



# **USAF Built Infrastructure Inventory and Assessments Manual**

## ***Appendix for Superstructure (B10)***

July 2017

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## I. Overview

This manual covers the inventory and assessment process for the building “Superstructure (B10)” system and components. This is an abbreviated manual and does not contain the same level of detail found in expanded manuals. Please see the SMS Playbook for additional information including:

- BUILDER™ Sustainment Management System Concepts
- Overview of ASTM E 1557 UNIFORMAT II Standard Classification for BUILDER™
- BUILDER™ Inventory Overview
- BUILDER™ Assessment Overview
- BUILDER™ Remote Entry Database (BRED™)
- Working with Web-Based BUILDER™
- Quality Assurance
- Site Visit Preparation and Execution
- Site Visit Safety

### A. B10 Superstructure Description

#### 1. UNIFORMAT definition

- Building superstructures are above ground and overhead structural components supporting other building systems such as the exterior enclosure, roofing and interior construction.

#### 2. Major components

- Floor Construction (B1010) – Includes balconies, ramps, columns/pillars, elevated floors, beams/girders, joists and slabs at intermediate floors.
- Roof Construction (B1020) – Includes awnings, beams/girders, joist, rafters, trusses, purlins and decking supporting the roof coverings and roof top equipment.

#### 3. Lifecycle characteristics

- Most Superstructure components are classified as longer lived or very long-lived components. Most Superstructure components show slow rates of deterioration, but are more subject to damage and deterioration than foundation elements. A few elements such as canvas/vinyl tubular metal or wood structure awnings are short-lived components.

## II. Inventory

### A. General B10 Inventory Guidance

This section presents common UNIFORMAT II B10 Superstructure Inventory Component Sections found across USAF installations as a guide for entering into the BUILDER™ SMS or BRED™ software. Inventory items are arranged by BUILDER™ SMS with Material Category, Component Subtype, Quantity and Inventory Notes. Each building’s full or partial inventory can be captured in the field using the Inventory/Assessment Data Collection Sheet(s) included in Section V and in the AFCEC BUILDER™ SharePoint Site in the Documents Library. Section VI (B20 UNIFORMAT II Minimum Component Reference Table) provides a complete listing of the minimum components inventoried and assessed for B20 for the USAF. Bases may elect to inventory and assess additional components.

**NOTE: The minimum components inventoried and assessed in BUILDER™ SMS inventory for B10 for the USAF are for Munitions Storage facilities only. Recommend inventorying and assessing visible hangar**

***and warehouse superstructure. Bases may elect to inventory and assess superstructure components. Inventory and assessment is required by the current AFCAMP Playbook as project support documentation for consideration in the project prioritization process.***

Component subtypes General, Other, and Unknown require a Section Name to further describe the Component Sections.

It is critical to confirm the year installed (default from Real Property Assets Database (RPAD)) or estimate the year installed. BUILDER™ SMS uses the install date, life cycle degradation curves and assessment observations to establish a Condition Index (CI) for each Component Section. If the assessor suspects the RPAD default date is not accurate or an addition or renovation has taken place, check the RPAD record for year renovated or check local as-built/renovation drawings to help determine the year installed. Estimated Install Dates decrease the Expected Service Life significantly.

If this is an initial assessment and no Superstructure inventory has previously been entered into BUILDER™ SMS, an inventory is required. When Superstructures are not visible, as-built drawings should be used to identify and quantify the Superstructure components. If as-built drawings are not available, the assessor may use experience to make an assumption for the Superstructure types and quantities based on similar construction of nearby buildings, consultation with local staff and other resources such as [www.inspectapedia.com](http://www.inspectapedia.com).

The remainder of this section provides photo examples of the most common USAF inventory items categorized by major components and accompanied with appropriate Material Category, Component Subtype and unit of measure from the BRED™ drop down menus. This information is supplemented with general and specific inventory hints as a guide for data entry by the assessor.

