GENERAL DESIGN GUIDELINES

SUSTAINABILITY

General Sustainability Design Guidelines

July 2026

General Sustainable Development Design Guidelines

Introduction

Realberry is driven by a commitment to creating places people love while ensuring a resilient future. Our goal to reduce energy and water consumption across all holdings. By prioritizing resource efficiency and carbon reduction, Realberry aims to lead the Colorado real estate industry toward a sustainable future, ensuring that real estate development contributes positively to the planet's health. It is important to understand, that sustainable development and design encompass a comprehensive approach and a commitment to ongoing environmental responsibility.

As a landmark Realberry community, Centerra embodies these values through its commitment to sustainable development and design. Located in Loveland's unique ecological landscape, Centerra has had the longstanding goal of being a truly sustainable community aligning with the United Nations 2030 Agenda for Sustainable Development. This includes a dedication to meeting the needs of the present without compromising the ability of future generations to meet their own. This is not a secondary objective; it is a fundamental principle that guides the evolution of Centerra.

At the community level, Realberry expects individual projects to move beyond "prototypical" designs. Sustainable development at Centerra requires an intimate response to the unique local and regional context. We believe that building solutions must be environmentally sound from the outset, with specific attention paid to:

Energy Efficiency
Prioritizing daylighting, solar applications, and high-performance envelopes.

Water Stewardship
Implementing innovative conservation, building level metering, and low-impact irrigation.

Responsible Material Usage
Utilizing low-embodied-carbon construction methods and sustainable lifecycles.
Sustainability is not an "add-on" feature or a checklist of green products; it is a comprehensive approach to environmental responsibility. Realberry views development through a Value-Added lens rather than a "first-cost" mentality. Modern research consistently shows that sustainable buildings yield lower maintenance costs (approximately 20% lower), shorter payback periods, and an increase in asset value of roughly 10%.

Ultimately, sustainability concerns the entire lifecycle of a place—from how the land is used and where buildings are situated, to the education of the users of these spaces.

Sustainability is an integrated process driven by several key factors. Applicants for individual projects are expected to develop strategies that demonstrate how they balance the following:

User Experience
Prioritizing occupant health and comfort (spatial, auditory, and visual) while minimizing the energy and environmental loads required to support them.

Environmental Context
Leveraging Climate (wind, sun, and temperature), Vegetation, and Topography to influence building placement, drainage, pedestrian usage, and wildlife habitat.

Resource Stewardship
Materials & Circularity: Prioritizing the use of indigenous and regionally sourced materials to reduce transport emissions. Selection of low-embodied-carbon products, the integration of recycled content, and the implementation of construction waste diversion strategies to keep materials in use longer.

Water Management: Implementing a "water-first" design philosophy that goes beyond simple conservation. This includes high-efficiency building systems, climate-appropriate "low-water" xeriscaping, and site design that manages stormwater as a resource to recharge local aquifers and support the regional watershed.

Cultural Context
Respecting Socio-Cultural values and Architectural Traditions that reflect the unique history and evolution of Northern Colorado.

Economic Vitality
Ensuring that sustainable design is not a financial burden but a value-add for all stakeholers that creates long-term asset appreciation and a vibrant place for commerce. A place where people can conduct their daily lives in an economically sustainable way.

The following guidelines assist project teams in developing holistically sustainable projects that align with Centerra's guiding principles.

Every choice made during design and development has an environmental consequence. To ensure consistency with Centerra's mission, the guidelines are organized into four categories: General Criteria, Land Use and Site Design, Building Design, and Job Site Practices. The general criteria introduce broad concepts while the remaining sections provide more specific recommendations.

These guidelines, used in conjunction with nationally recognized resources like the LEED Rating System, define the integrated criteria required for a sustainable solution.

Note: While all guidelines are highly encouraged by the DRC if one of the following guidelines is marked with S it is a requirement of the DRC for project approval.

Certifications

As part of Centerra's ongoing commitment to Sustainable Design and Development, all applicants should demonstrate their level of compliance with the appropriate third party program as part of their DRC Applications for each application from Schematic Design through completion.

For non-residential and high-rise residential projects, the U.S. Green Building Council's LEED Green building rating system shall be used. Applicants are encouraged to pursue LEED certification, aiming for the highest feasible level for their project. It is a goal of Centerra to have applicable projects meet or exceed the current Silver standards for LEED Certification, (50 points) whether actually certified or not.

Leadership in Energy and Environmental Design (LEED)
The leading sustainable design evaluation system in the U.S. for non-residential and high-rise residential buildings.

Website: www.usgbc.org

Multi-Family projects may use the National Green Building Standard (NGBS) as an alternative to LEED. The goal is to meet or exceed the NGBS base-level standards, with strong encouragement to pursue the highest feasible certification level for the project regardless of formal certification.

National Green Building Standard (NGBS)
This program is an American National Standards Institute (ANSI) approved standard for green building practices.

