

**BUILDER Summit 2021**  
**San Antonio, TX**

# **Using BUILDER Data**

## A Panel Presentation and Discussion



 **Cardno**  
**wood.**

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# Agenda

## Introductions

## Audience Composition

## Topic Presentation

- > USMC BUILDER Program Overview
- > Calculating BCI and FCI
- > Using the Data
  - MCICOM Perspective
  - Installation Perspective

## Panel Discussion



# Safety Moment

- Emergency evacuation route
- Assembly area



## Panel Members

USMC MCICOM – Mr. Greg Wagner

Cardno Wood JV – Mr. DeAllen Norris, PE

Cardno Wood JV – Mr. Douglas Barnard, PE, PMP

Moderator – Mr. Robin St. Charles, Cardno Wood JV



## Background – USMC BUILDER™ Program

- > Implementation started in 2007
- > All installations worldwide
- > Data refreshed every 4 to 5 years
- > Regional management and assessor training

Today's panel will present and be open for discussion of observations and feedback regarding the use of BUILDER data from recently conducted training sessions. In particular:

- > BCI and FCI
- > Component Section CI and lower-level rollups



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# BCI vs. FCI

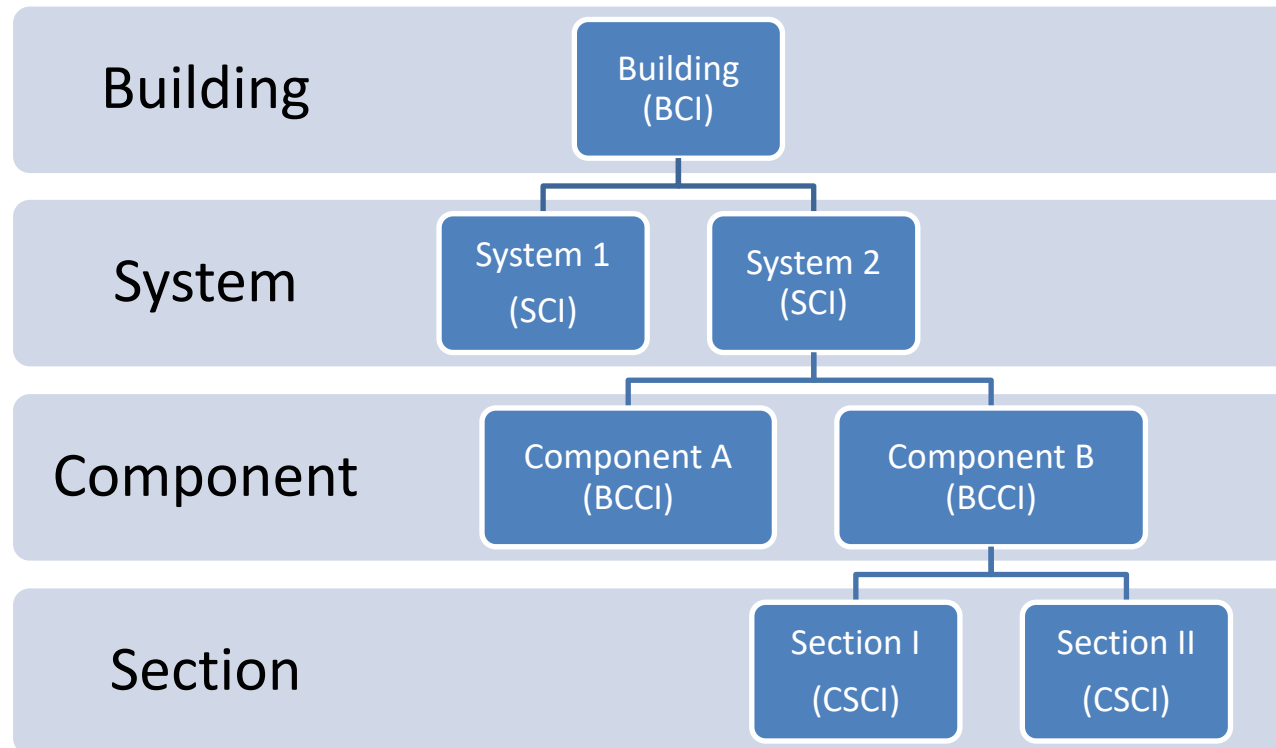
## > Confusion!

- Why aren't they the same?
- What's the difference?
- What's a weighted-average (CI rollup)
- Where does the FCI numerator value come from?
- What do these metrics tell us?
- How are they used?



