DSC Policy on  
Museum Lighting Power Density Design Values

National Park Service (NPS) - Denver Service Center (DSC) | 3-15-13

*Lighting Power density for museum general exhibition areas shall be less than or equal to 1 watt per square foot (with a goal of no more than 0.7 watts per square foot). An additional 1 watt per square foot (with a goal of no more than 0.7 watts per square foot) is permitted for highlighting exhibits. The designed power density for the general museum lighting and exhibit lighting shall be included in building energy calculations when demonstrating energy efficiency beyond an ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) 90.1 compliant version of the same building by at least 30%. The model for the ASHRAE 90.1 compliant version of the building shall assume lighting power density is no greater than 1 watt per square foot for general exhibition areas and no greater than 2 watts per square foot in areas highlighting exhibits.*

**Background**

The Denver Service Center (DSC) will pursue sustainability in all DSC projects including the efficient use of energy.

Lighting has a substantial impact on the energy use of buildings. Not only is energy used to create light, but heat from lighting must be removed from areas, particularly during the cooling season. Recently, projects have been proposed with lighting power densities as high as 10 watts per square foot. This level of lighting or more importantly this level of power use has a dramatic impact on the sustainability of a project. 10 watts per square foot is the same as approximately 350 square foot per ton of cooling. 350 square foot per ton is a typical maximum summertime cooling requirement for a commercial building. Therefore, a lighting power density of 10 watts per square foot approximately doubles the peak cooling requirement of a typical space. In contrast, lighting power densities of 1-2 watts per square foot add about 10-20% to this typical peak cooling requirement.

ASHRAE 90.1-2007 limits lighting power density for museum general exhibition areas to 1 watt per square foot. It also provides an allowance of an additional 1 watt per square foot for highlighting art or exhibits. While ASHRAE 90.1-2007 also provides an exception to theses limits for "display or accent lighting that is an essential element for the function performed in galleries, museums, and monuments", it is the position of the DSC that this exception should not apply to buildings or exhibits for which it is responsible.

Existing federal regulations require new and major renovations to federal buildings demonstrate the resulting construction uses at least 30% less energy than a comparable ASHRAE 90.1-2007 compliant building. If every energy consuming element of the building was designed to use less energy by this 30%, the lighting power density for museum general exhibition areas should be limited to 0.7 watts per square foot with an additional allowance of 0.7 watts per square foot for highlighting exhibits.