

Green Building Guidelines

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Introduction

The Border Environment Cooperation Commission (BECC) is a binational organization created by the Governments of the United States and Mexico as a side agreement to the North American Free Trade Agreement (NAFTA). The purpose of the BECC (www.cocef.org) is to help conserve, protect and enhance the environment in the U.S.-Mexico border region, through the development and certification of environmental infrastructure projects that incorporate innovative sustainability and public participation concepts. Once certified by BECC, a project may qualify for funding from Mexico's National Water Commission, United States Environmental Protection Agency (EPA), the North American Development Bank (NADB), or from other sources requiring or recognizing such certification.

Framework

BECC's "sustainable development" certification criterion recognizes the value that implementing sustainable practices, whether in water, wastewater, solid waste or expanded mandates projects will bring to the communities it serves. Therefore, BECC has prepared this document to serve as a set of guidelines for "green" building practices to enhance the sustainability of both infrastructure projects and their surroundings. This document is intended to address environmental infrastructure projects in the US and Mexico. Similar guidelines are widely utilized in the United States for the construction of sustainable and environmentally sound buildings and structures.

The EPA, along with other federal, state, and local agencies, as well as non-governmental organizations, advocates for implementing green building practices for projects where adequate sustainable construction methods and green products and practices are available. EPA requires application of sustainable concepts in projects funded through the EPA-supported funding programs, the Border Environment Infrastructure Fund (BEIF) and the Project Development Assistance Program (PDAP).

EPA encourages communities to adopt and/or implement measures geared toward achieving environmental stewardship. Incentives, such as tax rebates and preferential permitting, for implementing green practices and products in infrastructure projects are a growing trend in the United States, as more local and state governments encourage projects are constructed using sustainable practices. More and more federal, state and local entities are also requiring that their own projects be built sustainably. As such, BECC and other agencies are also working towards making this common practice in the development of environmental infrastructure.

There are a myriad of environmentally sound products and practices that the planning and/or design professional may select when developing infrastructure projects. Some of these products and practices may be found at <http://www.wbdg.org/design/greenspec.php>, BuildingGreen.com, GreenSpec.com, in the GreenSpec directory, and the LEED (Leadership in Energy and Environmental Design) standards. Additionally there are several certification programs that provide guidance for projects designed and constructed using standard green practices such as the U.S. Green Building Council's LEED certification and the Sustainable Building Industry Council.

The success of green building practices is greatly enhanced by including sustainability considerations in the planning and design phases. Applying these practices and products may offer substantial savings during the construction and operation of the projects and, **more importantly**, they enhance the quality of life by providing human and environmental benefits.

BECC, in coordination with EPA, has selected several sections from the Construction Specifications Institute's (CSI) MasterFormat™ (the organizational standard for specifications and other information for most commercial and institutional building projects in the U.S. and Canada) as an initial effort for requiring green building practices in project development and implementation. Based on various

sources including GreenSpec Directory and the Federal Green Construction Guide for Specifiers, section specifications have been evaluated, adapted and appended to these guidelines for consideration during the development of projects within the purview of BECC. In addition, two specific sections have been created to guide planning, design and construction activities related to drinking water and wastewater infrastructure projects. The new sections incorporate, by reference, selected CSI sections. The following are the CSI sections included in BECC's guidelines:

<ul style="list-style-type: none"> ▪ Earthwork, Erosion Control, Site Drainage ▪ Backfill ▪ Drainage and Containment ▪ Site Paving ▪ Landscaping ▪ Fluid Waste Containment 	<ul style="list-style-type: none"> ▪ Concrete Formwork ▪ Reinforcement ▪ Cast-in-place Concrete ▪ Concrete Masonry Units ▪ Renewable Energy Systems
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In the US, the CSI sections are typically used to organize the construction contract documents; In these guidelines, the CSI sections along with the new sections for drinking water and wastewater infrastructure projects are utilized for purposes of guiding the owner, planning/design professional, and contractor to incorporate green products and practices in their project. By utilizing the specification format and listing specific tasks for each project development stage in these CSI sections, the planning/design professional can more easily see the relationship and applicability of concepts to be applied in project development and incorporated into the project-specific construction documents.

BECC reserves the rights to amend, as it deems appropriate, the contents and applicability of the guidelines. Communities and the public at-large, as well as consultants, are encouraged to provide comments, expand and/or use these suggested guidelines as reference material or as a basis for developing specifications for their environmental infrastructure projects. The successful use of these documents will rely on an interactive role between communities and consultants undertaken during the planning and design phases of their projects. BECC acknowledges the *Federal Green Construction Guide for Specifiers* and the *GreenSpec Directory* as a reference in the formulation of these guidelines.

Environmental Goal

The general environmental goal is to produce sustainable and cost-effective facilities that function appropriately and promote productivity. The Federal Green Construction Guide for Specifiers further defines the general environmental goal with the following:

1. Resource Management: Promote stewardship of the earth's resources. The earth's resources include: perpetual resources, renewable resources, and non renewable resources.
 - a. Preserve or renew biodiversity and ecosystems.
 - b. Maximize use of biobased, energy efficient, water efficient, rapidly renewable, and recycled content materials.
 - c. Maintain or improve water quality and promote water stewardship.
 - d. Employ job-site recycling and salvage procedures.
 - e. Employ sustainable design principles and environmentally preferable products.
 - f. Preserve non renewable resources.
 - g. Minimize life cycle energy costs through a whole building approach that may include: daylighting, passive solar heating and cooling, energy efficient systems, and renewable energy systems.

2. Toxicity/IEQ: Promote good indoor environmental quality (IEQ). Aspects of IEQ include: light quality, acoustic quality, thermal comfort, and air quality.
 - a. Maximize use of non-toxic, non-hazardous, healthy and safe building materials.

3. Performance: Promote efficiencies in operational performance. Aspects of operational performance include: durability, maintainability, energy efficiency, and water efficiency.

Project-specific environmental goals will help guide planning and design decisions, as well as provide a basis for identifying improved green products or practices during construction. The owner, in coordination with the planning/design professionals, should consider the development of project-specific environmental goals, using the general goal as a starting point.

The Guidelines

The selected CSI sections were chosen primarily because of their perceived applicability, from a practical standpoint, to environmental infrastructure projects. The environmental infrastructure projects in which BECC participates typically include the following:

- Water treatment works
- Drinking Water transmission and distribution lines
- Booster, pump and lift stations
- Wastewater treatment works
- Sewer lines, collectors, laterals, and interceptors
- Municipal solid waste landfills
- Air-pollution reduction improvements

These guidelines are intended to instruct planners and designers to consider a number of sustainability factors when planning and designing drinking water or wastewater infrastructure projects supported by BEIF and PDAP. The GreenSpec Directory describes the following simple principles (adapted for the purposes of these guidelines) for applying sustainable products and practices in construction:

- Design for operating efficiency: The energy and resources that a facility uses over its life far outweigh the energy and resources required to construct the facility itself.
- Don't overbuild: Appropriately sized facilities use fewer resources and are more efficient to operate and maintain.
- Use local materials: Don't use energy and resources to move materials around.
- Look beyond initial cost: Consider the cost-benefit analysis that factors in operations, maintenance, durability, and replacement cost over the life-time of the facility.