# BCI – Bottom-Up Facility Metric

The Building Condition Index (BCI) is developed from a UNIFORMAT II data hierarchy which includes section, component, system, and building. The BCI is an indicator of the general “Health” of the facility.



\*\*Building Condition Index = BCI

\*\*System Condition Index = SCI

\*\*Building Component Condition Index = BCCI

\*\*Component Section Condition Index = CSCI



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## BCI vs. FCI

$$BCI = \frac{\sum(CI * CRV)}{\sum CRV}$$

Summed over all component sections in the building

$$FCI = 1 - \left( \frac{\sum(DM\&R)}{\sum PRV} \right) * 100$$





# Calculating Rollup CIs

| Metric   | Method  |
|--|---|
| Component Section CI ( <b>CSCI</b> )<br>i.e. Boiler 1                            | assigned to each individual Component Section based on inspection and/or age-based modeling.                                    |
| Rollup to Building Component CI ( <b>BCCI</b> )<br>i.e. D3010 Heating Generation | $\text{\$ weighed BCCI} = \frac{\sum (CI*CRV)}{\sum CRV}$ includes Sections within the Building Component                       |
| Rollup to System CI ( <b>SCI</b> )<br>i.e. D30 HVAC                              | $\text{\$ weighed SCI} = \frac{\sum (CI*CRV)}{\sum CRV}$ includes Sections within the Building System                           |
| Rollup to Building CI ( <b>BCI</b> )   | $\text{\$ weighed BCI} = \frac{\sum (CI*CRV)}{\sum CRV}$ includes Sections within the Building                                  |
| Rollup to Installation CI  | $\text{\$ weighed Installation CI} = \frac{\sum (CI*CRV)}{\sum CRV}$ includes Sections within the Buildings at the Installation |



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# Weighted Average Rollup of Component Section CIs



## Final 03 - Component-Section Report

Generated From BUILDER SMS on: 7/5/2021 11:15:10 AM

| Building Number | Building Name                            | Building Area | UoM | System                 | Component                  | Material/Equipment Category      | Component Subtype | Section Name | Section Install Date | CRV       | Section CI | RSL (years) | CRV Weighted CSCI |
|-----------------|--|---------------|-----|------------------------|----------------------------|----------------------------------|-------------------|--------------|----------------------|-----------|------------|-------------|-------------------|
| ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8,448         | SF  | A10 FOUNDATIONS        | A1010 STANDARD FOUNDATIONS | A101001 WALL FOUNDATIONS         | Strip Footing     | N/A          | 1998                 | \$111,000 | 98         | 76          | 10,878,000        |
| ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8,448         | SF  | A10 FOUNDATIONS        | A1030 SLAB ON GRADE        | A103002 STRUCTURAL SLAB ON GRADE | General           | N/A          | 1998                 | \$457,882 | 98         | 76          | 44,872,397        |
| ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8,448         | SF  | B10 SUPERSTRUCTURE     | B1020 ROOF CONSTRUCTION    | B102001 STRUCTURAL FRAME         | General           | N/A          | 1998                 | \$182,208 | 98         | 76          | 17,856,408        |
| ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8,448         | SF  | B10 SUPERSTRUCTURE     | B1020 ROOF CONSTRUCTION    | B102003 ROOF DECKS AND SLABS     | Deck - Steel      | N/A          | 1998                 | \$175,805 | 98         | 76          | 17,228,923        |
| ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8,448         | SF  | B10 SUPERSTRUCTURE     | B1020 ROOF CONSTRUCTION    | B102004 CANOPIES                 | General           | EAST         | 1998                 | \$123,240 | 91         | 4           | 11,214,840        |
| ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8,448         | SF  | B20 EXTERIOR ENCLOSURE | B2010 EXTERIOR WALLS       | B201001 EXTERIOR CLOSURE         | Concrete Block    | EAST         | 1998                 | \$17,413  | 94         | 50          | 1,636,833         |

A10 SCI is the rollup of A10 component section CIs  
 B10 SCI is the rollup of B10 component section CIs  
 And so on...



