

# **Building Design & Construction Standards**

**Prepared By  
Operations Services  
Design Standards Team**

**August, 2008**



CITY OF FORT COLLINS BUILDING DESIGN & CONSTRUCTION STANDARDS were prepared by the Operations Services Department to assist and guide Architects & Engineers (A&E) and City staff in the preparation of designs and contract documents for projects administered by the Department. All shall try to conform to the Standards as applicable to the specific project. This manual includes minimum criteria for specific materials and equipment along with sole-source City standardized systems.

The department responsible for revisions to these Standards is Operations Services. Any individual or department can propose a change to these Standards. Changes should be submitted in writing, along with the justification for the change, to the Director of Operations Services. The proposed change will be presented to the Committee, consisting of representatives from PMPD, Facilities Maintenance, Systems Control, and the Director of Operations Services. If the majority agrees, the change will become part of the Standards.

FACILITY SERVICES' BUILDING & CONSTRUCTION DESIGN STANDARDS TABLE OF CONTENTS

<u>PART</u>	<u>TITLE</u>	<u>PAGES</u>
I.	GENERAL .....	3-8
II.	SITE DEVELOPMENT .....	9-28
III.	BUILDING DEVELOPMENT .....	29-59
IV.	SPECIFICATIONS/GENERAL .....	60-62
	Division 0/1 - General Requirement .....	63
	Division 2 - Site Work .....	64-67
	Division 3 - Concrete .....	68-71
	Division 4 - Masonry .....	72-73
	Division 5 - Metals (Arch. & Structural).....	74-76
	Division 6 - Woodwork.....	77-78
	Division 7 - Thermal & Moisture Protection .....	79-83
	Division 8 - Doors & Windows .....	84-88
	Division 9 - Finishes .....	89-97
	Division 10 - Specialties .....	98-99
	Division 11 - Equipment.....	100
	Division 12 - Furnishings .....	101
	Division 13 - Special Construction.....	102
	Division 14 - Conveying Systems.....	103
	Division 15 - Mechanical.....	104-106
	Division 16 - Electrical .....	107-108
	Section 17 - Other Information.....	109-110
V.	APPENDIX	
	A - Constructability Review General Guidance .....	A1-A18
	B - Life Cycle Cost Sample .....	B1
	C - Curb Ramp Detail for ADA Compliance (Not Used) .....	C1
	D - Raised Access Floor Delivery (Not Used) .....	D1
	E - Custodial Closet General Specifications.....	E1-E18
	F - Key and Card Access .....	F1-F2
	G -Telecommunications Network Standards.....	G1-G11
	H – Irrigation Installation Standards .....	H1-H9
	I – Sustainability Design Standards.....	I1- I3
	J – Construction, Deconstruction or Demolition Waste Diversion	J1-J3
	K – Energy Modeling Specification.....	K1-K11
	L – Building Enclosure Commissioning .....	L1-L12
	M – Space Standards.....	M1-M2
	N – Stormwater Management Plan .....	N1-N94
	O – Quality Assurance/Quality Control Plan.....	O1-O31

FACILITY SERVICES' BUILDING & CONSTRUCTION DESIGN STANDARDS  
INTRODUCTION/GENERAL

I. GENERAL

A. Introduction

The planning and design standards are to be used as guidelines when developing a design. They are broken down into basic sections: (II.) Site Development - considerations that affect building location, placement, orientation, access, etc; (III.) Building Development philosophical design and planning commentary to be taken into account; (IV.) Specification Requirements; and (V.) Appendix.

Project Design normally progress through three phases:

1. Conceptual design - basic functional layout, community impacts alternatives, site considerations, and estimated costs are developed.
2. Preliminary design-alternatives are developed, limited technical design is done, functional layout is completed, public impact/comments are incorporated into design, and estimated costs are refined.
3. Final design - the technical specifications and drawings are prepared to complete the contract documentation, a final project cost estimate is developed.

B. LEED Requirements

1. The City of Fort Collins has established a goal of meeting LEED\_NC Gold Certification for all new City constructed buildings sized 5,000 gross square feet or more. The design of these buildings shall incorporate as many of green building principles (energy & water conservation, material selection, site location, etc.) as feasible to reduce building operating and maintenance costs along with minimizing environmental impacts.
2. To maintain fiscal integrity of the project – if the payback from the additional cost of meeting Gold Certification over that of meeting Silver Certification is greater than ten years OR if the payback from the additional cost of meeting Gold Certification when compared to the local market cost for a similar building type is greater than ten years, then the City staff will recommend which level of LEED certification is appropriate for that particular project.

3. See Appendix I for additional LEED Guidelines.

C. Purpose Of Standards

1. It is not the intent of this Standard to cover in detail all types of buildings. However, the Standards established herein are to be used as a design reference for buildings constructed by the City of Fort Collins. This is not to be a substitution for the technical competence expected of a design or engineering professional; therefore, any recommended changes should be provided to Operations Services Staff.
2. This standard deals with new construction, alterations/remodels, and repairs to existing buildings.
3. For each specific project only the applicable portions of the standard are to be used.

D. Design and Construction

1. Design and construction shall conform to or exceed the minimum applicable standards of the City of Fort Collins Zoning and Building Codes, the Fort Collins' Energy Code for commercial, industrial and high-rise residential buildings, Fort Collins' City Plan, and the ADAAG
2. With respect to additional governing jurisdictional authorities, they shall be referred to as supportive and/or in addition to the City Building Code requirements when applicable. The following authorities shall be considered in any given project design:
  - Poudre Fire Authority
  - Larimer County Health Department
  - City of Fort Collins Community Planning and Environmental Services
  - City of Fort Collins Utility Services
  - City of Fort Collins Cultural Library and Recreation Services
  - City of Fort Collins Transportation Services
3. Specific Code requirements are to be adhered to when referring to kitchen facilities, restroom facilities, fire fighting access and fire exiting/life safety aspects, swimming/wading pools and HVAC systems.

