



**APPENDIX F
SUSTAINABILITY AND CONSERVATION
INITIATIVES**

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F.1 OVERVIEW SUSTAINABILITY AND CONSERVATION INITIATIVES

The purpose of this analysis is to identify, review, and select potential sustainability and conservation strategies, practices, means and methods (collectively, sustainability initiatives) that can be applied to Airport-oriented elements . Many of these initiatives may result in reduced energy consumption and/or reduced environmental impact from airport planning and design, demolition and construction, and operations and maintenance. Initiatives can be implemented in a stand-alone fashion but are most effective when employed with other initiatives in the same category. Regardless of how quickly the identified initiatives are able to be implemented, sustainability and conservation at the most elemental levels are a step toward a better future for the Airport.

Sustainability can be traced back to the most referenced definition put forth by the United Nations (UN) World Commission on Environment and Development (WCED) in 1987. In establishing the commission, the UN General Assembly recognized that environmental problems were global in nature and determined that it was in the common interest of all nations to establish policies for sustainable development defined as “meeting the needs of the present without compromising the ability of future generation to meet their own needs.”

This definition has been modified and readdressed by many organized bodies seeking to craft a more contextual specific version. An example of modern refinement is the 2009 Jefferson County Comprehensive Master Plan Draft definition that reads “Sustainability is an approach to balancing economic, environmental and social considerations, in order to achieve an improved quality of life for ourselves and future generations.” For the purposes of conformity and consistency with existing County policies and programs, this document adopts the Jefferson County definition.

In the most literal sense, *conservation* is the careful preservation and protection of resources. More roundly applied in the context of development, conservation is the planned management of a natural resource to prevent exploitation, destruction, or neglect. Conservation differs from sustainability in that the practice of conservation may not always be sustainable. Conservation also is viewed largely as a component of sustainable practices and not a primary strategy that could be defined as one that is sustainable.

This analysis will incorporate sustainability and conservation initiatives as they apply to the Master Plan in the areas of Planning and Design, Demolition and Construction, and Operation and Maintenance. Several case studies and literature were reviewed and included reports from the US Green Building Council, American Planning Association, American Institute of Architects, American General Contractors and other industry trade groups. Many of these groups actively promote and integrate sustainable and conservation strategies into design, construction, operation and

maintenance of the built environment. In particular, the US Green Building Council has emerged as the primary sustainable strategy and evaluation organization.

F.2 LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED®)

LEED® is an internationally recognized green building certification system that provides third-party verification that a building or community was designed and built using strategies aimed at improving performance across five criteria: energy savings, water efficiency, carbon dioxide emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

Several specific key areas are evaluated for LEED® certification; these include sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, locations and linkages, awareness and education, innovation in design, and regional priority. Projects applying for LEED® certification receive points for each key area they meet which then qualifies the project as one of four certification levels. The LEED® points are awarded on a 100-point scale, and credits are weighted to reflect their potential environmental impacts. The levels are “certification” (requiring 40-49 points), “silver” (requiring 50-59 points), “gold” (requiring 60-79 points), and “platinum” (requiring 80-100 points). Achieving these point thresholds enables the sponsor to display and publicize the LEED® rating for the associated project.

In seeking LEED® certification, a continuing challenge has been and will continue to be the need to educate project team members that include contractors, construction management, and consultants. Each project team member needs to be aware of the LEED® certification process, how they contribute to the process, and the level and type of required information expected from them. Educating project team members about their responsible elements of the rating system is crucial to success.

The current LEED® system does not include airports as a specific certification system using rating criteria, but does not restrict the applicability of rating criteria. Building construction, associated site development, and interior remodeling are the most appropriate areas in which LEED® strategies can be applied. The difficult connection between LEED® and airports primarily occurs in airfield specific construction, such as runways or taxiways. The airfield can use portions of LEED® criteria, but will not meet the prerequisites for certification. Given the limitations of the LEED® criteria across a broad spectrum of airport development projects, this analysis recommends pursuit of LEED® certification as applicable on a project by project basis, while implementing LEED® criteria as applicable even when the basic thresholds for certification cannot be met. In this manner, the airport can apply the goals and intent of the criteria to a sustainable or conservation project benefit.

