#### 2.1.1 Third Party Certification - Whole Product Sustainability

<table>
<thead>
<tr>
<th>CERTIFICATION NAME</th>
<th>CERTIFYING ORGANIZATION</th>
<th>LEVEL</th>
<th>CERTIFICATION NUMBER</th>
<th>ACTIVATION DATE</th>
<th>LENGTH OF TERM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Choice</td>
<td>Scientific Certification Systems, Inc. (SCS)</td>
<td>Silver</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Other</td>
<td>SCS</td>
<td>Platin</td>
<td>01370</td>
<td>2007-09-30</td>
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#### 2.1.4 Third Party Certification - Other Certification Categories

<table>
<thead>
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<th>CERTIFICATION NAME</th>
<th>CERTIFYING ORGANIZATION</th>
<th>LEVEL</th>
<th>CERTIFICATION NUMBER</th>
<th>ACTIVATION DATE</th>
<th>LENGTH OF TERM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>climate neut</td>
<td>verifi</td>
<td>n.a</td>
<td>2008-01-01</td>
<td>12 months</td>
</tr>
</tbody>
</table>

#### 2.1.5 Second Party Certification Program - Whole Product Sustainability

<table>
<thead>
<tr>
<th>CERTIFICATION NAME</th>
<th>CERTIFYING ORGANIZATION</th>
<th>LEVEL</th>
<th>CERTIFICATION (OR STANDARD*) NUMBER</th>
<th>ACTIVATION (OR TEST*) DATE</th>
<th>TESTING ORGANIZATION*</th>
<th>LENGTH OF TERM</th>
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<td>Cradle-to-Cradle</td>
<td>MBDC</td>
<td>Biological Nutrient</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
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<tr>
<td>Environmental Choice/Ecologo</td>
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<td>12 months</td>
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</table>

4.1 Stewardship • 4.2 Transparency of Information • Manufacturer Comments
### OmniClass Tables:

<table>
<thead>
<tr>
<th>11 Construction Entities by Function</th>
<th>31 Phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Construction Entities by Form</td>
<td>32 Services</td>
</tr>
<tr>
<td>13 Spaces by Function</td>
<td>33 Disciplines</td>
</tr>
<tr>
<td>14 Spaces by Form</td>
<td>34 Organizational Roles</td>
</tr>
<tr>
<td>21 Elements - UniFormat</td>
<td>35 Tools</td>
</tr>
<tr>
<td>22 Work Results – MasterFormat 04</td>
<td>36 Information</td>
</tr>
<tr>
<td>23 Products</td>
<td>41 Materials</td>
</tr>
<tr>
<td></td>
<td>49 Properties</td>
</tr>
</tbody>
</table>
Basis of Table Concept

Classification of Information in the Construction Industry

- ISO/IS 12006-2 Framework for classification of information
- ISO/PAS 12006-3 Framework for object-oriented information exchange
Faceted Classification

Classification Tables

PARENT CONCEPT
Child Concept
  Child of Child Concept
  Child of Child Concept
  Child of Child Concept
  Child of Child Concept

Color Table

PARENT CONCEPT
Child Concept
  Child of Child Concept
  Child of Child Concept
  Child of Child Concept
  Child of Child Concept

Materials Table

PARENT CONCEPT
Child Concept
  Child of Child Concept
  Child of Child Concept
  Child of Child Concept
  Child of Child Concept

Shape Table

Object = Red Rubber Ball
Faceting in OmniClass Numbering

22-221013  pipes/piping/as a work section
23-7116    pipe as a product
11-2800    process facility

23-7116:22-221013<11-2800  pipe (product) as specified in a work section as part of a process facility
OmniClass Status

• Active Working Groups (WG) for:
  • Facility Types and Spaces
  • Products
  • Properties
  • Activities and Process (ensuring tables meet demands of BIM)

• Revised drafts of tables from above WG expected March 2010

• OmniClass Development Committee approval for these drafts expected May 2010

• Part of National BIM Standard

• Being incorporated into IFD
OmniClass Working Groups

Facility Types and Spaces

WG

• Table 13 – Spaces by Function
  – Organizes Facility Spaces by Use Type
  – VA Medical Facility Spaces being classified
  – Participation from OSCRE, ICC, BOMA, others