4. Abbreviations

ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADAAG	ADA Accessibility Guidelines - Buildings and Facilities
AIA	American Institute of Architects
ANSI	American National Standards Institute
ARI	Air Conditioning & Refrigeration Institute
ASA	American Standards Association
ASHRAE	American Society of Heating, Refrigeration & Air Conditioning Engineers
ASLA	American Society of Landscape Architects
ASM	American Society of Metals
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASTM	American Society for Testing & Materials
CSI	Construction Specifications Institute
IES	Illuminating Engineering Society
NCMA	National Concrete Masonry Association
NEC	National Electric Code
NEMA	National Electrical Manufacturer's Association
NFPA	National Fire Protection Association
PCA	Portland Cement Association
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
IPC	International Plumbing Code
IMC	International Mechanical Code
IFC	International Fire Code
IBC	International Building Code
LEED-NC	Leadership in Energy & Environmental Design - New Construction
LEED-EB	Leadership in Energy & Environmental Design - Existing Building

E. Environmental Policies

1. Prohibited Materials. The use of the following materials is prohibited on all projects:
  - Products containing asbestos.
  - Products containing urea formaldehyde.
  - Products containing polychlorinated biphenyls.
  - Solder or flux containing more than 0.2 percent lead and domestic water pipe or pipe fittings containing more than 8 percent lead.
  - Paint containing lead.

- HBCD (Hexabromocyclododecane) – Commonly used in rigid insulation material as a fire-retardant.
2. Lead-Based Paint in Alteration or Demolition Projects. When alteration or demolition requires sanding, burning, welding or scraping painted surfaces, test the paint for lead content. If lead is found, implement the controls required by OSHA in 29 CFR 1926.62.
  3. Recycled Materials. Architects and Engineers should use recycled materials to the maximum extent practical and economically viable within the project requirements.
  4. Prior to occupancy, run a purge cycle of 100% outside air for several days.

F. Demolition

Prior to commencing any exterior building demolition and removal, either a “Demolition-Removal” permit or a “Demolition-Construction” permit must be issued by the City of Fort Collins Building and Zoning Department. Contact the Building and Zoning Department of the City of Fort Collins at 221-6760 and obtain a copy of “Demolition Permits, Policy & Procedures” Memo #59, revised June 15, 1998.

G. Life Cycle Costing (L.C.C.)

1. Life cycle costing is an important analysis used in the selection of systems that generate significant operating costs and/or replacement costs.

In designs for new buildings and major alterations, life cycle cost analyses shall be performed to assist in the selection of various systems and is required in the A/E’s scope of work. An example of an HVAC life cycle cost analysis is provided in Appendix B-1.

Cost Elements

The life cycle cost analysis should use present value calculations.

It is important to note that present value calculations are only meaningful for design decision comparisons. Present value costs should never be used to make budgetary projections of actual costs.

Note: The following terms are used within present value life cycle cost formula:

FV = future value  
PV = present value  
TV = today's value  
D = real discount rate  
E = real growth escalation rate (the differential escalation rate that exists after removing the influence of general inflation)  
N = number of years to occurrence or the analysis period, as appropriate

2. Sustainability: Additional considerations to L.C.C. is the material's environmental appropriateness and ecological sensitivity when analyzed on a cradle-to-grave basis.

The complete life-cycle energy, environmental, and waste implications of each building material must be examined. This cradle-to-grave analysis is the tracing of a material or product, and its by-products, from its initial source availability and extraction through refinement, fabrication, treatment and additives, transportation, use, and eventual reuse or disposal. This tracing must include the tabulation of energy consumed and the environmental impacts of each action and material.

3. The following general design objectives shall be considered and utilized where feasible when designing or planning the construction of new buildings or renovation of existing buildings.
  - a. Reduce environmental impact through respect for natural systems and the ecology of the site by considering storm water management & pollution prevention, storm water detention & retention, natural solar shading, incorporating renewable resource use and other innovative environmental impact reduction designs.
  - b. Ensure energy efficiency by incorporating the use of sustainable energy sources, reduce energy costs reduction strategies through building design, maximizing the use of natural day light, daylighting, the use of energy efficient artificial lighting, passive heating/cooling and other cost effective energy conservation designs.
  - c. Ensuring resource conservation when considering the use of land, materials & building in the most efficient & effective manner through the use of pre-used construction materials, use of construction materials made from recycled materials, the minimizing construction waste, the use of water



minimizing fixtures and other cost effective source conservation designs and activities.

- d. Ensure the health & well-being of the building occupants & visitors through the use of low VOC materials (paint, cleaners, etc.), efficient HVAC design with fresh air to maintain the recommended CO2 levels and other indoor air quality and indoor environmental enhancing designs and activities.
- e. Strive to incorporate all the above sustainable approaches to achieve a comprehensive and holistic environmentally sustainable facility.

<b>Factors Considered in Choosing Products and Materials</b>	
Energy efficiency	Energy-efficient production methods Energy-efficient use Use of renewable source of energy
Resource responsibility	Minimal need for other materials Lower maintenance, durability Efficient use of resource material Recycled content Recyclable
Social/Public health responsibility	Avoidance of harmful chemicals in production Reduction of off-gassing Avoidance of harmful chemicals in disposal And reuse
Economic/functional responsibility	Cost effectiveness Availability Acceptability
Qualities of supplier on manufacturer	Local resource Local manufacture Local economic benefit In-house environmental programs