F.3 SUSTAINABILITY AND CONSERVATION INITIATIVES FRAMEWORK

In order to best consider the implementation of sustainability and conservation initiatives, the development of a framework within which to categorize and prioritize initiatives is useful. The

shape and form of such a framework is variable dependant on the timeframe of implementation; the scope and scale of an initiative; and the type of initiative considered for implementation. Despite these variables, the framework can be thought of in terms of three levels: Primary, Secondary, and Tertiary.

Ideally, a viable framework would initially consider the basic elements of air, water, energy, and earth. These basic elements are frequently targeted for sustainable and conservation initiatives. When properly addressed and considered in the context of available resources, these initiatives can deliver a significant return considering the social, economic and environmental goals of a sustainability and conservation initiatives framework. The overall goal of any framework would be to analyze one or more of the primary initiatives and implement recommendations that would improve or enhance the economic, social or environmental aspects of the airport *and the surrounding community*. In considering a broad impact as well as the internal benefits to the Airport, it can solidify a role as a responsible operator well beyond the traditional aviation user base.

F.3.1 Primary Sustainability and Conservation Initiatives Framework

The Primary Sustainability and Conservation Initiatives Framework includes those policy and strategy initiatives or planning studies that provide an overview from which further decision-making and project identification can be made. The overview will provide quantifiable measures, projects, policies, strategies, means, methods, operational procedures and/or outcomes that can be catalogued as secondary or tertiary elements of a sustainable or conservation initiative. Examples of appropriate initiatives would include:

- Master Development and Drainage Plan – this type of plan typically studies the existing hydrology of the developable and undevelopable areas of the airport and makes recommendations to accommodate future runoff capture, storage, conveyance and/or basin developments;
- Airport Energy Audit – This type of study typically analyzes the energy needs of the a facility on a single level or combination of multiple levels (building specific, owner specific, or even airport-wide) and provides strategies, infrastructure, and operational methods to reduce energy consumption at the selected level of analysis; and
- Greenhouse Gas Analysis – This type of study typically identifies the existing quantifiable greenhouse gasses attributable to the operation and maintenance of an airport. In quantifying the emissions, recommendations for potential reduction goals can be identified as well as strategies, means, and methods of achieving or exceeding such goals.

F.3.2 Secondary Sustainability and Conservation Initiatives Framework

The Secondary Sustainability and Conservation Initiatives Framework includes those projects and operational initiatives that are consistent with Primary Sustainability and Conservation Initiatives Framework. These initiatives may be broadly applicable or narrowly specific in terms of location. Examples of associated projects or operational initiatives using the Primary Sustainability and Conservation Initiatives Framework in F.3.1 would include:

- Detention and Retention Pond Design and Construction;
- Airport Terminal Energy Reduction Strategies; and
- Airport Maintenance Equipment Alternative Fuels Implementation Plan.

F.3.3 Tertiary Framework

The Tertiary Sustainability and Conservation Initiatives Framework includes those specific project or operational initiatives that are consistent with and the result of the Secondary Sustainability and Conservation Initiatives Framework. The Tertiary Sustainability and Conservation Initiatives Framework provide project and operational initiatives at a level of detail resulting in implementation of the intent conveyed by the Primary Sustainability and Conservation Initiatives Framework. Examples of associated projects or operational initiatives using the Primary Sustainability and Conservation Initiatives Framework in F.3.1 would include those that:

- Implement operation and maintenance strategies for a specific retention pond that results in a reduction in water quantities to an offsite conveyance;
- Install proximity light switches to reduce office electrical consumption; and
- Convert maintenance vehicles to 100% biodiesel compatibility and operation.