Website: ngbs.com

SITES applies to a variety of project types with or without architectural structures and can be used independently or alongside LEED. For streetscapes, plazas, and residential or commercial projects, applicants are encouraged to achieve at least base-level certification while striving for their project's highest possible credits.

The Sustainable SITES Initiative (SITES)
This program provides standards for creating sustainable landscapes and other outdoor spaces.

Website: sustainablesites.org

S Centerra single-family projects are required to design to a HERS Index rating below 55, with the goal to achieve a rating of 50 or lower if possible.

Home Energy Rating System (HERS)
This program is a nationally recognized tool to identify a home's energy performance.

Website: hersindex.com

While full participation in these or other sustainabiliy programs is strongly encouraged and will be recognized by the DRC, participation-other than achieving the required HERS rating-will not be a condition of final DRC approval. Applicants must, however, demonstrate that they have made a good-faith effort to incorporate these initiatives by submitting the applicable industry certification checklist as part of their project submittal.

To assist in meeting these sustainability goals, applicants are encouraged to utilize professional consultants well-versed in these rating systems.

Resources

Several good resources are available to assist and guide the applicant in the design and development of their project, that should be used in conjunction with the following standards and guidelines. Some resources and concepts are better suited for residential construction, while others are oriented to non-residential uses and construction. While not a comprehensive list of potential resources, these resources were consulted in the preparation of this document.

- **High Plains Environmental Center**
  1854 Piney River Drive
  Loveland, Colorado 80538
  (970) 622-9697
  www.suburbitat.org

  The HPEC owns and manages much of Centerra's natural areas while providing information and education on environmental conservation and restoration. The center also operates a native plant nursery cultivating and selling species specifically suited for sustainable, local landscapes.

- **Centerra Construction Waste Diversion & Recycling Program (CWDRP)**
  centerra.com

  This resource details the requirements of the CWDRP. For all new commercial construction projects, applicants are required to implement a Construction Waste Diversion and Recycling Plan with the intent of diverting/recycling at least 60% of total construction waste. Below are preferred vendors for Centerra:

  Republic Services
  1941 Heath Pkwy Unit 2
  Fort Collins, Colorado 80524
  (970) 484-5556
  republicservices.com

  Sage Disposal
  8646 Blackwood Dr.
  Windsor, Colorado 80550
  (970) 556-9351
  sagedisposal.com

- **Institute for the Built Environment (IBE)**
  1501 Campus Delivery
  Fort Collins, CO 80523-1590
  (970) 491-5041
  chhs_ibe@mail.colostate.edu
  ibe.colostate.edu

  This program is a local resource that helps teams to coordinate projects that prioritize healthy and thriving environments.

- **International WELL Building Institute**
  wellcertified.com

  This program is a nationally recognized tool that prioritizes sustainable practices and human health.

- **Green Roofs for Healthy Cities (GRHC)**
  greenroofs.org

  GRHC is a non-profit professional industry association that has created design standards for green roofs and walls.

- **Cool Roof Rating Council (CRRC)**
  coolroofs.org

  CRRC provides information and ratings for cool roofing products.

- **Forest Stewardship Council (FSC)**
  fsc.org

  FSC is the gold standard for responsibly managed forests. FSC provides certification for responsibly sourced wood.

- **Continuous Insulation: Foam Plastic Applications for Better Building**
  continuousinsulation.org

  This website provides informational resources about Continuous Insulation and it's benefits.

- **WaterSense**
  epa.gov/watersense

  This website provides informational resources about the WaterSense program and label.

- **ENERGY STAR**
  energystar.gov

  This website provides information about ENERGY STAR rated energy efficient products, and information about the Energy Star program requirements based on project type.

1.0 General Criteria

1.1 Assemble a design team based upon sustainability credentials in addition to other criteria.

1.2 Approach each task with environmental responsibility and sensitivity.

1.3 Wherever possible incorporate systems and procedures to reduce carbon emissions that harm the environment.

1.4 Reduce and/or eliminate wastes at every opportunity.

1.5 Utilize energy-conserving systems, products, and practices.

1.6 Integrate environmental considerations in design and operational decisions.

1.7 Enhance natural ecosystems and preserve and promote urban wildlife opportunities.

1.8 Restore the environment at every opportunity.

1.9 Deal with the public in an open manner regarding environmental concerns, issues, and problems.

1.10 Develop owner/developer/management commitment to goals regarding environmental responsibility.

1.11 If the nature of a business requires the generation or storing of hazardous wastes, provide annual environmental audits and "progress reports", to be available for public review.

2.0 Land Use and Site Design

Principles

1. Control erosion to reduce negative impacts on water and air quality.

2. Reduce the environmental impact of the location of a building on a site, leave the most pristine areas "untouched".

3. Reduce pollution and land development impacts from vehicle use.

4. Protect existing natural areas and restore damaged areas for wildlife habitat.

5. Manage storm water run-off to limit disruption and pollution of natural water flows.

6. Reduce heat island effects of buildings and pavement to minimize impact on the micro climate.

7. Reduce water consumption through the use of water efficient landscapes.

8. Eliminate light trespass from the building and site to improve night sky and reduce development impact on nocturnal environments and xeriscape techniques.