## **B. Inventory B1010 Floor Construction**

Typical inventory at USAF bases includes the following component types:

- B101001 Structural Frame SF
- B101002 Structural Interior Walls SF
- B101003 Floor Decks and Slabs SF
- B101004 Inclined and Stepped Floors EA
- B101005 Balcony Construction SF
- B101006 Ramps SF
- B101007 Floor Raceway Systems SF
- B101090 Other Floor Construction SF

#### Floor Construction B1010 Inventory Hints

- Floor construction materials are typically concrete, steel or wood.
- B1010 applies to floor construction; some components are similar to B1020.
- All slabs on grade (SOG) are inventoried under A1030.
- Floor construction above will not be visible in areas with finished ceilings, but may be visible in mechanical/electrical rooms.
- Inventory Comments should be recorded to clarify component description if Section Name is insufficient.
- If floor construction components are not visible an Inspection Comment must be provided.


### **C. Inventory B1020 Roof Construction**


Typical inventory at USAF bases includes the following component types:

- B102001 Structural Frame SF
- B102002 Structural Interior Walls SF
- B102003 Roof Decks and Slabs SF
- B102004 Canopies SF
- B102090 Other Roof Construction SF

#### Roof Construction B1020 Inventory Hints

- Roof Construction materials are typically concrete, steel or wood.
- B1020 applies to roof construction; some components are similar to B1010.
- Canvas and vinyl window awnings/canopies typically attached to buildings for aesthetics or sunshades and are NOT inventoried to include Aircraft Sunshades. More permanent metal or concrete awning/canopies are inventoried.
- Roof construction may be visible in mechanical/electrical rooms where there are no finished ceilings.
- Loading dock refers to the built-in/fixed structure. Dock leveling devices are included in D10 Conveying Systems.
- Inventory Comments should be recorded to clarify component description if Section Name is insufficient.
- Metal or concrete arch barrel structures are covered under B102090 Roof Construction. Earthen berms (munition storage or magazine roofs) are covered under B301090 as roof covering. End walls are covered under B201090 Other Exterior Walls.
- If superstructure components are not visible, an Inspection Comment must be provided.

<p>1. Material Category: B102001 Structural Frame  Component Subtype: Column- Concrete  Quantity: LF      Year Built/Renewed: RPAD  Painted/Coated: No  Year Painted/Coated: Normally Estimated  Paint/Coating Type: Best Guess  Inventory Notes:</p> <ul style="list-style-type: none"> <li>• Structural Column in MUNS Igloo</li> <li>• Also shown is B102003 Roof Decks and Slabs: Slab– CIP Concrete</li> </ul>	
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<p>2. Material Category: B102090 Other Roof Construction  Component Subtype: General  Quantity: SF      Year Built/Renewed: RPAD  Painted/Coated: No  Year Painted/Coated: Normally Estimated  Paint/Coating Type: Best Guess  Inventory Notes:</p> <ul style="list-style-type: none"> <li>• Structural CIP Concrete Barrel Roof in MUNS Igloo</li> <li>• End Wall covered under B2010 Exterior Walls</li> </ul>	
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### III. Assessment

#### A. General B10 Assessment Guidance

Superstructure component sections are assessed using Direct Condition Rating (DCR). Much of the time Superstructure component sections are not visible. When component sections are not visible, no assessment is required and an Age-Based Rating is given by BUILDER™ SMS. In this case, BUILDER™ SMS will use the inventory Year Installed and life cycle degradation curves built-in to the software to establish the CI.

When superstructure component sections are visible, they should be assessed.

**Under no circumstances should age be factored into a DCR or Distress Survey assessment. Ratings are based on condition, operability and/or survivability only. BUILDER™ SMS factors in the age from the Install Date when BUILDER™ calculates Condition Index (CI).**

The following conditions or events can accelerate deterioration:

- Improper construction or installation
- Settlement or subsidence

- Material damage
- Flooding
- Earthquake
- Landslide
- Soil erosion
- Moisture infiltration

The assessor may observe distresses in the visible Superstructure major components such as cracking, displacement, rotting or other damage. These conditions may also be visible in interior or exterior walls and the floor. If observed, the assessor must provide an Inspection Comment for any **Amber +** or lower DCR or BUILDER™ calculated Distress Survey rating. Photographs documenting defects must be taken and attached to the assessment.