For example, when selecting a site and developing the site and drainage plans, in addition to employing native materials to the maximum extent possible and practical, the planning and design must maximize the use of natural topography, reclaimed materials, construction materials near the project and construction practices which protect the surrounding area from unnecessary disturbance. However, the intent is not to specify hard-to-find equipment or materials that would represent an added cost to the project or burden on the project owner.

It is important to underscore that, although there might be other CSI sections with an important perceived value for BECC projects, a significant portion of the long-term savings are in one way or another associated with site selection and site earthwork operations. For instance, a sound planning study evaluates multiple options for site grading, requiring an analysis of opportunities to maximize topographic features, promote natural drainage, and minimize mechanical pumping. Furthermore, a preliminary geotechnical engineering study that contemplates a well-devised subsurface exploration program may seem costly in the beginning. However, when the assessment of the excavation, concrete, and steel reinforcement for the project's foundation and retaining wall systems is conducted, a more cost-effective solution can be expected by the project sponsor because the potential long-term savings will be realized with a well-developed construction specification.

The Format

To provide specific guidelines for drinking water and wastewater infrastructure, BECC has created Division 00, which provides activities directly related to the development of these types of projects. These activities are intended to guide the owner, planning/design professional(s), and other project participants in evaluating and identifying green building opportunities as early as possible. Many of the instructions supplement the typical tasks performed during the project development stages with new environmentally-oriented measures to determine process, product and practices. Division 00 and the other selected CSI sections are complementary and intended to be implemented jointly. The CSI sections may be applied to several types of construction projects and owners, consultants and contractors are encouraged to consider their applicability in other efforts.

The guidelines for each section include a description of activities to be conducted during three distinct stages of project development: 1) Planning, 2) Design, and 3) Construction. Although the activities described are primarily intended to guide the tasks of the planning and/or design professional during these project development stages, some activities are also described for the owner and construction contractor. The planning/design professional should initiate these activities through communication with the owner and/or by incorporating the activity into the design and construction documents. Each section is structured to include the following:

Planning: A description of activities associated with selecting a process, site, system layout, product, and materials that promotes operating efficiency, good resource allocation and environmental soundness. These concepts are presented in three sub-topics:

- Alternative Analysis (Technology, Site Selection, System Layout)
- Design Criteria Selection
- Special Considerations in Design

Design: A description of activities to be conducted during design to promote operating efficiency, determine appropriate capacity sizing, and evaluate the use of green products and practices. These activities are subdivided into the following tasks:

- Facilities and Process Design
- Construction Plans and Specifications

Construction: This stage of development is presented differently in Division 00 and the selected CSI sections. In Division 00, general and specific activities are recommended for the owner, design professional and contractor. In the selected CSI sections, general guidelines for developing contractor responsibilities are provided for the design professional in the development of the project's construction specifications. The design professional may review the model specifications presented in the US *Federal Green Construction Guide for Specifiers* and the *GreenSpec Directory* for further guidance. Similar to the *GreenSpec Directory* models, the guideline specifications are subdivided into three subcategories:

- General – Lists general environmental requirements for that particular section, including submittals, definitions, references and quality assurance.
- Products – Products and criteria that define the environmental performance and characteristics of a material are listed. Unfamiliar materials or constructions methods, for which no standard specification is available, may require a more comprehensive specification included under this subcategory.
- Execution – Specifies methods of construction that minimize waste, reduce pollution, and maximize resource efficiency. The requirements for clean-up and waste disposal, reuse of materials, and use of on-site materials are also addressed in this subcategory.

These guidelines attempt to promote a logical approach for screening applicable criteria and are not intended to cover all possible scenarios or environmental concepts for achieving sustainability. Project participants are encouraged to recommend additional activities and opportunities to further the

environmental and human benefits of incorporating sustainable practices within the project development process.

Summary of Key Terms

The Federal Green Construction Guide for Specifiers provides definitions of key terms used in these guidelines and in other green product or practice references. The following definitions will assist you to understand key terms pertaining to sustainable development:

Biobased Materials: Fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000. Minimum biobased content shall be as defined by the US Department of Agriculture pursuant to the US Farm Bill May 2002 and 7 CFR Part 2902 (www.biobased.oce.usda.gov).

Deconstruction: Disassembly of buildings for the purpose of recovering materials.

Non Renewable Resource: A resource that exists in a fixed amount that cannot be replenished on a human time scale. Non renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over millions of years. Examples include: iron ore, coal, and oil.

Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with Federal Trade Commission Guide for the Use of Environmental Marketing Claims.

Renewable Resource: A resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource. A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include: solar energy, tidal energy and wind energy, trees in forests, grass in grasslands, and fertile soil.

Stewardship: Responsible use and management of resources in support of sustainability.

Sustainability: The maintenance of ecosystem components and functions for future generations.

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DIVISION 00 – Water and Wastewater Projects

Section 00100 – Wastewater Collection and Treatment

Objective:

The objective of this section is to describe specific activities to supplement facility planning, design and construction, in order to promote environmental stewardship in wastewater collection and treatment projects. The activities are intended to identify designs and/or mechanisms as well as Best Management Practices that will be conducive to accomplishing this intent. The purpose is to select process and design elements, which promote operating efficiency, appropriate resource utilization, energy and natural resource conservation, solid waste reduction, pollution prevention and habitat protection. It is essential that the planning/design professional(s) reviews the attached individual construction specification sections for relevancy in completing the activities described in this section.

PROJECT STAGE	DESCRIPTION	APPLICABILITY
Planning	<p><u>Alternatives Analysis</u> In this phase the planning professional will conduct an alternatives analysis which includes the following, as applicable:</p> <p>Wastewater Treatment Plant: Technology</p> <ol style="list-style-type: none"> a. Analyze the possibility of using on-site treatment systems for rural or isolated areas and provide recommendations. b. Evaluate treatment alternatives with an emphasis on methods that minimize the need for chemical treatment and energy consumption. c. Analyze effluent discharge alternatives, considering reuse as the preferred alternative when possible. Reuse must be closely related to the treatment effluent quality. Identify reuse options and potential users. d. Identify potential by-products of the wastewater treatment process that could provide energy cost savings and/or further enhance the environment. Evaluate the technical and financial feasibility for the use of these by-products for power co-generation or other beneficial use (on- or off-site). e. Determine appropriate capacity needs to reduce the risk of overbuilding. f. Conduct a present worth analysis prior to selecting an alternative. g. Consider use of renewable energy. <p>Site</p> <ol style="list-style-type: none"> a. Develop site selection criteria which consider the technical, financial and environmental feasibility of the potential sites. b. Incorporate site considerations as described in Division 02 as factors in the site selection criteria. <p>Collection System: Layout, Materials and Equipment</p> <ol style="list-style-type: none"> a. Evaluate system layouts which minimize energy intensive operations. b. Maximize the use of the natural topography. c. Evaluate means to improve energy efficiency or the viability to utilize renewable energies in the collection system facilities. d. Identify risks which foster potential presence of septic 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 00 – Water and Wastewater Projects

Section 00100 – Wastewater Collection and Treatment

- conditions or other conditions which cause nuisance, inefficient operations, or decrease the useful life of the infrastructure. Evaluate means to mitigate these risks.
- e. Determine appropriate capacity needs to eliminate the risk of overbuilding.
 - f. Evaluate alternative materials (i.e. pipe) and equipment options which are environmentally preferable or achieve greater operating efficiencies. Refer to the Special Consideration in Design, provided below, and the *Green Spec Directory* for further guidance.
 - g. Minimize the requirements for pavement replacement, landscape disturbance, and intrusive construction practices.
 - h. Conduct a present worth analysis prior to selecting an alternative.