F.3.4 Summary

A viable Sustainability and Conservation Initiatives Framework will consider a variety of factors at all levels (Primary, Secondary, and Tertiary). With limited capacity for funding among the considerations for implementing a Sustainability and Conservation Initiatives Framework, the following initiatives attempt to provide a broad overview of the most applicable airport-related recommendations for consideration or implementation. These recommendations were largely drawn from the Sustainable Aviation Guidance Alliance (“SAGA” found at <http://www.airportsustainability.org>), which is a coalition of aviation interests formed to assist airports with identifying sustainability and conservation initiatives. There are over 900 initiatives that can be implemented at various levels of the Sustainability and Conservation Initiatives Framework. As the field of study broadens and improves, the database of sustainable initiatives

will change. Thus, the policies described in the remainder of this Appendix may need to be reviewed and improved as the Sustainability and Conservation Initiatives Framework takes shape.

F.4 PLANNING AND DESIGN

Planning and design that promotes and encourages sustainability and conservation initiatives would enable the Airport to implement selected initiatives at the earliest possible opportunity in the development process. When considered in the conceptual phase of vertical or horizontal project design; implementing recommended initiatives saves considerable time and prevent irreversible steps that may prevent the viability of a project within current or future sustainable and conservation initiatives. The recommended initiatives may be implemented with large or small projects in mind. The intent of the following initiatives is to guide a project from the earliest phases, rather than prescribe items that address project-specific components. Planning and Design initiatives include:

- Conceptual Development;
- Site Planning;
- Design Innovations;
- Architecture;
- Landscaping;
- Stormwater Management;
- Lighting; and
- Signage.

F.4.1 Conceptual Development

Adopt processes, procedures, rules, regulations and policies for development that meet the needs of the present and anticipate the needs of the future without compromising the ability of future generations to meet their own needs.

F.4.2 Site Planning

Eliminate or minimize disruption of the existing environment as much as possible by redeveloping areas that have been used and/or abandoned. Avoid greenfield sites where other built sites may be reclaimed for new development.

F.4.3 Design Innovations

Consider horizontal and vertical designs that consider the environmental, social and economic impacts of products, processes and systems. Examples of design innovations include the adoption

of low water usage irrigation, supplemental solar energy, or recycling concrete into base layer rubble for roads.

F.4.4 Architecture

Create buildings that contribute to a community vision of sustainability and conservation by applying creative architectural principles.

F.4.5 Landscaping

Design the Airport landscaping to limit or eliminate the use of potable water, or other natural surface or subsurface water resources available for landscape irrigation on or near the project provides a reduction in consumption as well as increasing the longevity of that landscaping even in drought years.

F.4.6 Stormwater Management

Limit disruption of natural hydrology, and reduce or eliminate water pollution by implementing initiatives that reduce impervious cover, increase on-site infiltration, and manage storm water runoff. As stormwater management permits and regulations continue to tighten up the nature and amount of contaminants that may be discharged into stormwater collection, stormwater management will be a critical element for potential cost savings over a long-term timeframe.

F.4.7 Lighting

Implement Airport building and non-airfield lighting to minimize light trespass and reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce development impact on nocturnal environments. Particularly on the airside, pilots and other users are able to better see the airfield environment when light containment strategies are practiced.

F.4.8 Signage

Lower signage life-cycle costs by using efficient new technologies such as low-power, low-maintenance LED lighting when signage needs to be visible at night or in low-light conditions. This initiative may result in reduced power requirements and extended equipment costs and offer an opportunity to implement recyclable materials.

F.5 DEMOLITION AND CONSTRUCTION

Demolition and Construction as it relates to sustainability and conservation initiatives is the effort in providing buildings that use less non-renewable resources and less energy, cause less pollution and create less waste but still provide the benefits of the initial construction project. The reduction of environmental impacts as a result from demolition and construction requires an additional level of control over both processes, specifically controlling the amount and location of waste. Sustainability and conservation initiatives as applied to all phases of the demolition and/or construction for airside and landside development include short-, mid-, and long-term capital projects as discussed in Chapter 5.