**NOTE: Red highlighted text is provided as an example of a lifecycle of a typical components and should be adjusted as needed to represent other various components.**

Direct Condition Rating (DCR) Definitions	
Rating	Observation
Green (+)	Fully Operational - Free of Known or Observable Defects Keep doing PM required to maintain warranty - no action required
Green	Fully Operational - Slight Deterioration or Minimal wear Keep doing PM - no action required
Green (-)	Fully Operational – Normal wear and/or serviceability defects Keep doing PM - need to start planning for rehabilitation
Amber (+)	Reduced Operation – Minor wear and/or serviceability defects Repairs could be accomplished and replacement planned within next eight to ten years (Investment of resources could extend life)
Amber	Reduced Operation – Moderate wear and/or serviceability defects Repairs could be accomplished and replacement planned within next six to seven years (Investment of resources could extend life)
Amber (-)	Reduced Operation – Significant wear and/or serviceability defects Repairs could be accomplished and replacement planned within next three to five years (Investment of resources could extend life)
Red (+)	Loss of Operation – Moderate wear and/or serviceability failure Repairs could be accomplished and replacement planned within next two years (Run to failure - further investment unwise)
Red	Loss of Operation – Significant wear and/or serviceability failure Repairs could be accomplished and replacement planned within the next year (Run to failure - further investment unwise)
Red (-)	Loss of Operation – Complete wear and/or serviceability failure Replacement needs to be planned immediately

Below are assessment hint questions to help the assessor determine the most appropriate DCR.

### Superstructure B10 Assessment Hints

- If assessment “Rating” is Amber + or below, enter an Inspection Comment to describe the reason. Photographs documenting the defects must be taken and attached to the assessment. An Inspection Comment should also be entered regardless of DCR rating if a significant localized issue needs to be highlighted which may not necessarily impact the overall component section DCR.
- If superstructure components are not visible an Inspection Comment must be provided.

## **B. Assessment B1010 Floor Construction**

Some Floor Construction may not be visible in buildings with floor covering or finished ceilings (elevated slabs). No assessment will be entered under these conditions unless the assessor observes some portion of the Roof Construction, observes distresses noted above, or has access to an engineering report allowing BUILDER™ SMS to Age-Base the Rating.

Examples of typical floor construction distresses or conditions include: rot, structural damage or displacement.

### 1. Wood Floor with Rot from Condensation or Water Leak



## **C. Assessment B1020 Roof Construction**

Roof Construction will normally not be visible unless the building is a warehouse or maintenance type structure with no finished ceilings. No assessment will normally be entered unless the assessor observes some portion of the roof construction, observes distresses noted above or has access to an engineering report allowing BUILDER™ SMS to Age-Base the Rating.



Examples of typical roof construction distresses or conditions include rot, structural damage or displacement.

1. Roof Supporting Members with Water Damage.



## IV. Inventory and Assessment Rules of Thumb

### A. Assessor Qualifications

- The architectural/structural assessor should have a combination of 8+ years of general building construction, facilities maintenance and planning/estimating experience related to building foundations, structure, enclosure and interior construction or be equivalent to a Journeyman, a V Level Technician, an Architect or a Civil Engineer. The assessor should have a working knowledge of the ASTM E 1557 Standard Classification for Building Elements UNIFORMAT II and a basic understanding of other building systems such as HVAC, Plumbing, Fire Protection and Electrical. The assessor should be able to identify common building materials, techniques and structural/architectural system types/elements, be proficient at reading drawings and engineering reports and have experience identifying common problems related to architectural/structural systems. The lead architectural/structural assessor may be supported by less experienced staff during the inventory and assessment.