2.1 Integrated Land Use

2.1.1 Promote pedestrian connections and reduce vehicular trips.

2.1.2 Provide shared parking opportunities to reduce total parking coverage.

2.1.3 Encourage development that complements surrounding uses that allows people to live, work, shop, learn, gather, and play as part of their experience in the community.

2.2 Efficient Land Use

2.2.1 Concentrate development within compact, walkable centers by clustering buildings to maximize land efficiency, thereby minimizing environmental impact on open space and wildlife habitats

2.2.2 Utilize parking garages/structures, where financially feasible, to reduce the size of open parking fields and heat island effect.

2.3 Transportation

2.3.1 Locate new developments adjacent to existing infrastructure to provide good connectivity, discouraging leapfrog development.

2.3.2 Connect to and expand pedestrian and bike trail systems and provide connectivity for pedestrians and bikes internal to the site between buildings.

2.3.3 Increase densities near existing or proposed mass transit opportunities.

2.3.4 Provide secure bicycle storage and consider adding shower/changing facilities for building occupants to encourage bicycle and pedestrian commuting.

2.3.5 Work with local transit management organizations to organize carpools, shuttle systems, and rideshare opportunities, to reduce reliance on single occupancy vehicles. Provide preferred parking for carpools and other incentives.

2.3.6 Provide and/or encourage alternative fuel vehicles and provide preferred parking for these vehicles.

2.4 Building Siting and Orientation

2.4.1 Reduce energy use by orienting buildings to make optimal use of passive solar heating, daylighting, and natural cooling.

2.4.2 Situate buildings to benefit from existing vegetation, where possible. Trees on east or west sides can dramatically reduce cooling loads.

2.4.3 Organize buildings, roads and parking on their sites to minimize the amount of cut and fill which is energy intensive and minimizes import/export of material.

2.4.4 Limit site disturbance, including earthwork and clearing of vegetation to 40 feet beyond the building perimeter, 5 feet beyond primary roadway curbs, walkways and utility trenches, and 25 feet beyond constructed areas with permeable surfaces (such as detention areas and landscape areas).

2.4.5 Provide shade (within 5 years) and/or use light colored/high albedo materials (reflectance of at least 0.3) and/or open grid pavement for at least 30% of the site's non-roof impervious surfaces, including parking lots, walkways, plazas, etc. to reduce heat island effects.

2.4.8 Cut and fill should be balanced to minimize reliance on imported or exported material and maintain sustainable earthwork practices.

2.4.9 Where feasible, fly ash should be used in place of Portland cement in the concrete mixes.

2.4.10 Radon control and mitigation should be considered in building design and construction. The site should be tested for radon prior to construction so that radon mitigation systems can be designed for the building to prevent indoor air quality problems.

2.5 Storm Water Management
(see also the General Landscape Design Guidelines)

2.5.1 Develop grading and drainage designs that minimize run-off, impervious surfaces, and utilize storm drainage systems to meet basic engineering requirements.

2.5.2 Direct water from parking lots, roof drains and other areas into landscape areas that could benefit from additional water and/or improve the quality of the storm water.

2.5.3 Utilize porous pavement systems to minimize concentrated run-off and allow water to percolate through the pavement. Examples include permeable pavers, modular pavers, porous asphalt, and porous concrete.

2.5.4 Utilize flexible paving systems, which adapt more naturally to site variations and can function as a porous pavement system.

2.5.5 Convey drainage along dedicated streets, private drives and swales along property lines, or in open space corridors. Sheet flow and surface drain where possible.

2.5.6 **S** Meet or exceed Centerra Natural Area Design Guidelines and City of Loveland and Urban Drainage Best Management practices and standards for storm water management and erosion control.

2.5.7 **S** Post development 1.5 year, 24 hour peak, run-off rates shall not exceed pre-developed 1.5 year, 24 hour, run-off rates.

2.5.8 Unless regional stormwater facilities are provided, design on-site storm water treatment systems to remove 80% of the annual post-development total suspended solids and 40% of the average annual post-development total phosphorous for all storms less than or equal to 2-year/24-hour storm by implementing either EPA or local Best Management Practices documents, whichever is more stringent.

2.6 Wetlands and Open Water

2.6.1 Wetlands provide multiple benefits to an ecosystem, including enhancing wildlife diversity functions as a part of the storm drainage system, and assist in water quality and flood control. If any modifications to existing wetlands is desired, it is likely to require permitting and involve the Army Corps of Engineers. Refer to these additional documents for more information: General Landscape Design Guidelines and Natural Area Design Guidelines.

2.6.2 Provide biofiltration for all surface drainage entering open waters, allowing lateral zones to dominate wetland edges. (See Figure A).

