

This is a guidance document with sample specification language intended to be inserted into project specifications on this subject as appropriate to the agency's environmental goals. Certain provisions, where indicated, are required for U.S. federal agency projects. Sample specification language is numbered to clearly distinguish it from advisory or discussion material. Each sample is preceded by identification of the typical location in a specification section where it would appear using the SectionFormat™ of the Construction Specifications Institute; the six digit section number cited is per CSI Masterformat™ 2004 and the five digit section number cited parenthetically is per CSI Masterformat™ 1995.

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SECTION 01 81 10 (SECTION 01120) – FACILITY SERVICE LIFE REQUIREMENTS

SPECIFIER NOTE:

Sustainable Federal Facilities: A Guide to Integrating Value Engineering, Life-Cycle Costing, and Sustainable Development, Federal Facilities Council Technical Report No.142; 2001 <http://www.wbdg.org/ccb/SUSFFC/fedsus.pdf> , states that the total cost of facility ownership, which includes all costs an owner will make over the course of the building's service lifetime, are dominated by operation and maintenance costs. On average, design and construction expenditures, "first costs" of a facility, will account for 5-10 % of the total life-cycle costs. Land acquisition, conceptual planning, renewal or revitalization, and disposal will account for 5-35 % of the total life-cycle costs. However, operation and maintenance will account for 60-85 % of the total life-cycle costs.

Service life planning can improve the economic and environmental impacts of the building. It manages the most costly portion of a building's life cycle costs, the operation and maintenance stage. And, by guiding appropriate and necessary investments over the course of the building's life cycle, increases the residual value of the building. Additionally, service life planning manages environmental impacts. Extending the service life of the building and reducing maintenance and replacements contributes to achieving sustainable development and preservation of scarce resources.

The process of service life planning can be applied to both existing buildings and new constructions. This will help facility managers by indicating anticipated future operations and cyclical maintenance. It may also be extended to provide cost plans for maintenance. However, not all maintenance can be foreseen and planned, and some provision should therefore be made for unforeseen costs

For existing buildings, many of the choices have been predetermined; and, the building is already some way through its service life. Therefore, planning the service life for existing buildings will focus on assessing the residual service life of building elements and optimizing future operation and maintenance.

For new buildings, a preliminary service life plan should be developed during the design phase and updated during the construction phase to reflect specific building elements incorporated into the building. Buildings with very long design lives may need continual repair and replacement to achieve their design lives. Thus, ease of disassembly and reassembly to retain the existing building fabric may be a design objective, together with the ease of repair without causing damage.

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Requirements for building design life.
 - 2. Requirements for building element design life.
 - 3. Requirements for building service life plan.
- B. Related Sections:
 - 1. 01 10 00 (01100) – Summary: Environmental Goals For Project.
 - 2. 01 43 50 (01435)– Continual Improvement Of Environmental Quality

3. 01 78 23 (01830) – Operation And Maintenance Data

1.2 DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Definitions pertaining to service life planning: As defined in ISO 15686-1 and as indicated.
- C. Building Element: Product, component or system incorporated into the project, including sitework.
- D. Design Life: The intended service life.
- E. Planned Obsolescence: A policy of deliberately planning or designing a product with a limited useful life so it will become obsolete or nonfunctional after a period of time shorter than the serviceability of the product would otherwise allow.
 - 1. Planned obsolescence may be functional, technological, economic, or aesthetic.
- F. Service Life: The period of time after installation during which a building, building product, building component, or building system meets or exceeds the specified performance requirements.
 - 1. Service Life is optimized and may be extended with regular maintenance.
 - 2. Service Life may be extended with repair.
 - 3. Service Life ends with replacement and/or removal.

SPECIFIER NOTE:

Under EO 13423, sustainable means “to create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations of Americans”
The following definition is consistent with the EO and with ASTM E2114.

- G. Sustainability: The maintenance of ecosystem components and functions for future generations.

1.3 COORDINATION

- A. Coordinate Building Service Life Plan (BSLP) with Operation and Maintenance Manual as specified in Section 01 78 23 (01830).
- B. Coordinate with **[Owner’s Environmental Management system (EMS) and]** work of Section 01 43 50 (01435).

1.4 SUBMITTALS

SPECIFIER NOTE:

EO 13423 directs Federal agencies to “provide reports on agency implementation of this order to the Chairman of the Council [on Environmental Quality] on such schedule and in such format as the Chairman of the Council may require; and ... provide information and assistance to the Director of the Office of Management and Budget, the Chairman of the Council, and the Federal Environmental Executive.”

Refer to <http://www.wbdg.org/sustainableEO>

Additionally, under the Sustainable Building requirements per Guiding Principle #2 Optimize Energy Performance, EO 13423 directs Federal agencies to “Enter data and lessons learned from sustainable buildings into the High Performance Buildings Database.” <http://femp.buildinggreen.com/>

Executive Order 13514; *Federal Leadership in Environmental, Energy, and Economic Performance*; was signed on October 5, 2009. <http://www.ofee.gov/execorders.asp> It expands upon the environmental performance requirements of EO 13423.

http://www1.eere.energy.gov/femp/regulations/printable_versions/eo13423.html

EO 13514 sets numerous Federal requirements in several areas, including:

- Federal agency heads must designate a senior management official to serve as Senior Sustainability Officer accountable for agency conformance, reporting to the Chair of the Council on Environmental Quality (CEQ) and the Director of the Office of Management and Budget (OMB). The Senior Sustainability Officer shall prepare targets for agency-wide reductions in 2020 for greenhouse gas (GHG) emissions and shall prepare and submit a multi-year Strategic Sustainability Performance Plan.
- Agency efforts and outcomes in implementing EO 13514 must be transparent and disclosed on publicly available Federal Web sites.
- OMB must prepare scorecards providing periodic evaluation of Federal agency performance. Scorecard results must be published on a publicly available Web site.