### B. Year Installed

- In some cases superstructure sections may be replaced as an individual repair or partial replacement. These areas would have a different age. The RPAD construction and renovation dates should be confirmed. If they are not appropriate, the superstructure age must be estimated. The building occupants or other facilities staff may be able to provide some information.
- If construction drawings or as-builts are available, look for date published to assist with determining age of materials.
- Additions, new wings or major renovations likely require identifying a separate superstructure component sections with a different age.
- In the case of superstructures, the assessor must use judgment in sectioning these

components. Superstructure components should be sectioned in the manner they are generally managed. If there are no new superstructures, a separate section for a single new superstructure is not necessary. However, if there are two major types or ages of superstructures, then separate sectioning is a good idea.

### C. Inventory/Assessment

- If as-builts can be located, they should indicate superstructure type, material and quantity.

## V. Inventory / Assessment Data Collection Sheet

Many assessors use floor plans or a notebook. Use whatever collection method works best for the individual assessor.

## VI. B20 UNIFORMAT II Minimum Component Reference Table

The following table provides SMS MINIMUM inventory and condition assessment requirements. The table effectively provides a list of WHAT will be inventoried, WHERE within the SMS the component inventory will reside and HOW a component is to be condition assessed. The structure of the list is within UNIFORMAT II to be consistent with BUILDER™ SMS. Usually, components are assessed with Direct Condition Ratings. As appropriate, Distress Survey assessments may be conducted on selective components.

PM Inspection/Testing Directive column gives information on any Air Force applicable publication providing Preventative Maintenance (PM) actions that, once conducted, provides information on a component's condition assessment. Preventive Maintenance Task Lists (PMTLs) or other inspections may be considered a Distress Survey type assessment in the future for some components.

Condition assessment frequency is not to exceed 5 years. Condition assessments conducted as part of a PMTL may be entered into SMS but should not be more often than an annual assessment.

AMP reflects the AMP to which the component is assigned:

F: Facility AMP

B SHELL				DEFINITION							
Unf L1	Unf L2	Unf L3	WBS L4		In Builder/ Fueler/ Paver/ Railer/ Utility	PM Inspection/ Testing Directive	Insp/ Assess Freq	SMS Type Insp	Assessment Method	AMP/ Sub-AMP	
			B10	SUPERSTRUCTURE	Includes floor construction and roof construction.						
			B1020	ROOF CONSTRUCTION	This construction is similar to floor construction except that it applies to the framework supporting the roof and roof decks. (See also System B30 Roofing.)						
			B102001	STRUCTURAL FRAME	The structural frame could consist of structural steel including columns, beams, joists, and all associated items. It could be a concrete frame utilizing concrete or masonry columns and concrete girders and beams. The structural frame could be wood columns with wood beams or wood trusses. The structural frame could be a combination of the above. For example, concrete or masonry columns with structural steel beams and joists. All associated work items should be included in each assembly. Separate assemblies would be used for different types of construction. The unit of measure at the assembly level is the square footage of the supported area. Decks and slabs are not included in this assembly. Inventory where visible such as Munitions Storage facilities.	B	N/A	5 yr	Direct	Visual	F/S & F
			B102003	ROOF DECKS AND SLABS	Roof decks and slabs should be broken into assemblies according to their particular type of construction (i.e., flat slab, pan slab, precast or pre-stressed slab, four-way slab, slabs on metal or wood decking with concrete fill, etc.). All associated work items should be included in each assembly.	B	N/A	5 yr	Direct	Visual	F/S & F
			B102090	OTHER ROOF CONSTRUCTION	Any type of special roof construction not included above would fall into this category including barrel roof construction for munitions storage facilities. All associated work items would be included in this assembly. Earthen roof covers for Munitions Storage facilities are covered under B3010 as a roof covering.	B	N/A	5 yr	Direct	Visual	F/S & F