2.6.3 To maintain safety near airport fly zones, development within the western portion of Centerra must avoid creating open water habitats that attract large or flocking avian species. This includes a prohibition on the construction of islands in wetland areas and a restriction on large ponds or significant open water. These design limitations are necessary to minimize interference from nuisance birds (ducks/geese) within active airport fly zones.

2.6.4 **S** Provide appropriately designed drop structures pond aeration, and fountains for aerating water bodies.

2.6.5 **S** Avoid impacting existing wetlands. When impacts are necessary, mitigation shall be provided in appropriate manners. Plans involving any potential impacts or mitigation – or creating new wetlands – must be approved by the DRC and possibly the Army Corps of Engineers.

2.6.6 When dealing with wetlands and considering wetland modifications, retain qualified specialists to assess the existing conditions and develop mitigation plans.

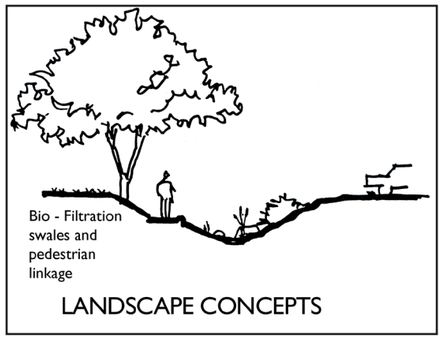

Figure A

2.7 Landscape Design and Management Practices (see also the General Landscape Guidelines and District Specific Landscape sections)

2.7.1 Use high efficiency irrigation technology in compliance with the specific Irrigation sections of the Design Guidelines.

2.7.2 Utilize water-efficient, low maintenance landscaping in compliance with the Landscape sections of the Design Guidelines with a goal of reducing potable water consumption for irrigation by 50% over conventional means.

2.7.3 Use plantings to provide wind and solar protection for both the building and occupants.

2.7.4 Weed barriers are highly disruptive to wildlife and plant regeneration, and should be avoided wherever possible. When needed, utilize natural mulches to control weeds and moisture. Local river rock is preferred, reference Section 6.1 of the General Landscape Design Guidelines.

2.7.5 Protect existing trees to the maximum extent possible.

2.7.6 When possible, implement a landscape management and maintenance plan. See resources for Habitat Friendly Guidelines for additional details.

2.8 Wildlife Cohabitation

2.8.1 Perserve and enhance desirable wildlife habitat. This should be accomplished through thoughtful planning and design and consultation with the High Plains Environmental Center and the National Wildlife Federation, as a certified Wildlife Habitat Community.

2.8.2 Identify each site's opportunities to sustain ecosystems, both macro and micro, in perpetuity. Do not introduce exotic species or non-native solutions for maintaining or introducing species.

2.8.3 Use existing and proposed land forms to complement planting and water designs.

2.8.4 Design sites to accommodate how people will use the site, by providing intentional access, circulation, and infrastructure that discourages habitat disturbance and protects sensetive areas.

2.8.5 When selecting target species to be introduced to an area, landscape and site designs must provide for appropriate food sources, reproductive habitat requirements, and security. This inlcudes providing native Colorado vegetation suited to the specific location to enhance the habitat and its food sources for wetlands species. Designers must also employ habitat-limiting elements to control nuisance species and maintain ecological balance. For example, restricting long and unobstructed views can discourage prairie dog colonies. For additional restriction regarding large or flocking avian species near airport fly zones, also see Guideline 2.6.3.

2.8.6 While designing the site, incorporate linkages between open space and recreational corridors to improve the wildlife system and urban design. Recreational uses should support wildlife habitat.

2.8.7 Design the site so that infrastructure does not interfere with wildlife habitats, especially areas that animals need for breeding, nesting, or raising young. (ex: a circulation path conflicting with an animal's reproductive habitat.)

2.8.8 Incorporate specific habitat requirements for target species in the landscape/site design. Interpretive signs should be considered for explaining objectives and identifying wildlife.

2.8.9 Provide clear corridors for wildlife movement. Many types of wildlife (especially small mammals) will resist crossing paved surfaces.

3.0 Building Design

The Construction Specification Institute (CSI) Division Sections serve as a foundational framework for the Building Design Guidelines to help materials and systems specifiers identify important concepts and project options. More detailed information, particularly for local and regional sources, are available from the resources identified earlier. At a minimum, the following questions should be asked by project teams when selecting materials, products, and systems and should become The Foundations for the Principles associated with building development.

- Is the raw material renewable/recyclable?
- Does the harvesting/extraction/manufacturing process cause environmental degradation?
- What happens to waste/pollution during the process?
- Is it an energy intensive process?
- What is the payback period for energy/water saving systems and products – the time in which initial costs are recouped through lower long-term operating and maintenance costs?
- What is the recycled percentage for resource conserving materials?
- Is it more durable than competitors/alternatives?
- Does it off-gas toxins, and if so, for how long?
- Has the minimum amount of packaging been used and is it recyclable?
- How is the product disposed?
- Is it easily recycled and into what?
- What are its maintenance requirements?