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# Building and System CI Rollup

Sum of CRV Weighted ÷ CSCI Sum of CRV

| Building and Systems                                    | Sum of CRV          | Sum of CRV Weighted CSCI | B/S CI    |
|---|---------------------|--------------------------|-----------|
| <b>ARMR2 - ADMINISTRATIVE BUILDING, GENERAL PURPOSE</b> | <b>5,306,538.08</b> | <b>430,260,907</b>       | <b>81</b> |
| A10 FOUNDATIONS   | 568,881.60          | 55,750,397               | 98        |
| B10 SUPERSTRUCTURE                                      | 481,253.58          | 46,300,171               | 96        |
| B20 EXTERIOR ENCLOSURE                                  | 1,071,347.79        | 100,461,634              | 94        |
| B30 ROOFING   | 193,916.40          | 18,228,142               | 94        |
| C10 INTERIOR CONSTRUCTION                               | 846,109.82          | 79,364,866               | 94        |
| C30 INTERIOR FINISHES                                   | 1,129,371.08        | 53,144,688               | 47        |
| D20 PLUMBING  | 194,213.95          | 16,664,485               | 86        |
| D30 HVAC  | 189,000.00          | 4,468,800                | 24        |
| D40 FIRE PROTECTION                                     | 279,460.76          | 26,065,840               | 93        |
| D50 ELECTRICAL  | 352,983.10          | 29,811,885               | 84        |

The Building CI is a rollup of all Component Section CI in the building.

Each System CI is a rollup of composite Component Section CIs of the system.



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# BCI – Report Values vs. Example Calculations



## Final 02 - System Summary Report

Generated From BUILDER SMS on: 7/5/2021 11:14:10 AM

| Site Name | Building Number | Building Name                            | Building Area | UoM | System                    | System CI | System CRV  | Final 3 SCI Calc | Final 3 CRV Sum |
|-----------|-----------------|--|---------------|-----|---------------------------|-----------|-------------|------------------|-----------------|
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | A10 FOUNDATIONS           | 98        | \$568,882   | 98               | \$568,882       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | B10 SUPERSTRUCTURE        | 96        | \$481,254   | 96               | \$481,254       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | B20 EXTERIOR ENCLOSURE    | 94        | \$1,071,348 | 94               | \$1,071,348     |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | B30 ROOFING               | 94        | \$193,916   | 94               | \$193,916       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | C10 INTERIOR CONSTRUCTION | 94        | \$846,110   | 94               | \$846,110       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | C30 INTERIOR FINISHES     | 48        | \$1,129,371 | 47               | \$1,129,371     |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | D20 PLUMBING              | 86        | \$194,214   | 86               | \$194,214       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | D30 HVAC                  | 24        | \$189,000   | 24               | \$189,000       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | D40 FIRE PROTECTION       | 94        | \$279,461   | 93               | \$279,461       |
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | D50 ELECTRICAL            | 85        | \$352,983   | 84               | \$352,983       |



## Final 01 - Building Summary Report

Generated From BUILDER SMS on: 7/5/2021 11:12:44 AM

| Site Name | Building Number | Building Name                            | Building Area | UoM | Floors | Building PRV | BCI | Sum of Work Items | Sum of CRV  | Number of Components | Final 3 BCI Calc | Final 3 CRV Sum |
|-----------|-----------------|--|---------------|-----|--------|--------------|-----|-------------------|-------------|----------------------|------------------|-----------------|
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | 1      | \$5,984,746  | 81  | \$269,500         | \$5,306,538 | 65                   | 81               | \$5,306,538     |

## FCI – Example Calculation

$$FCI = 1 - \left( \frac{\sum(DM\&R)}{\sum PRV} \right) * 100$$

- > **Caution!** A BUILDER calculated FCI may only be a partial FCI.
- > BUILDER Work Items are only a portion of DM&R requirements.
  - For example, BUILDER Work Items do not include ad hoc or command interest project work requirements.



### Final 01 - Building Summary Report

Generated From BUILDER SMS on: 7/5/2021 11:12:44 AM

| Site Name | Building Number | Building Name                            | Building Area | UoM | Floors | Building PRV | BCI | FCI | Sum of Work Items | Sum of CRV  | Number of Components | Final 3 BCI Calc | Final 3 CRV Sum |
|-----------|-----------------|--|---------------|-----|--------|--------------|-----|-----|-------------------|-------------|----------------------|------------------|-----------------|
| Site 1    | ARMR2           | ADMINISTRATIVE BUILDING, GENERAL PURPOSE | 8448          | SF  | 1      | \$5,984,746  | 81  | 95  | \$269,500         | \$5,306,538 | 65                   | 81               | \$5,306,538     |

1-(Sum of Work Items / Building PRV) \* 100



# BCI and FCI Use – MCICOM Perspective

## MCICOM Perspective

- > iNFADS FCI and Quality data elements
- > How they support decision making and HQ level
- > Maintaining the BUILDER database







# Discussion and Questions for the Panel