Design Criteria Selection

In this phase, the planning professional will incorporate the following in the selection of design criteria:

- a. Define the environmental goals for the project with the owner.
- b. Develop or identify the appropriate design criteria to incorporate the recommendations developed in the alternatives analysis, specifically to:
 - o Maximize energy efficiency or the use of renewable energy sources, the natural topography, effluent reuse options and the use of treatment process by-products
 - o Minimize the need for chemical treatment, presence of septic conditions, and site disturbance construction practices.
 - o Conserve natural, renewable and non renewable resources.
- c. Identify design criteria required to incorporate the design requirements of each attached section specification.

Special Considerations in Design

In this phase, the planning professional will identify potential vendors, materials or products which may be evaluated during design to further incorporate operating efficiencies, use of local materials, and good resource utilization. Efforts shall be focused on identifying environmentally preferable products such as:

- a. Products made with salvaged, recycled, or agricultural waste content.
- b. Products that conserve natural resources.
- c. Products that avoid toxic or other emissions and minimize toxic content.
- d. Products that reduce environmental impacts during construction, demolition, or renovation.
- e. Products that save energy or water.
- f. Products that contribute to a safe, healthy indoor environment.

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DIVISION 00 – Water and Wastewater Projects

Section 00100 – Wastewater Collection and Treatment

Design	<p><u>Facilities and Process Design</u> Based on the planning phase results, in this phase the design professional will supplement the design process by assuring the following:</p> <ol style="list-style-type: none"> a. Design is intended to achieve operating efficiency and to incorporate appropriate capacity needs. b. Utilization of recommended design criteria and identified vendors, materials or products which induce operating efficiencies, use of local materials, and good resource utilization. c. The suggested environmentally preferable products, criteria for a material's environmental performance/ characteristic, and use of potential treatment process by-products are evaluated for appropriate use and feasibility considering a cost-benefit analysis that factor in maintenance, durability, and replacement cost over the project life-cycle. The results are reviewed with the owner to determine applicability. d. A management plan is provided for the on- or off-site use of by-products as recycled/ reclaimed materials or in co-generation. e. Considerations for minimizing energy and chemical usage, in addition to integrating elements for conservation and/or improvements to the ecosystem are included. f. The usage of construction materials and resources are optimized. g. Considerations for the potential reuse of materials in future deconstruction. h. The design requirements of each of the attached section specifications are incorporated. 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Construction Plans and Specifications</u> Following the format provided in the <i>Green Spec Directory</i> model specification section, the design professional will supplement the construction specifications with the following:</p> <p><i>Part 1 – General:</i> List general environmental requirements for the specification section (updated environmental goals), including submittals, definitions, references and quality assurance.</p> <p><i>Part 2 – Products:</i> Describe the environmentally preferable products or criteria for the material's environmental performance and characteristics, determined appropriate by the owner and design professional to enhance the environmental soundness of the project. The consultant shall:</p> <ol style="list-style-type: none"> a. Confirm the availability of specified products. b. Specify products that are energy-efficient, low toxic and restore/preserve existing ecosystems and protected areas. c. Specify the by-products that were determined as suitable for use within the project or in other applications. d. List the native, environmentally friendly post-consumer recycled and/or reclaimed materials that could be used within the project. 	

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DIVISION 00 – Water and Wastewater Projects

Section 00100 – Wastewater Collection and Treatment

	<ul style="list-style-type: none"> e. If the feasibility of environmentally preferable products or use of potential treatment process by-products is unclear, the products may be specified as an alternate. f. Document all actions conducive to the optimization of material and resources. g. List all references from other sections that were applied to the design. <p><i>Part 3 – Execution:</i> Specify methods of construction that minimize waste, reduce pollution, and maximize resource efficiency. Provide requirements for cleanup and disposal, including sorting and recycling of materials and on-site reuse of materials.</p>	
<p>Construction</p>	<p>The owner and owner representative (i.e. design professional, construction supervisor, etc.) will take additional steps to ensure that all project participants are familiar with the environmental performance goals of the construction process and infrastructure as well as the intended use of green products and practices. These activities shall be conducted:</p> <ul style="list-style-type: none"> a. The owner’s representative will discuss these concepts at the pre-bid conference, encouraging general contractors to alert all sub-contractors to the requirements. b. The owner’s representative shall repeat the instruction at the pre-construction conference, when both general and sub-contractors shall participate. c. The owner, owner’s representative and contractor shall establish appropriate means to identify, review and implement any new green building opportunities proposed during construction. <p>The owner’s representative will anticipate potential adjustments during the construction phase and will make provisions to accept modifications to proposed products and implementation measures that would be conducive to furthering environmental stewardship.</p> <p>The contractor will perform as described in contract documents. In addition, the contractor will inform the project owner about equal or better alternative materials or site construction practices that are available at low or no additional cost and shall not adversely affect areas outside of construction limits, and, will implement measures to protect vegetation, trees and other designated elements as stipulated in the contract documents.</p> <p>Furthermore the contractor shall implement, with the approval of the owner and owner’s representative, the following:</p> <ul style="list-style-type: none"> a. Opportunities to enhance the project’s ecologically responsible actions to further improve the ecosystem and environment. b. Environmentally friendly actions, either permanent or temporary during the construction process. c. Incorporate alternative materials that meet green building criteria for application in the construction process. d. Implement necessary activities to reclaim onsite materials not previously identified as suitable for use in the project. 	<p><i>In this space or by a supplemental report, the owner or owner’s representative will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 00 – Water and Wastewater Projects

Section 00100 – Wastewater Collection and Treatment

The owner's representative will observe that the work is being executed according to project specifications.
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RESOURCES: U.S. Department of Energy, Building Technologies Program, www.eere.energy.gov/buildings
U.S. Environmental Protection Agency, <http://cfpub.epa.gov/npdes/stormwater/const.cfm>
GreenSpec Directory, Product Directory with Guideline Specifications, Third Edition (Building Green, Inc., 2002)
Federal Green Construction Guide for Specifiers, http://www.wbdg.org/design/greenspec_msl.php

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DIVISION 00 – Water and Wastewater Projects

Section 00200 – Drinking Water Treatment and Distribution

Objective:

The objective of this section is to describe specific activities to supplement facility planning, design and construction, in order to promote environmental stewardship in drinking water treatment and distribution projects. The activities are intended to identify designs and/or mechanisms as well as Best Management Practices that will be conducive to accomplishing this intent. The purpose is to select process and design elements, which promote operating efficiency, appropriate resource utilization, energy and natural resource conservation, solid waste reduction, pollution prevention and habitat protection. It is essential that the planning/design professional(s) reviews the attached individual construction specification sections for relevancy in completing the activities described in this section.