Principles

1. Create energy and environmentally responsive buildings.
2. Enhance the quality and performance of the workplace environment, thus contributing to improved employee productivity, satisfaction, comfort, health, and morale.
3. Enhance the quality and performance of the retail environment, thus contributing to improved customer comfort and purchasing.
4. Enhance the quality and performance of the residential environment, thus contributing to improved residential comfort, satisfaction, and health.

3.1 General

3.1.1 Design buildings with optimum use of interior space in mind to keep overall building sizes – and operating demands on natural resources – to a minimum.

3.1.2 Maximize daylighting opportunities, but when additional lighting is required use zoned and task lighting. To reduce energy consumption and cooling loads. (See Figure B)

3.1.3 Utilize open interior planning to promote access to light, views, and ventilation. (See Figures B and C)

3.1.4 Utilize energy-efficient building envelope techniques, specifying high levels of insulation, high-performance windows, tight construction, etc. (See Figure D)

3.1.5 Design structures "to last", in terms of adaptability to other uses, as well as materials and methods. Choose materials and components that can be reused or recycled when changes are required.

3.1.6 Design buildings to use renewable energy. Consider incorporating photovoltaics in the structure, or incorporate opportunities for future installation.

3.1.7 Optimize material use. Minimize waste by designing

for standard sizes.

3.1.8 Avoid potential health and indoor air quality hazards, including radon, EMF, off-gassing, and pesticides by careful selection of materials and details. (See Figure E)

3.1.9 Avoid ozone depleting chemicals in mechanical equipment and insulation.

3.1.10 Use durable products and materials. A product that lasts longer or requires less maintenance usually saves energy. Durable products also contribute less to solid waste issues.

3.1.11 Choose building materials with low embodied energy, the energy required to produce the material.

3.1.12 Buy ethically and sustainably sourced and manufactured materials. Use local (within 500 miles) or native Colorado materials whenever possible.

3.1.13 Use building products made from recycled materials, including:

a. Concrete
b. Asphalt
c. Metals
d. Wood
e. Glass
f. Certain plastics
g. Cellulose insulation

3.1.14 Use salvaged building materials when possible.

3.1.15 Minimize use of old-growth timber or tropical hardwoods, unless the seller can document that the wood comes from well-managed forests.

3.1.16 Minimize use of pressure treated lumber because of the toxins present in the product and used in its production.

3.1.17 Purchase items that minimize packaging waste, and recycle the packaging materials.

3.1.18 Install high-efficiency heating and cooling equipment to reduce energy consumption.

3.1.19 Install high-efficiency lights and appliances to reduce energy consumption.

3.1.20 Install water-efficient equipment.

3.1.21 Install mechanical ventilation equipment.

3.1.22 Fully commission all buildings. Major portions of the commissioning process include specifications, Operations and Maintenance manuals, operator training, and functional testing of all building systems to ensure that they are operating according to the design intent.

3.1.23 Choose materials, components, and systems based upon the following:

a. Indoor air quality (see Figure C)
b. Operating energy
c. Resource depletion
d. Building durability and maintenance
e. Embodied energy
f. Embodied CO2

3.1.24 Plan for future expansion without demolition of built facilities.

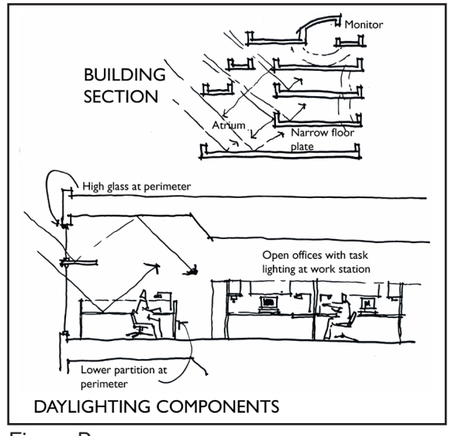

Figure B

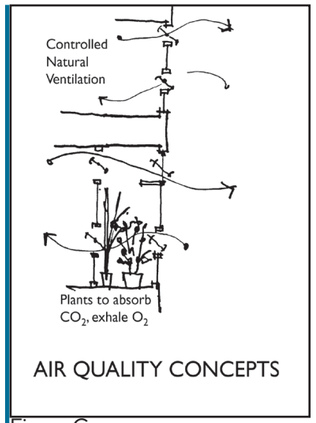

Figure C

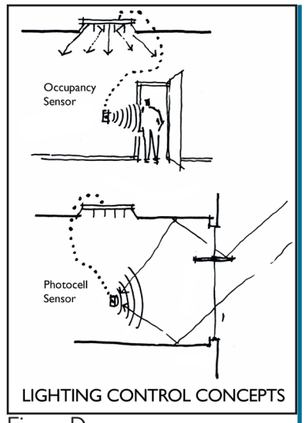

Figure D

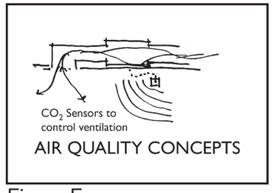

Figure E

3.2 Concrete

3.2.1 Concrete should be specified with as high a pozzolan (fly ash) content as possible (15-30%) while still maintaining the appropriate strength and structural characteristics. Fly ash is a useful by-product of coal-fired power plants and can be a substitute for Portland cement.