Demolition and Construction includes implementing initiatives that encompass:

- Sustainable Site Development;
- Water Efficiency;
- Energy and Atmosphere;
- Materials and Resources; and
- Indoor Environmental Quality

F.5.1 Sustainable Site Development

Reduce the adverse environmental impacts of demolition and construction on a project area, specifically by implementing initiatives that:

- Reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation;
- Avoid development of inappropriate sites and reducing the environmental impacts from the location of a building on a site;
- Channel development to urban areas with existing infrastructure, protect greenfields, and reserve habitat and natural resources;
- Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land;
- Reduce pollution and land development impacts by using alternative transportation;
- Conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity; or
- Provide a high ration of open space to development footprint to promote biodiversity.

F.5.2 Water Efficiency

Maximize water efficiency within buildings (to reduce the burden of municipal water supply and wastewater systems) and reduce the generation of wastewater and potable water demand, while at the same time increasing the local aquifer recharge.

F.5.3 Energy and Atmosphere

Maintain a balance between air quality and energy consumption, specifically by implementing initiatives associated with insulation, air infiltration, windows, heating and cooling distribution, space heating and cooling equipment, domestic hot water, lighting, appliances, and renewable energy.

F.5.4 Materials and Resources

Use Materials and Resources throughout building demolition and construction by implementing initiatives that:

- Extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport;
- Divert construction and demolition debris from disposal in landfills and incinerators, redirect recyclable recovered resources back to the manufacturing process, and redirect materials to appropriate sites;
- Reuse building materials and products in order to reduce demand for virgin materials and to reduce waste, thereby reducing impacts associated with the extraction and processing of virgin materials;
- Increase demand for building products that incorporate recycled materials, thereby reducing impacts resulting from extraction and processing of virgin materials;
- Increase demand for building materials and products that are extracted within the region, thereby supporting the use of local resources and reducing the environmental impacts resulting from transportation;
- Reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials; and
- Encourage environmentally responsible forest management.

F.5.5 Indoor Environmental Quality

Reduce indoor air quality problems resulting from the construction and/or renovation process in order to help sustain the comfort and well-being of the construction workers and building occupants.

F.6 OPERATION AND MAINTENANCE

Operation and Maintenance as it relates to sustainability and conservation includes all aspects of operating and maintaining a building over the course of its useful life. A well-designed and properly executed Sustainability and Conservation Initiatives Framework is critical to the overall success of a sustainably designed facility. Sustainability and conservation initiatives as applied to operation and maintenance for airside and landside development should include buildings and building systems. Proposed initiatives will be integrated into operations and maintenance activities for Rocky Mountain Metropolitan Airport facilities. Operation and Maintenance initiatives include:

- Indoor Environmental Quality;
- Energy and Atmosphere;
- Materials and Resources; and
- Operational Innovation.

F.6.1 Indoor Environmental Quality

Operate and maintain Indoor Environmental Quality as it relates to the comfort, safety, and health of a building's occupants by implementing initiatives that:

- Establish minimum indoor air quality performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants;
- Minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to Environmental Tobacco Smoke;
- Provide capacity for ventilation system monitoring to help sustain occupant comfort and well-being;
- Provide additional outdoor air ventilation to improve indoor air quality for improved occupant comfort, well-being, and productivity;
- Reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants;
- Minimize exposure of building occupants to potentially hazardous particulates and chemical pollutants;

- Provide a high level of lighting and thermal systems controlled by individual occupants or by specific groups in multi-occupant spaces to promote the productivity, comfort, and well-being of building occupants;
- Provide a comfortable thermal environment that supports the productivity and well-being of building occupants; and
- Provide the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

F.6.2 Energy and Atmosphere

Implement efficient energy use in buildings by implementing initiatives that:

- Establish the minimum level of energy efficiency for the proposed building and systems;
- Achieve increasing levels of energy performance above the baseline standard to reduce environmental and economic impacts associated with excessive energy use;
- Encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use;
- Reduce ozone depletion and supporting early compliance with the Montreal Protocol while minimizing direct contribution to global warming;
- Provide for the ongoing accountability of building energy consumption over time; and
- Encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.

F.6.3 Materials and Resources

Reduce waste generated by building occupants that is hauled to and disposed of in landfills.

F.6.4 Operational Innovation

Use innovative ideas to increase the environmental efficiency of building operation.