PROJECT STAGE	DESCRIPTION	APPLICABILITY
Planning	<p><u>Alternatives Analysis</u> In this phase the planning professional will conduct an alternatives analysis which includes the following, as applicable:</p> <p>Drinking Water Treatment Plant:</p> <p style="padding-left: 20px;">Technology</p> <ul style="list-style-type: none"> h. Analyze the possibility of using Point-of-Entry or Point-of-Use treatment systems for rural or isolated areas and provide recommendations. i. Identify current water quality conditions and analyze treatment options which might address the required needs. j. Consider use of renewable energy sources. k. Evaluate treatment alternatives with an emphasis on methods that minimize energy consumption and optimized the use of treatment chemicals. l. Analyze the alternatives for maximum treatment efficiency and minimization of waste stream. m. Conduct a present worth analysis prior to selecting an alternative. n. Identify treatment by-products beneficial use options and potential uses that could further enhance the environment. o. Evaluate the technical and financial advantages/disadvantages for the beneficial use of these by-products compared to disposal costs. p. Determine appropriate capacity needs to reduce the risk of overbuilding. <p style="padding-left: 20px;">Site</p> <ul style="list-style-type: none"> c. Develop site selection criteria which consider the technical, financial and environmental feasibility of the potential sites. d. Incorporate site considerations as described in Division 02 as factors in the site selection criteria. <p>Distribution Network:</p> <p style="padding-left: 20px;">Layout, Materials and Equipment</p> <ul style="list-style-type: none"> i. Evaluate system layouts which minimize energy intensive operations. j. Maximize the use of the natural topography. k. Evaluate means to improve energy efficiency or the viability of utilizing renewable energies in the distribution network facilities. l. Identify potential problems with stagnant water conditions, and inadequate or excessive residual chlorine. Evaluate 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 00 – Water and Wastewater Projects

Section 00200 – Drinking Water Treatment and Distribution

- means to mitigate these risks.
- m. Determine appropriate capacity needs to eliminate the possibility of overbuilding.
 - n. Evaluate alternative materials (i.e. pipes, valves, fittings, appurtenances, etc) and equipment options which are DfE, environmentally preferable or achieve greater operating efficiencies. Refer to the Special Consideration in Design, provided below, and the *Green Spec Directory* for further guidance.
 - o. Minimize the requirements for pavement replacement, landscape disturbance, and intrusive construction practices.
 - p. Conduct a present worth analysis prior to selecting an alternative.

Design Criteria Selection

In this phase, the planning professional will incorporate the following in the selection of design criteria:

- d. Define the environmental goals for the project with the owner.
- e. Develop or identify the appropriate design criteria to incorporate the recommendations developed in the alternatives analysis, specifically to:
 - o Maximize energy efficiency or the use of renewable energy sources, the natural topography, and the use of treatment process by-products
 - o Optimized the use of treatment chemicals.
 - o Minimize site disturbance construction practices.
 - o Conserve natural, renewable and non renewable resources.
- f. Identify design criteria required to incorporate the design requirements of each attached section specification.

Special Considerations in Design

In this phase, the planning professional will identify potential vendors, materials or products which may be evaluated during design to further incorporate operating efficiencies, use of local materials, and good resource utilization. Efforts shall be focused on identifying environmentally preferable products such as:

- g. Products made with salvaged, recycled, or agricultural waste content.
- h. Products that conserve natural resources.
- i. Products that avoid toxic or other emissions and minimize toxic content.
- j. Products that reduce environmental impacts during construction, demolition, or renovation.
- k. Products that save energy or water.
- l. Products that contribute to a safe, healthy indoor environment.

However, products including treatment chemicals, devices, components and materials which may come in contact with the drinking water shall not contribute contaminants that could cause adverse health effects. Relevant standards include National Science Foundation/ANSI standards 60 and 61.

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DIVISION 00 – Water and Wastewater Projects

Section 00200 – Drinking Water Treatment and Distribution

Design	<p><u>Facilities and Process Design</u> Based on the planning phase results, in this phase the design professional will supplement the design process by assuring the following:</p> <ul style="list-style-type: none"> i. Design is intended to achieve operating efficiency and to incorporate appropriate capacity needs. j. Utilization of recommended design criteria and identified vendors, materials or products which induce operating efficiencies, use of local materials, and good resource utilization. k. The suggested environmentally preferable products, criteria for a material's environmental performance/ characteristic, and use of potential treatment process by-products are evaluated for appropriate use and feasibility considering a cost-benefit analysis that factor in maintenance, durability, and replacement cost over the project life-cycle. The results are reviewed with the owner to determine applicability. l. A management plan is provided for the on- or off-site use of by-products such as recycled/ reclaimed materials, including filter backwash water, or in co-generation. m. Considerations for minimizing energy and optimized chemical usage, in addition to integrating elements for conservation and/or improvements to the ecosystem are included. n. The usage of construction materials and resources are optimized. o. Considerations for the potential reuse of materials in future deconstruction. p. The design requirements of each of the attached section specifications are incorporated. 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Construction Plans and Specifications</u> Following the format provided in the <i>Green Spec Directory</i> model specification section, the design professional will supplement the construction specifications with the following:</p> <p><i>Part 1 – General:</i> List general environmental requirements for the specification section (updated environmental goals), including submittals, definitions, references and quality assurance.</p> <p><i>Part 2 – Products:</i> Describe the environmentally preferable products or criteria for the material's environmental performance and characteristics, determined appropriate by the owner and design professional to enhance the environmental soundness of the project. The consultant shall:</p> <ul style="list-style-type: none"> h. Confirm the availability of specified products. i. Specify products that are energy-efficient, low toxic and restore/preserve existing ecosystems and protected areas. j. Specify the by-products that were determined as suitable for use within the project or in other applications. k. List the native, environmentally friendly post-consumer recycled and/or reclaimed materials that could be used within the project. 	

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Section 00200 – Drinking Water Treatment and Distribution

	<ul style="list-style-type: none"> I. If the feasibility of environmentally preferable products or use of potential treatment process by-products is unclear, the products may be specified as an alternate. m. Document all actions conducive to the optimization of material and resources. n. List all references from other sections that were applied to the design. <p><i>Part 3 – Execution:</i> Specify methods of construction that minimize waste, reduce pollution, and maximize resource efficiency. Provide requirements for cleanup and disposal, including sorting and recycling of materials and on-site reuse of construction or existing site materials.</p>	
Construction	<p>The owner and owner representative (i.e. design professional, construction supervisor, etc.) will take additional steps to ensure that all project participants are familiar with the environmental performance goals of the construction process and infrastructure as well as the intended use of green products and practices. These activities shall be conducted:</p> <ul style="list-style-type: none"> d. The owner’s representative will discuss these concepts at the pre-bid conference, encouraging general contractors to alert all sub-contractors to the requirements. e. The owner’s representative shall repeat the instruction at the pre-construction conference, when both general and sub-contractors shall participate. f. The owner, owner’s representative and contractor shall establish appropriate means to identify, review and implement any new green building opportunities proposed during construction. <p>The owner’s representative will anticipate potential adjustments during the construction phase and will make provisions to accept modifications to proposed products and implementation measures that would be conducive to furthering environmental stewardship.</p> <p>The contractor will perform as described in contract documents. In addition, the contractor will inform the project owner about equal or better alternative materials or site construction practices that are available at low or no additional cost and shall not adversely affect areas outside of construction limits and will implement measures to protect vegetation, trees and other designated elements as stipulated in the contract documents.</p> <p>Furthermore the contractor shall implement, with the approval of the owner and owner’s representative, the following:</p> <ul style="list-style-type: none"> e. Opportunities to enhance the project’s ecologically responsible actions to further improve the ecosystem and environment. f. Environmentally friendly actions, either permanent or temporary during the construction process. g. Incorporate alternative materials that meet green building criteria for application in the construction process. h. Implement necessary activities to reclaim on-site materials not previously identified as suitable for use in the project. 	<p><i>In this space or by a supplemental report, the owner or owner’s representative will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 00 – Water and Wastewater Projects