3.2.2 Concrete specifications should prohibit the use of toxic concrete additives and shall include a clause prohibiting the use of unapproved additives.

3.2.3 Use of precast concrete should be maximized due to the increased efficiency associated with the forming, batching, and casting at a central location.

3.2.4 When cast-in-place concrete is required, repetitive shapes should be used so that form work can be reused; avoid one-off configurations; and when plywood forming is essential, plan flat surfaces in modules of plywood dimensions to reduce waste.

3.2.5 Where practical, concrete using recycled materials should be used.

3.2.6 Utilize stay-in-place insulating form work when possible.

3.2.7 Residential foundations should include insulation levels that meet an R-10 rating.

3.3 Masonry

3.3.1 When concrete masonry units are required:

a. Specify locally manufactured units;
b. Specify units manufactured using a maximum amount of fly ash (when possible).

3.3.2 Use masonry appropriate for the application, exploiting at least two of masonry's positive qualities (ease of design and construction, durability, load bearing capacity, potential for thermal performance).

3.3.3 When stonework is required, the following guidelines should be used in specifying stone with the lowest embodied energy.

a. Use loose stones found on or near the surface.
b. Use stone from a local source (within 75 miles.)
c. Allow for dimensional variation in size/ thickness of stone.
d. Specify a rougher surface finish whenever possible, since it requires less energy to produce.

3.3.4 Carefully select chemical treatments for mortar to minimize their environmental effects. Specify non-toxic additives, and include a clause in the specifications prohibiting the use of unapproved additives.

3.3.5 Consider masonry made with recycled and waste materials.

3.3.6 Utilize straw bale construction technology when allowed by building codes.

3.4 Metals

3.4.1 Specify metals with a high recycled content.

a. Structural steel should have a recycled content in excess of 66%.

b. Steel joists and girders should have recycled content in excess of 80%.

c. Cold-formed metal framing should utilize the highest recycled content possible. Products shall be specified with recycled contents in excess of 50% (100% recycled content if possible).

3.4.2 Recycle all possible metal construction waste.

a. Provide job site separation for the different types of metals being used on the project.

3.5 Wood, Plastics, and Composites

3.5.1 Engineered lumber products should be used to minimize use of old growth timber. Engineered lumber uses low density, fast-growing varieties of trees in combination with plastic resins. Engineered lumber includes truss-joists, I-joists, laminated veneer lumber (LVL), parallel strand lumber (PSL), glue-laminated beams, oriented strand board (OSB), waferboards, and particleboards.

3.5.2 Waste lumber on the site shall be recycled for blocking, engineered lumber, mulch, etc.

3.5.3 Formaldehyde emissions should be minimized by specifying low-emitting UF-bonded panel products or phenol-bonded products.

3.5.4 Use easily recycled plastics, and recycle all possible waste plastic on the job site.

3.5.5 Use woods originating from known sustainable or well-managed sources. FSC certified wood is encouraged.

3.5.7 When rare woods are required, use veneers instead of solid wood.

3.5.8 When wood preservatives are required:

a. Use preservatives sparingly and develop standard details, which do not rely on preservatives. Less toxic preservatives should be used whenever possible. These include copper napthenate, copper-8-quinolinate, and borax salt for indoor use.

b. Have treated wood sealed whenever possible.

3.5.9 Recycled plastic products should be specified whenever possible.

3.5.10 Avoid plastic foams which use CFC's or HCFC's as blowing agents.

3.5.11 Where possible minimize the use of materials which use PVC's in their makeup.

3.5.12 Avoid using plastics for coating, bonding, and sealing.

3.5.13 Avoid petroleum based plastics.

3.5.14 Utilize salvaged lumber for flooring, trim, heavy timbers, and framing when possible.

3.6 Thermal and Moisture Protection

3.6.1 Sealants shall be of a "neutral curing" with no solvent release format.

3.6.2 When waterproofing, damp-proofing, and/or water repellents have to be used, products shall be specified which minimize the use of volatile organic compounds (VOC's). The following minimum requirements shall be met.

a. General primers, sealers, and undercoaters must not have VOC concentrations exceeding 2.9 lbs./gal.

b. Waterproofing mastic coatings must not have VOC concentrations exceeding 2.5 lbs./gal.

c. Waterproof sealers must not have VOC concentrations exceeding 3.3 lbs./gal.

3.6.3 Avoid using isocyanurate, urethane, and phenolic rigid foam insulation manufactured using CFC's or HCFC's. If rigid boardstock is required, choose rigid fiberglass or expanded polystyrene (often called EPS or beadboard) which is formed using pentane.

