

Appendix M-0: Suggested Implementation of All Material and Waste Guidelines

M.1 Life Cycle Assessment of Building Assemblies

Agency Planning

- Refer to Performance Management Guideline P.2 Planning for Conservation for phase recommendations in addition to those indicated below. Coordinate efforts of P.2 with M.1 so that all aspects of life cycle materials use are considered together.
- Establish recommendations for life of building and major building systems based on typical program, expectations for future expansion and reuse, and considerations for flexibility and adaptability.

Schematic Design

- Complete Guideline M.1 evaluation using either the *Athena Eco-Calculator for Assemblies*, or *Athena Environmental Impact Estimator*. Enter building data in B3 Guidelines Tracking Tool at www.msbgtracking.com to establish a custom LCA benchmark for embodied carbon impacts. Enter results from Athena calculations and submit with the SD package.
- If the material lifecycle plan includes disassembly goals, establish materials, products, or components that support disassembly goals and develop design strategies to achieve these goals. At this design phase, employ design strategies to reflect the following considerations as needed to meet disassembly goals:
 - Use structural systems, cladding systems, and non-load bearing wall systems that facilitate disassembly.
 - Use structure/shell systems that maintain integrity when demounted or disassembled (i.e. steel, glass, or concrete and panel claddings)
 - Use materials, systems, and components that can be assembled or fastened in a manner that facilitates reassembly into new construction or remodeling.
 - Provide cost and environmental data for comparison and evaluation.
- Where disassembly is not an option, or proves less efficient because of the expectations for the full life cycle of the building, establish materials, products, and components that promote durable construction that supports life-cycle goals.

Design Development

- Refine selection of materials and products to reflect project plan team recommendations for overall environmental performance for maximum flexibility, adaptability, and disassembly. At this design phase, employ design strategies to reflect the following considerations:
 - Use materials, systems, and components that can be recycled or reused in whole or in part.
 - Use materials that are durable, weather well, and last for the intended lifetime of the structure (including masonry, steel, glass, and some timber products such as beams, columns, floorboards, etc.)
 - Use materials, systems, and components that can be assembled or fastened in a manner that facilitates reassembly into new construction or remodeling.
 - For greatest flexibility, use homogeneous materials, products, or assemblies that facilitate separation and reuse, additional lateral recycling, or are readily

biodegradable. However, if using composite, glued, adhered, or laminated components, select those that can be reused, deconstructed, recycled again, or composted, if possible. Ensure if composite, glued, laminated, or adhered materials are selected which have the potential to off-gas, they are properly sealed during or after fabrication and before occupancy.

- Determine final building assemblies and enter results in B3 Guidelines Tracking Tool at www.msbgtracking.com.

Construction Documents

- Represent chosen building assemblies from Guideline M.1 in drawings and specifications.
- Develop final drawings and specifications detailing specific system requirements for disassembly, including description of fastening systems, connectors, and recommendations for reuse of materials to be reused within existing construction or which could be reused for other construction in the future.

Construction Administration

- Document any changes to recommendations for construction that occur that may seriously impact the future disassembly of components or materials.
- Observe construction site to verify that materials, products, and systems are being correctly installed to preserve project goals and objectives as represented in the drawings and specifications.

Next Use

- During considerations for the "next use" of the facility, consult the project data history to identify and inventory systems and building components that can be disassembled for reuse, salvage, or recycling and document their inclusion in project renovation, remodeling, or deconstruction for use in the future or at another location.

M.2 Evaluation of Environmentally Preferable Materials

Schematic Design

- Based on the service life of the building, select materials that have durability appropriate for that service life, materials that are salvaged or reused, and materials that are renewable / bio-based.
- Make initial selection of building materials and products and enter results in B3 Guidelines Tracking Tool at www.msbgtracking.com
- Provide cost data for comparison and evaluation.

Design Development

- Refine selection of materials and products and enter results in B3 Guidelines Tracking Tool at www.msbgtracking.com
- Research suppliers, costs, scheduling and availability of materials that may impact material selection.
- Provide updated cost data for comparison and evaluation.

Construction Documents

- Represent chosen materials from Guideline M.2 in drawings and specifications.

- Develop detailing and construction recommendations that minimize material use and maximize performance of materials to support 'material resource efficiency' requirements.
 - Compile material and product documentation from the manufacturer, declaring life cycle and warranty recommendations indicating durable life cycle projections for building components.
 - Provide specifications that require contractor submittals highlighting service life of materials installed.
- Provide updated cost data for comparison and evaluation.

Construction Administration

- Monitor submittals to ensure project includes selected materials; review substitutions based on selected criteria to ensure consistency and compliance with goals and objectives.
- Monitor construction site to verify that materials, products, and systems are being correctly installed to preserve project goals and objectives.

Next Use

- During considerations for "next use" of the facility, incorporate material selections which reflect selections that support use of durable materials, which can be disassembled, reused, or recycled.

M.3 Waste Reduction and Management

Pre-design-Programming

- Evaluate agency operational waste management procedures and develop implementation goals for incorporation in building program and design. Set a goal to reduce and recycle at least 50% of the waste generated during building operation
- Provide dedicated recycling areas, processing and holding space, and reverse distribution space in the building. A guideline is to provide 20 square feet of space for recycling for every 10,000 square feet of occupied space up to 50,000 square feet. Over 50,000 square feet, provide at least 100 square feet of space.
- Reduction of construction waste through deconstruction, salvage, recovery, and appropriate design and detailing are primary goals.
- Set goals for reduction/recycling/salvage/disposal for construction and packaging waste based on project type and availability of local programs.

Schematic Design

- Establish project occupancy goals for waste management during the life cycle of the building. Incorporate areas to support those goals through first and subsequent occupancy cycles.
- Establish goals for landfill diversion and adopt a construction waste management plan to achieve these goals.
 - Minimal list for inclusion: Recycling land clearing debris, cardboard, metals, brick, concrete, plastic, clean wood, glass, gypsum wallboard, carpet, and insulation.

Design Development

- In planning, set aside a staging area on site for collecting, storing, and processing packaging that needs to be returned to the vendor, along with an area for construction waste management (salvage/recycling/disposal.)
- Develop environmentally responsible packaging criteria. Identify suppliers that use environmentally responsible approaches to packaging. Favor suppliers that meet these criteria.
- Refine selection of materials and products to reflect project team recommendations for overall environmental performance for minimal creation of construction, packaging, and hazardous waste.

Construction Documents

- Develop details and specifications that support the minimization of material use and clearly require construction waste management that meets project requirements.
- Include specification language mandating compliance with the pursued level of construction waste landfill diversion.
- Request reduced, reused or eliminated material packaging.

Construction Administration

- Monitor submittals to ensure project construction waste program includes materials specified; review revisions to program to ensure consistency and compliance with goals and objectives. Enter actual construction waste disposal and recycling in B3 Guidelines Tracking Tool at www.msbgtracking.com.

Ongoing Occupancy

- Enter actual operations waste disposal and recycling in B3 Guidelines Tracking Tool at www.msbgtracking.com.

Next Use

- During considerations for "next use" of the facility, verify selections that can be recycled or salvaged.