Section 00200 – Drinking Water Treatment and Distribution

	The owner's representative will observe that the work is being executed according to project specifications.	
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RESOURCES: U.S. Department of Energy, Building Technologies Program, www.eere.energy.gov/buildings
U.S. Environmental Protection Agency, <http://cfpub.epa.gov/npdes/stormwater/const.cfm>
GreenSpec Directory, Product Directory with Guideline Specifications, Third Edition (Building Green, Inc., 2002)
Federal Green Construction Guide for Specifiers, http://www.wbdg.org/design/greenspec_msl.php

Summary of Contents

DIVISION 02 – Site Construction

Section 02300 – Earthwork / Erosion Control / Site Drainage

Objective:

The objective of this section is to reduce/eliminate the need for importing or exporting fill material; to provide and protect natural habitats; conserve transport energy and to divert materials from landfill. This section refers to the elements associated with site selection as well as site grading and drainage improvements. The planning/design professional(s) will evaluate the site specific features such as topography, overall drainage characteristics, vegetation, access routes, surroundings, habitat, etc. Furthermore, the planning/design professional(s) will ascertain that the site grading and drainage plans are consistent with relevant master or urban plans, as well as applicable ordinances and/or regulations.

PROJECT STAGE	DESCRIPTION	APPLICABILITY
Planning	<p><u>Alternatives Analysis - Site Selection and System Layout</u> In this phase the planning professional will analyze site selection/layout alternatives that consider the following criteria, as applicable:</p> <ul style="list-style-type: none"> e. Impacts to the surroundings, minimizing or mitigating cut and fill requirements, and maximizing the use of the natural topography. f. Availability of on site existing materials. g. Site drainage and erosion control. h. Adequate access routes to site, during and after construction. i. Protection of environmentally sensitive areas. 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Design Criteria Selection</u> In this phase the planning professional will identify design criteria which support the use of on-site materials, best practices for site drainage and erosion control, as well as a natural use of the site topography.</p>	
	<p><u>Special Consideration in Design</u> In this phase, the planning professional will identify:</p> <ul style="list-style-type: none"> a. Any native materials that may be utilized to inhibit erosion such as vegetative cover. b. Potential uses of on site existing materials. Excess materials should be identified for potential reuse and/or disposal. c. Use of native materials, whenever practical and cost effective, will supersede import materials. a. Regarding erosion control, the use of non-native vegetation may be considered provided that reclaimed water is utilized and the use of best management practices is implemented for this purpose 	
Design	<p><u>Facilities and Process Design</u> In this phase the design professional will complete the following activities for the selected site(s) and pipeline locations, as applicable:</p> <ul style="list-style-type: none"> a. Determine mass grading and balance cut-and-fill practices and evaluate the suitability of onsite materials to be used as structural fill. b. Develop a site grading plan that maximizes the amount of onsite soils and minimizes the use of import fill, provided that onsite soils are suitable for their intended purpose. c. Identify local vendors, borrow pits and quarries for importing materials originating or produced using reclaimed materials. Imported materials should be brought from the closest available source or from grading and demolition operations off-site. A cost analysis shall be conducted to determine if a more distant 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>

Summary of Contents

DIVISION 02 – Site Construction

Section 02300 – Earthwork / Erosion Control / Site Drainage

- source of recycled materials is justified.
- d. Conduct subsurface site investigations to obtain geotechnical data to be used for designing on-site improvements.
 - e. Identify permeability characteristics of the in-situ soils to improve infiltration and minimize surface runoff, therefore maximizing recharge of the aquifer.
 - f. Minimize unnecessary disturbance of native species and waterways, protected areas, wetlands, refuges, etc.
 - g. Evaluate using flatter slopes to minimize erosion and the use of covers for reducing soil sloughing (particularly when cohesionless soils conform to the slope).
 - h. Identify specific green products or practices required at the site or for any site improvement requirements, such as alternatives to the use of treated wood or materials with toxic make-up.
 - i. Further identify and/or develop opportunities to use materials from other construction projects and/or the potential use of surplus materials from this project on other construction job sites.
 - j. Develop an erosion control and dust abatement plan to be implemented during construction and operation. The plan should be directed to control surface run-off and run-on, and must follow accepted stormwater control practices. In areas where stormwater control practices are not established, US EPA's stormwater control practices shall be followed, as appropriate (referenced below).
 - k. Implement manageable building to site ratio practices to avoid taxing the surrounding environment.
 - l. Clearly identify the limits of construction and regulatory requirements for handling storm water run-off to prevent encroachment on protected areas.

Construction Plans and Specifications

The *GreenSpec Directory* provides CSI section models that may be used as a basis for developing project-specific construction specifications. In developing the project-specific documents, the design professional will ensure the activities listed below have been considered for the selected site(s) and pipeline locations and incorporated into the construction documents, as applicable.

- a. Identify landscaped areas which will be protected during construction.
- b. Specify any specific green products or practices incorporated into the design.
- c. Define the suitability of onsite materials to be used as structural fill or identify other recycled materials retrieved from near-by constructions sites or other sources.
- d. List approved borrow pits and quarries for importing materials.
- e. Incorporate erosion control and minimization concepts through the use of best management practices.
- f. Define methods to minimize erosion and implement dust abatement measures.
- g. Identify staging areas for storing surplus material for use on or off site, hence minimizing disposal.
- h. Include provisions in the bid documents for adding or deducting labor or material costs for reclaimed onsite materials.
- i. Define the stormwater control practices.
- j. Evaluate the concepts described for the Construction stage,

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DIVISION 02 – Site Construction

Section 02300 – Earthwork / Erosion Control / Site Drainage

	<p>below, as well as other applicable products and practices to improve the environmental sustainability of the work required for this section.</p>	
Construction	<p>Following the format of the CSI specification models, the construction practices specified shall include, but are not limited to, the following concepts:</p> <p><u>Part 1 – General</u> As described in contract documents, the contractor will complete the following activities for the selected site(s) and pipeline locations:</p> <ol style="list-style-type: none"> a. Further identify opportunities for on site use of surplus materials from other construction projects, and off site use of surplus materials from this project on other projects prior to final disposal. b. Submit a list of proposed local materials and any recycled/reclaimed products for approval by the owner representative prior to implementation. Local products are defined as those that are located in proximity to the project site and will not require extensive transportation. c. Submit invoices, product information, and manufacturer documentation to recommend the use or substitution of materials. d. Implement measures to protect existing habitat. 	<p><i>In this space or by a supplemental report, the design professional or Specifiers will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Part 2 – Products</u> As described in contract documents. the contractor will complete the following activities for the selected site(s) and pipeline locations:</p> <ol style="list-style-type: none"> a. Obtain required materials and products as specified for sub-base fill and fill material. b. Obtain required products to implement slope protection and erosion control; foundation and subsurface drainage; filtration; trench control; materials separation and stormwater detention. 	
	<p><u>Part 3 – Execution</u> As described in contract documents, the contractor will:</p> <ol style="list-style-type: none"> a. Complete the activities as described for the selected site(s) and pipeline locations. b. Implement the necessary measures to protect onsite vegetation, trees, natural habitats and other designated elements. c. Apply site clearing practices as specified. 	