3.6.4 When loose-fill mineral fiber insulation is used, carefully seal the insulation from inhabited spaces to minimize carcinogenic potential.

3.6.5 Where possible, maximize use of Cellulose Batt, HempWool, or other similar sustainable solutions for insulation.

3.6.6 Where possible, maximize use of Continuous Insulation (CI) techniques. See resource section.

3.6.7 Lead-coated roofing and flashing should be avoided.

3.6.8 When coal and petrochemical roofing systems are required, care should be taken to use products with a high percentage of recycled material.

3.6.9 Utilize manufactured roofing and siding systems that include; fiber cement, recycled metals, recycled plastics, and wood-waste by-products.

3.6.10 Prioritize the use of light colored roofing materials and sustainable roofing products. When possible implement the use of Green Roof technology or Cool Roof rated products linked in resource section.

3.7 Openings

3.7.1 Solar heat gain from glazings shall be minimized for non-residential projects through use of shading devices.

3.7.2 Passive solar heating strategies should be utilized for residential applications through appropriate building/window orientations.

3.7.3 Exterior glazing materials adjacent to occupants shall be selected which maximize occupant comfort, usually incorporating high performance films or coatings.

3.7.4 Use of recycled materials shall be maximized where appropriate.

3.7.5 Use high performance glazing (low 'e' and/or suspended plastic film heat mirror) appropriate to the exposure.

3.7.6 U-values should be appropriate for the wall section. Doors and windows should not be expensively over-insulated.

3.7.7 To ease future recycling of building components, avoid using complicated material combinations.

3.8 Finishes

3.8.1 Low toxic content finishing materials should be used to ensure better indoor air quality.

3.8.2 Latex paints should be used instead of alkyd-based paints to minimize toxic fumes.

3.8.3 Do not select finishes only on the basis of low first cost. More durable materials with less out-gassing may have a higher initial cost, but can be more economically viable over the life of a building.

3.8.4 Install carpets with natural fibers (jute, cotton, wool) and which do not contain formaldehyde, or select carpets, which utilize recycled content.

3.8.5 Wherever possible, use sustainable drywall systems like Synthetic Gypsum, Recycled Gypsum, or other systems that contain recycled or renewable material.

3.8.6 Avoid materials with volatile organic compounds (VOC's) and urea-formaldehyde to improve indoor air quality.

3.8.7 Select flooring materials that are certified low-VOC products.

3.8.9 When using wall coverings, utilize biodegradable papers with recycled content of paper or fiber. Avoid vinyl wall coverings that are manufactured from PVC.

3.8.10 Explore wall coverings made of alternative materials, such as pressed sunflower seeds as an alternative to wood or other materials.

3.8.11 Utilize ceiling tiles that promote indoor air quality, such as those made from perlite.

3.8.12 Utilize non-solvent adhesives such as yellow and white glues.

3.8.13 Avoid butyl sealants as they emit VOC's and other toxic compounds.

3.9 Specialties

3.9.1 Whenever possible, use specialty products that use recycled material. Examples include: recycled plastic toilet partitions, vanity tops, locker room benches, tack boards, shelving, display panels, and partitions.

3.9.2 Avoid use of wood burning stoves/fireplaces unless they comply with State and EPA clean burning standards.

3.10 Equipment

3.10.1 Energy Star rated office equipment should be used to minimize thermal loads on the building.

3.10.2 Consider Energy Star rated refurbished products. Examples include: refrigerators, stoves, copiers, fax machines, printers, and computers.

3.10.3 Refer to EPA's ENERGY STAR logo indicating a power-down feature during periods of inactivity.

3.10.4 Consider the indoor air quality issues associated with office equipment. Of particular concern are copiers, fax machines, computer monitors, and printers.

3.10.5 Provide convenient recycling equipment and facilities for all users and occupants.

3.10.6 Provide Carbon Monoxide (CO) sensors with alarms.

3.11 Furnishings

3.11.1 Furnishings should be selected which use natural and recycled materials and which minimize the use of materials containing toxic substances. (Note: Life safety issues sometimes require the use of substances such as fire retardants which contain some toxic elements).

3.11.2 Whenever possible, foam products made without CFC's shall be used.

3.11.3 Whenever possible, mats and rugs made with recycled materials, such as recycled tires, should be used. Note: mats and rugs made from natural materials (wool, cotton, or jute) are not as durable as synthetic products but should still be considered.

3.11.4 All wood furnishings should be of indigenous materials, not exotic species.

3.11.5 Manufactured casework should be selected that include non-toxic finishes and adhesives.

3.11.6 To reduce heat gain, provide shades and blinds made of natural or recycled materials to the extent possible. Avoid plastic blinds.

3.11.7 Utilize refurbished and reconditioned furnishings to the extent possible.

3.12 Special Construction

3.12.1 Provide alternative energy systems (including photovotaics or geo-thermal energy) for water heating, space heaters, exterior lighting, pumping systems, etc.