WG Lead: Alan Edgar

<table>
<thead>
<tr>
<th>Table 13</th>
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<td>13-11 17 14 34</td>
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</tbody>
</table>
OmniClass Working Groups

Products WG

- Table 23 – Products
  - Organizes Product classes
  - Table 23 being revised in conjunction with GSA IFACT project
  - Used to identify components
  - Combined with Table 21 – Elements

WG Lead: Robert Keady
Activities and Process WG

Demands of BIM

Work progressing on three tables currently:

Table 31 – Phases
Organize project data exchanges based on project life cycle

Table 32 – Services
For combining with Disciplines and Organizational Roles tables

Table 36 – Information
Interaction with Properties Table

Other tables being examined for enhancement

WG Lead: Dianne Davis
Properties WG

• Participation from Autodesk, Reed, MHC, others

• Table 49 – Properties
  – Conceptual organization for properties
  – Establish preferred terms

• Being incorporated into SPie

WG Lead: Wayne Watson
OmniClass Tables in NBIMS
IFD Library
Core buildingSMART standard

IFC model
- create a comprehensive information specification

Dictionary
- Uniquely identify properties and objects.
  Dynamically extend the IFC model.

Exchange Requirements - IDM
- define information requirements and rules for particular business processes
Interoperability through standards

Aeronautics & Space
- RDL (ISO 15926-4)
- OASIS DEX
- ISO 10303-203, 209, 212, 214, 239, ASD 9300-110

Built Environment (AEC-BIM)
- IFC (ISO 16739)
- IDM (ISO TC51 SC13)

Digital Storage
- IFC Library (ISO 12206-3)

Defense
- PLCS (ISO 10303-239), ASD/AIA S1000D, ADL SCORM
- RDL (ISO 15926-4)

Oil & Gas
- RDL (ISO 15926-4)
- ISO 15926-2

EPM Technology
IFD Library Description

• IFD Library provides:
  – Multilingual and translation capabilities
    • Important in a globalized world
  – Unique global reference to any concept – GUID
  – IFC model enrichment and link to product specific data
  – Database of terminology and definitions

• IFD Library needs to be international to succeed
  – A GUID must be G = Global

• Implementation – many opportunities but market driven
  – IFD Library provide a generic API and content
  – Business opportunities?
  – Demonstration – dominated by commercial interests
Pilot Projects – U.S. / Canada

• **Construction Industry Terminology Initiative (CITI)** – Terms used on drawings and in specifications (using NCS terms)
• **OmniClass** – Support NBIMS
• **ICC SMART Codes** – Energy Code (*on hold*)
• **Specifiers Properties Information Exchange (SPie)**
• **PRM Glossary/other Terminology bases**
Vision - Objects in a model have integrated supporting information available from multiple sources.
buildingSMART is about exchange and sharing of information

BIM software
- Drawings
- Arch, HVAC, EL, CivEng

VRML
- Visualisation

SIMULATIONS
- Indoor climate
- Air, heating
- Lifecycle cost analysis
- Light and acoustics
- Energy use
- Fire and hazards
- Environmental impact
- Life expectancy

Codes and regulations
- Building codes
- Building regulation
- Central authority

Specification
- Specified Bill Of Quantities
- Standardized texts
- Cost estimates

Tendering / Procurement
- Product databases
- Price databases

Knowledge databases
- Best practice
- Specific knowledge
- Company knowledge

Building application – E-submission
- Local authority
- Building permit

Briefing
- Functions
- Estimates
- Budget
- Requirements

Demolishing, re-use
- Renovation
- Demolishing
- Reconstruct

FM Operation
- Renting, sale and use
- Maintenance
- Warranty

Progress - time schedules
- Progress planning
- Logistics, 4D

February 2010

Pictures from: Selvaagbygg, DDS, Byggforsk, NBLN University of California, CIFE Stanford, Pythagoras and Oluf Granlund Yo.