RESOURCES: U.S. Environmental Protection Agency, <http://cfpub.epa.gov/npdes/stormwater/const.cfm>
 U.S. Department of Energy, Building Technologies Program, www.eere.energy.gov/buildings/greenspec
 GreenSpec Product Directory with Guideline Specifications (BuildingGreen, Inc., Third Edition)
 Federal Green Construction Guide for Specifiers, http://www.wbdg.org/design/greenspec_msl.php

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DIVISION 02 – Site Construction

Section 2320 –Backfill Section 2700 – Site Paving

Objective:

The purpose of this section is to utilize best practices for backfill and pavement works, reduce/eliminate pavement replacement, increase the use of on- and off-site reclaimed materials and to identify and maximize the use of native soils in the design and construction of temporary access roads, permanent paved areas as well as pipe installation. Best practices for backfill and pavement works will incorporate appropriate means for dust abatement, indirect aquifer recharge, reduction of erosion effects, reduction of offsite disposal of materials that would otherwise could be used onsite as well as protection of surface water bodies, flora and fauna. This section refers to the elements associated with paving and trenching/backfilling requirements and needs to be closely coordinated with the site drainage and erosion control plans of the project. Applicable local, state, and federal regulations must be observed.

DESCRIPTION	APPLICABILITY	APPLICABILITY
Planning	<p><u>Alternatives Analysis - Site Selection and System Layout</u> In this phase the planning professional will analyze site selection/layout alternatives that consider the following criteria, as applicable:</p> <ul style="list-style-type: none"> j. Minimizing or mitigating cut and fill requirements and pavement replacement. 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Design Criteria Selection</u> In this phase the planning professional will identify design criteria which support the use of reclaimed materials as well as best practices for trenching, backfilling and site paving.</p>	
	<p><u>Special Consideration in Design</u> In this phase, the planning professional will identify:</p> <ul style="list-style-type: none"> d. Durable pavement designs that will make the most use of native soils for sub-grade, base course or surface course. e. Site or off-site surplus materials or reclaimed materials from nearby or adjacent construction sites or projects for use in backfilling or paving. f. Pavement materials that promote indirect aquifer recharge and reduce erosion. 	
Design	<p><u>Facilities and Process Design</u> In this phase the design professional will complete the following activities for the selected site(s) and pipeline locations, as applicable:</p> <ul style="list-style-type: none"> m. Conduct subsurface site investigations to obtain geotechnical data and evaluate the suitability of in-situ soils for purposes of designing pavement sections or use in backfill activities. n. Develop a site grading plan that maximizes the amount of onsite soils and minimizes the use of import fill, provided that onsite soils are suitable for their intended purpose. o. Identify local vendors, borrow pits and quarries for importing backfill and/or paving materials originating or produced using reclaimed materials. Imported materials should be brought from the closest available source or from grading and demolition operations off-site. A cost analysis shall be conducted to determine if a more distant source of recycled materials is justified. p. Further identify and/or develop opportunities to use materials from other construction projects and/or the potential use of surplus materials from this project on other construction job sites. q. Minimize unnecessary disturbance of native species and waterways, protected areas, wetlands, refuges, etc. 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 02 – Site Construction

Section 2320 –Backfill

Section 2700 – Site Paving

	<p>r. Require manageable site pavement practices to avoid disturbing topsoil and vegetation in areas outside the immediate construction location.</p> <p><u>Construction Plans and Specifications</u> The <i>GreenSpec Directory</i> provides CSI section models that may be used as a basis for developing project-specific construction specifications. In developing the project-specific documents, the design professional will ensure the activities listed below have been considered for the selected site(s) and pipeline locations and incorporated into the construction documents, as applicable.</p> <p>a. Specify pervious surface materials as part of pavement sections that will be conducive to indirect aquifer recharge.</p> <p>b. Specify the use of alternative materials such as recycled base for pavement sections.</p> <p>c. Specify native materials which meet the design criteria for use as select fill.</p> <p>d. Identify landscaped areas, natural habitat, or other sensitive areas which will be protected during construction.</p> <p>e. Define the suitability of on-site materials to be used as structural fill or identify other recycled materials retrieved from near-by constructions sites or other sources.</p> <p>f. List approved borrow pits and quarries for importing materials.</p> <p>g. Include provisions in the bid documents for adding or deducting labor or material costs for reclaimed on-site materials.</p> <p>h. Evaluate the concepts described for the Construction stage, below, as well as other applicable products and practices to improve the environmental sustainability of the work required for this section.</p> <p>i.</p>	
Construction	<p>Following the format of the CSI specification models, the construction practices specified shall include, but are not limited to, the following concepts:</p> <p><u>Part 1 – General</u> As described in contract documents, the contractor will complete the following activities for the selected site(s) and pipeline locations:</p> <p>e. Further identify opportunities for on site use of surplus materials from other construction projects, and off site use of surplus materials from this project on other projects prior to final disposal.</p> <p>f. Submit a list of proposed local materials and any recycled/ reclaimed products for approval by the owner representative prior to implementation. Local products are defined as those that are located in proximity to the project site and will not required extensive transportation.</p> <p>g. Submit invoices, product information, and manufacturer documentation to recommend the use or substitution of materials.</p> <p>h. Implement measures to protect existing habitat.</p> <p><u>Part 2 – Products</u> As described in contract documents. the contractor will complete the following activities for the selected site(s) and pipeline locations:</p>	<p><i>In this space or by a supplemental report, the design professional or Specifiers will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 02 – Site Construction

Section 2320 – Backfill

Section 2700 – Site Paving

- c. Obtain required materials and products as specified for sub-base fill and fill material.
- d. Obtain required products to meet pavement system designs and permeability standards.

Part 3 – Execution

As described in contract documents, the contractor will:

- d. Make provisions for phasing the pavement work, from site clearing to asphalt placement, to protect natural habitat, and adherence to the drainage and erosion control plans
- e. Complete the activities as described for the selected site(s) and pipeline locations.
- f. Implement the necessary measures to protect onsite vegetation, trees, natural habitats and other designated elements.
- g. Apply site clearing practices as specified.

RESOURCES:

U.S. Environmental Protection Agency, <http://cfpub.epa.gov/npdes/stormwater/const.cfm>
U.S. Department of Energy, Building Technologies Program, www.eere.energy.gov/buildings/greenspec
GreenSpec Product Directory with Guideline Specifications (BuildingGreen, Inc., Third Edition)
Federal Green Construction Guide for Specifiers, http://www.wbdg.org/design/greenspec_msl.php

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DIVISION 02 – Site Construction

Section 02900 – Landscaping

Objective:

The objective of this section is to utilize best practices for elements associated with site landscaping. Best practices for landscaping include the minimization of water consumption activities while maximizing the use of native plants to conserve the natural environment. The planning/design professional will assure that landscaping plans are in consonance with relevant master or urban plans, as well as applicable ordinances and/or regulations. The planning/design professional will consult with a specialized landscape professional, as appropriate, to assure compliance and to identify all opportunities for environmental stewardship.