3.12.2 Utilize light shelves at windows to enhance daylighting applications. (See Figure B)

3.13 Conveying Equipment

3.13.1 Utilize the minimum amount of elevators, escalators, and people movers possible to encourage walking and climbing of stairs as a means to promote a healthy lifestyle.

3.14 Plumbing and HVAC
(Now Divisions 22 & 23 In CSI Format)

3.14.1 The mechanical systems shall be designed using energy efficient equipment for heating, cooling, and ventilation.

3.14.2 The mechanical systems shall be sized to account for the use of daylighting or passive solar heating within the building.

3.14.3 Indoor air quality issues shall be addressed when designing the ventilation system. (See Figure C)

3.14.4 All cooling systems shall be CFC-free.

3.14.5 Select equipment that will not have high maintenance problems and beware of commonly overlooked interactions between conservation measures that undermine overall efficiency of building operation.

3.14.6 Use salvaged materials when possible, and avoid ozone-depleting chemicals in mechanical equipment.

3.14.7 Take maximum advantage of ventilation as a cooling strategy (air economizer) to minimize mechanical cooling requirements. Water economizers, which require a cooling tower, may be used instead of an air economizer. The relative economic benefits of air vs. water economizers should be explored for a given application.

3.14.8 The HVAC system should be commissioned prior to building occupancy and periodically diagnosed for proper operation. An independent commissioning agent should be retained to monitor the work of contractors and to oversee the operation of a building over the long term.

3.14.9 During the heating season, mechanical heating needs can be offset by the use of heat recovery devices in the ventilation system for non-residential uses.

3.14.10 Passive solar heating strategies should be used to reduce mechanical heating needs in residential uses.

3.14.11 Consider evaporative cooling as a highly cost-effective strategy in the dry Colorado climate to augment mechanical cooling.

3.14.12 Given the cost of electricity, gas cooling may be a viable alternative.

3.14.13 Thermal storage systems should be considered to improve the performance of electric and gas cooling equipment.

3.14.14 Energy management systems (EMS) are a highly effective means to ensure the efficient operation of an HVAC system. Major strategies to consider are: nighttime temperature setback, optimizing supply air temperature based on individual zone requirements, shutting off fans at night, and so forth.

3.14.15 Heat recovery from hot water use should be considered.

3.14.16 Install water conservation devices (WaterSense): low flow toilets, showerheads, and faucets with infrared sensors to sense user presence, greywater use devices, etc.

3.15 Electrical and Lighting
(Now Divisions 26 & 27 in Current CSI Format)

3.15.1 Efficient lighting fixtures using compact fluorescent lamps, T8 fluorescent lamps, and electronic ballasts should be used to meet the required illumination levels, and to reduce electrical energy use and demand.

3.15.2 Occupancy sensors and EMS should be used to turn off lights when they are not needed.

3.15.3 For office spaces, the luminous environment shall be designed for a visual display terminal (VDT) intensive environment, including consideration of indirect lighting.

3.15.4 Occupant override of automatic lighting controls should be provided.

3.15.5 All lighting controls and equipment should be selected and optimized to take full advantage of the daylighting systems designed into the building.

3.15.6 All lighting control equipment should be commissioned prior to building occupancy.

3.15.7 Cogeneration, which generates electricity (usually by a gas-fired system) and utilizes a heat-recovery system, should be considered for the building.

3.15.8 Electromagnetic fields (EMF's) generated by electrical conductors and equipment should be diagnosed and treated by appropriate shielding to protect human health.

3.15.9 Use renewable energy when available, including power from "wind farms", such as that available from Platte River Power Authority.

4.0 Job Site Practices

The practices of the Contractor during construction is a key influence on sustainable building. Up to 25% of an average landfill is construction and demolition waste. Minimizing site disturbance and grubbing practices make a big difference in site bio-diversity and protection of habitat. All construction at Centerra will incorporate a wide variety of sustainable building techniques.

4.1 S Protect trees from damage during construction by fencing off the "drip line" around them and avoiding major changes to surface grade.

4.2 Avoid use of pesticides, herbicides, and other chemicals that may leach into groundwater.

4.3 S Do not bury any construction debris.

4.4 Centralize cutting operations to reduce waste and simplify sorting.

4.5 S Every project must implement a Construction Waste Diversion and Recycling Plan with the intent of diverting/recycling at least 60% of total construction waste. See Resource section for more details on DRC requirements and preferred vendors.

4.6 Arrange carpools to job sites. Schedule site related errands to minimize unnecessary driving.

4.7 Set up break/lunch areas to discourage workers from leaving the job site at lunch.

4.8 Minimize the use of disposable cups, etc. on the job site. Recycle all materials possible.

4.9 Utilize recycled office paper and supplies and recycle after use.

4.10 S In addition to these guidelines all applicants must be in compliance with Section 4.0 of the Centerra Design Review Committee Information and Procedures Packet.