Documentation of service life planning can assist in required Agency reports.

- A. **[With Response to Solicitation] [With submittals for Design Approval]** prepare and submit a preliminary Building Service Life Plan (BSLP). Identify all building elements incorporated in the building.
1. Classify building elements in accordance with ASTM E1557 for UNIFORMAT II **[Level 1] [Level 2] [Level 3] [Level 4]** alpha-numeric designations of building elements.
 2. Identify the design life of each building element. State basis of determination.
 3. Identify the schedule for maintenance, repair, and replacement for each building element for the duration of the building design life.

SPECIFIER NOTE:

The objective of service life planning is to assure, as far as possible, that the estimated service life of the building or component will be at least as long as its design life. This helps provide the most advantageous combination of capital, maintenance and operational costs over the life of the building. Assumptions made in service life planning should be recorded for future reference. Forecasts of service lives may be invalidated by changes or activities which take place during the service life of the building.

As part of service life planning, elements should be assessed for compliance with performance requirements. Many factors can affect performance during service life:

- the quality of the materials,
- the design of the building, the component and installation detailing,
- the quality of the installation,
- the environment, including the reactions at interfaces between materials and/or components,
- operation, including normal operation and possible abuse,
- maintenance, and
- repair.

Assumptions for the factors affecting performance should be indicated in the BSLP.

4. Identify assumptions utilized in BSLP.
5. Describe adaptability of building elements.
 - a. For each building element, indicate potential for adaptability, upgrade and flexibility.
 - [b. Provide a plan to accommodate future dismantling, disassembly and re-configuration of interior non-loadbearing walls, partitions, lighting and electric systems, suspended ceilings, raised floors, and interior air distribution systems for a minimum of 25 years.]**
6. Revise and resubmit Plan as required by Owner.
 - a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable regulations.

- B. **[Not less than 10 days before the Pre-construction meeting] [With Record Submittals]**, prepare and submit an updated Building Service Life Plan (BSLP).

1.5 BUILDING DESIGN LIFE

- A. Building Design Life: The design life of the building shall be not less than **[60] [100] [150] [xxxx]** years

1.6 BUILDING ELEMENTS DESIGN LIFE

- A. Select and utilize building elements that provide the specified performance and that demonstrate a design life consistent with the service life goals of the facility.
1. Planned obsolescence of building elements is not permitted.
 2. The design life of building elements shall be not less than indicated below for the specified building design life, except as approved by the **[Owner] [Architect/Engineer]** in cases where practical difficulties are identified in the preliminary BSLP.

building design life (years)	building element design life (years)					
	structural elements and/or inaccessible elements	expensive and/or difficult replacement	major replaceable	mechanical, electrical, plumbing, and energy generation	roofing	site hardscape
150	150	100	40	20	20	30
100	100	100	40	20	20	30
60	60	60	40	20	20	30

- a. Structural elements include UNIFORMAT II Level 2 designations:
 - A10 Foundations
 - A20 Basement Construction
 - B10 Superstructure
 - b. Mechanical, electrical, plumbing and energy generation services include UNIFORMAT II Level 2 designations:
 - D20 Plumbing
 - D30 HVAC
 - D40 Fire Protection
 - D50 Electrical
 - D60 Energy Generation
 - c. Roofing includes UNIFORMAT II Level 3 designations:
 - B3010 Roof Coverings
 - B3020 Roof Openings
 - d. Site Hardscape includes UNIFORMAT II Level 3 designations:
 - G2010 Roadways
 - G2020 Parking Lots
 - G2030 Pedestrian Paving
- B. Basis of Determination:
1. Determination of building element design life shall assume:

- a. Normal operation and use.
 - b. Maintenance provided in accordance with manufacturer's published recommendations.
2. Determination of building element design life shall be based upon one or more of the following:
- a. Data provided by a manufacturer. **[If a manufacturer's warranty is provided for the product, the design life shall be the amount of time specified in the manufacturer's warranty.]**
 - b. Data provided by a related professional or trade organization.
 - c. Data provided by independent testing laboratory or academic review.
 - d. Other information, including professional experience or observation of similar construction or materials or in similar conditions, as approved by **[Owner] [Architect/Engineer]**.

SPECIFIER NOTE:

Whatever the purpose of the sample, adhering to the principles of probability sampling will allow the uncertainties, such as bias and variance of estimates or the risks of the rational disposition or action, to be calculated objectively and validly from the theory of combinatorial probabilities. ASTM E105 addresses probability sampling and the preparation of a sampling plan for a specific material.

An outlying observation, or outlier, is one that appears to deviate markedly from other members of the sample in which it occurs. ASTM E178 addresses outlying observations in samples and how to test the statistical significance of them.

3. Sampling operations shall conform to ASTM E105 for probability sampling and to ASTM E178 for outliers.

SPECIFIER NOTE:

Service life test data often show different distribution shapes than many other types of data. This is due to the effects of measurement error (typically normally distributed), combined with those unique effects which skew service life data towards early failure (infant mortality failures) or late failure times (aging or wear-out failures). ASTM G166 outlines some generally accepted methods of statistical analyses which are useful in the interpretation of service life data. ASTM G172 outlines generally accepted methods of statistical analyses that are useful in the interpretation of accelerated service life data.

4. Interpretation of service life data shall follow methods described in ASTM G166 and ASTM G172.

PART 2 - PRODUCTS

PART 3 EXECUTION

END OF SECTION