DESCRIPTION	APPLICABILITY	APPLICABILITY
Planning	<p><u>Alternatives Analysis</u> - Site Selection and System Layout In this phase the planning professional will analyze site selection alternatives that consider the following criteria, as applicable:</p> <ul style="list-style-type: none"> k. Maximizing the use of natural topography, native plants, on-site materials and existing landscaped areas. l. Minimizing the use of imported off-site materials or plants. m. Site drainage and erosion control. n. Opportunities for incorporating xeriscape or other similar landscape practices. 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Design Criteria Selection</u> In this phase the planning professional will identify design criteria which support the use of best practices for landscaping.</p>	
	<p><u>Special Consideration in Design</u> In this phase, the planning professional will identify:</p> <ul style="list-style-type: none"> g. Identify native plants of the bioregion and drought-tolerant species. h. Potential use of on-site or off-site surplus materials or reclaimed materials from nearby or adjacent construction sites or projects for use in landscaping. i. Potential use of landscaping for site drainage and erosion control. j. Potential use of biosolids as soil enhancers. k. Minimizing the use of non-organic fertilizers and fertilizers which contain petrochemical additives or that may have been treated with pesticides or herbicides. l. Environmentally preferable products as described under Special Considerations in Design for Division 00 water and wastewater products to accommodate product requirements of the landscape plan. 	
Design	<p><u>Facilities and Process Design</u> In this phase the design professional will complete the following activities for the selected site(s), as applicable:</p> <ul style="list-style-type: none"> s. Develop a landscape plan that maximizes the amount of onsite vegetation, native species and existing natural topography and soils and minimizes the use of import materials. t. Evaluate the suitability of in-situ soils for purposes of designing landscape elements. u. Identify fertilizers that are organic in composition and do not contain petrochemical additives or that may have been treated with pesticides or herbicides. v. Consider soil enriching compounds and mulch, utilize organic compost and untreated ground gypsum-board scrap, biosolids (subject to approval). 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 02 – Site Construction

Section 02900 – Landscaping

	<ul style="list-style-type: none"> w. Identify native plant species to the region and nonnative species requiring minimal irrigation after they are established. x. Adequately plan for landscape water (reclaimed whenever possible and available, and must meet applicable standards) free from harmful amounts of acids, alkalis, salts, chemical pollutants, and organic matter. y. Design subsurface and drip irrigation systems considering the use of environmentally preferable products. z. Identify local vendors for environmentally preferable products and native plant species. aa. Minimize unnecessary disturbance of native species and waterways, protected areas, wetlands, refuges, etc. <p><u>Construction Plans and Specifications</u> The <i>GreenSpec Directory</i> provides CSI section models that may be used as a basis for developing project-specific construction specifications. In developing the project-specific documents, the design professional will ensure the activities listed below have been considered for the selected site(s) and incorporated into the construction documents, as applicable.</p> <ul style="list-style-type: none"> j. Specify materials that are protective of the natural environment. k. Specify native materials which meet the design criteria for use as landscaping materials. l. Identify landscaped areas, natural habitat, or other sensitive areas which will be protected or utilized during construction. m. List approved vendors for importing landscape materials. n. Include provisions in the bid documents for adding or deducting labor or material costs for reclaimed on-site materials. o. Evaluate the concepts described for the Construction stage, below, as well as other applicable products and practices to improve the environmental sustainability of the work required for this section. 	
Construction	<p>Following the format of the CSI specification models, the construction practices specified shall include, but are not limited to, the following concepts:</p> <p><u>Part 1 – General</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ul style="list-style-type: none"> i. Further identify opportunities for use of on site materials including vegetation and natural topography/drainage. j. Submit a list of proposed local materials and any recycled/reclaimed products for approval by the owner representative prior to implementation. Local products are defined as those that are located in proximity to the project site and will not require extensive transportation. k. Submit invoices, product information, and manufacturer documentation to recommend the use or substitution of materials. l. Implement measures to protect existing habitat. <p><u>Part 2 – Products</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ul style="list-style-type: none"> e. Obtain required materials and products as specified for landscaping. 	<p><i>In this space or by a supplemental report, the design professional or Specifiers will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 02 – Site Construction

Section 02900 – Landscaping

- f. Recommend alternative environmentally preferable products, as applicable.

Part 3 – Execution

As described in contract documents, the contractor will:

- a. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to designated areas.
- b. Do not disturb topsoil and vegetation outside of the area indicated in drawings.
- c. Provide erosion control and seeding with native plant species to protect slopes. Provide protected on-site storage for excavated rock, soil and vegetation.

RESOURCES: U.S. Environmental Protection Agency, <http://cfpub.epa.gov/npdes/stormwater/const.cfm>
GreenSpec Product Directory with Guideline Specifications (BuildingGreen, Inc., Third Edition)
Federal Green Construction Guide for Specifiers, http://www.wbdg.org/design/greenspec_msl.php

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DIVISION 03 – Concrete

Section 03100 – Concrete Formwork

Section 03200 – Reinforcement

Section 03300 – Cast-in-place Concrete

Objective:

The objective of this section is to utilize best practices for the use of concrete in facilities and pipeline construction. Concrete is a durable material offering an effective moisture- and insect-resistant, insulated, and permanent formwork which conserves energy and resources. However, its production and installation can cause various undesirable effects to the environment. As such, one alternative is to reduce the amount of concrete required for construction by adding reclaimed and/or recycled materials to the mix. By adding these materials to the concrete, to replace some of the cement, the intensive energy requirements from the cement production process can be offset, and disposal requirements can be avoided, resulting in environmental benefits. Additionally, environmental benefits may result from the identification and implementation of construction practices where the use of environmentally friendly and multiple-use components for placing concrete are considered. In particular, the use of reclaimed and/or recycled materials for formwork and steel reinforcement may support this concept.

DESCRIPTION	APPLICABILITY	APPLICABILITY
Planning	<p><u>Alternatives Analysis - Site Selection and System Layout</u> In this phase the planning professional will analyze site selection/layout alternatives that consider the following criteria, as applicable:</p> <ul style="list-style-type: none"> o. Maximizing the use of on-site materials. p. Minimize amount of concrete needed to achieve design objectives 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Design Criteria Selection</u> In this phase the planning professional will identify design criteria which support the use of best practices for the use of concrete.</p>	
	<p><u>Special Consideration in Design</u> In this phase, the planning professional will identify:</p> <ul style="list-style-type: none"> a. The concrete ready-mix contractors in the area and obtain technical data for the concrete, recognizing those that utilize environmentally preferable production practices. b. Sources of aggregates required in the production of on-site manufactured concrete. c. In-situ materials viable for use as aggregate in the production of on-site manufactured concrete. d. The available options for minimizing the use of concrete with replacement or combination of other less energy intensive materials, preferably of on-site and unprocessed origin. e. All options within the area for recycled and/or reclaimed reinforcement and formwork to be considered during the design and construction process. 	

Summary of Contents

DIVISION 03 – Concrete

Section 03100 – Concrete Formwork

Section 03200 – Reinforcement

Section 03300 – Cast-in-place Concrete

Design	<p><u>Facilities and Process Design</u></p> <p>In this phase the design professional will complete the following activities for the selected site(s), as applicable:</p> <ul style="list-style-type: none">a. Develop a concrete mix design which minimizes the amount of cement, increases the amount of fly ash and/or other pozzolans, and minimizes the amount of water in the mix.b. Evaluate the effectiveness of increasing the time allowed for concrete to reach specified strength, providing an opportunity for concrete containing less cement and water.c. Consider the use of available alternative materials, on-site materials and green products for use in concrete and forms whenever possible as long as the construction and cost do not increase significantly.d. Evaluate the use of natural topography and soils to minimize the requirements for conventional formwork.e. Consider the use of reclaimed steel during the design of reinforced concrete structures.f. Identify locations/uses for excess concrete or for recycling reinforcing steel.g. Identify local vendors for required concrete mix and installation products including formwork products described below.h. Avoid in-ground concrete foundations.i. Recommend the use of certified reclaimed steel reinforcement and allow for the use of fibers to reinforce concrete in lieu of steel reinforcement, when practicalj. Minimize unnecessary disturbance of native species and waterways, protected areas, wetlands, refuges, etc.	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
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DIVISION 03 – Concrete

Section 03100 – Concrete Formwork

Section 03200 – Reinforcement

Section 03300 – Cast-in-place Concrete

	<p><u>Construction Plans and Specifications</u> The <i>GreenSpec Directory</i> provides CSI section models that may be used as a basis for developing project-specific construction specifications. In developing the project-specific documents, the design professional will ensure the activities listed below have been considered for the selected site(s) and incorporated into the construction documents, as applicable.</p> <ol style="list-style-type: none"> a. Specify construction practices that consider the use of earth forms, one-sided forms, reusable forms, insulating permanent formwork, or certified wood and reuse form lumber for framing and sheathing. In addition, specify forms that minimize the use of concrete. b. Specify curing methods appropriate for concrete mix, finishing requirements and weather. c. Specify materials that are protective of the natural environment. d. Specify native materials which meet the design criteria for use as concrete additives. e. Identify landscaped areas, natural habitat, or other sensitive areas which will be protected or utilized during construction. f. List vendors utilizing environmentally preferable production practices for concrete mix materials and formwork. g. Include provisions in the bid documents for adding or deducting labor or material costs for reclaimed on-site materials. h. Evaluate the concepts described for the Construction stage, below, as well as other applicable products and practices to improve the environmental sustainability of the work required for this section. 	
Construction	<p>Following the format of the CSI specification models, the construction practices specified shall include, but are not limited to, the following concepts:</p> <p><u>Part 1 – General</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ol style="list-style-type: none"> a. Submit a list of proposed local materials and any recycled/ reclaimed products for approval by the owner representative prior to implementation. Local products are defined as those that are located in proximity to the project site and will not require extensive transportation. b. Submit invoices, product information, and manufacturer documentation to recommend the use or substitution of materials. c. Implement measures to protect existing habitat. <p><u>Part 2 – Products</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ol style="list-style-type: none"> a. Obtain required materials and products as specified for mixing and installing concrete. b. Recommend alternative environmentally preferable products, as described under Special Considerations in Design for Division 00 water and wastewater products. 	<p><i>In this space or by a supplemental report, the design professional or Specifiers will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 03 – Concrete

Section 03100 – Concrete Formwork

Section 03200 – Reinforcement

Section 03300 – Cast-in-place Concrete

Part 3 – Execution

As described in contract documents, the contractor will:

- a. Employ a Finisher experienced in finishing slabs affected by slower set times and less bleed water.
- b. Designate locations or uses for excess concrete, for cleaning out concrete trucks, and for collecting reinforcing steel for recycling.
- c. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to designated areas.
- d. Do not disturb topsoil and vegetation outside of the area indicated in drawings.
- e. Provide protected on-site storage for excavated rock, soil and vegetation.

RESOURCES:

U.S. Environmental Protection Agency, <http://cfpub.epa.gov/npdes/stormwater/const.cfm>

U.S. Department of Energy, Building Technologies Program, www.eere.energy.gov/buildings/

GreenSpec Product Directory with Guideline Specifications (BuildingGreen, Inc., Third Edition)

Federal Green Construction Guide for Specifiers, http://www.wbdg.org/design/greenspec_msl.php

Summary of Contents

DIVISION 04 – Masonry

Section 04000 – Concrete Masonry Units

Objective:

The objective of this section is to utilize best practices for the use of concrete masonry units (CMU) as part of the construction elements. In construction, the use of CMU offers a sound way to achieve structural soundness, while maximizing energy savings when coupled with insulation. Environmental benefits are realized with the use of reclaimed, recycled or alternative materials in manufacturing or replacing conventional CMU production methods. In addition, minimizing, to the extent practical, moving materials from distant locations to the job site, if possible, as well as the use of on-site materials in fabricating CMU support environmental stewardship.

DESCRIPTION	APPLICABILITY	APPLICABILITY
Planning	<p><u>Alternatives Analysis - Site Selection and System Layout</u> In this phase the planning professional will analyze site selection/layout alternatives that consider the following criteria, as applicable:</p> <ul style="list-style-type: none"> a. Maximizing the use of on-site materials. b. Maximizing the use of CMU to achieve structural soundness and energy savings. 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Design Criteria Selection</u> In this phase the planning professional will identify design criteria which support the use of best practices for the use of CMU.</p>	
	<p><u>Special Consideration in Design</u> In this phase, the planning professional will identify:</p> <ul style="list-style-type: none"> a. Sources for CMU and document the technical data associated with the production process for the manufacturers available in the region, recognizing processes that replace the use of cement with fly ash or other environmentally preferable products. b. The available environmentally preferable options including the use of alternative materials, other than CMU, that meet the properties and characteristics suitable to the project requirements. c. Identify sources for CMU which are manufactured replacing Portland cement with fly ash, replacing aggregate with industrial waste by product or locally or onsite-sourced aggregate. 	
Design	<p><u>Facilities and Process Design</u> In this phase the design professional will complete the following activities for the selected site(s), as applicable:</p> <ul style="list-style-type: none"> a. Evaluate the effectiveness of alternative materials, other than CMU, that meet the properties and characteristics suitable to the project requirements. b. Identify local vendors for required masonry products. 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Construction Plans and Specifications</u> The <i>GreenSpec Directory</i> provides CSI section models that may be used as a basis for developing project-specific construction specifications. In developing the project-specific documents, the design professional will ensure the activities listed below have been considered for the selected site(s) and incorporated into the construction documents, as applicable.</p> <ul style="list-style-type: none"> a. Specify materials that are protective of the natural environment. b. Specify native materials which meet the design criteria for use 	

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DIVISION 04 – Masonry

Section 04000 – Concrete Masonry Units

	<p>as aggregate materials in on-site CMU production.</p> <ul style="list-style-type: none"> c. Identify landscaped areas, natural habitat, or other sensitive areas which will be protected or utilized during construction. d. List vendors utilizing environmentally preferable production practices for concrete mix materials and production of CMU. e. Include provisions in the bid documents for adding or deducting labor or material costs for reclaimed on-site materials. f. Evaluate the concepts described for the Construction stage, below, as well as other applicable products and practices to improve the environmental sustainability of the work required for this section. 	
Construction	<p>Following the format of the CSI specification models, the construction practices specified shall include, but are not limited to, the following concepts:</p> <p><u>Part 1 – General</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ul style="list-style-type: none"> a. Submit a list of proposed local materials and any recycled/ reclaimed products for approval by the owner representative prior to implementation. Local products are defined as those that are located in proximity to the project site and will not require extensive transportation. b. Submit invoices, product information, and manufacturer documentation to recommend the use or substitution of materials. c. Implement measures to protect existing habitat. <hr/> <p><u>Part 2 – Products</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ul style="list-style-type: none"> a. Obtain required materials and products as specified for masonry work. b. Recommend alternative environmentally preferable products, as described under Special Considerations in Design for Division 00 water and wastewater products. <hr/> <p><u>Part 3 – Execution</u> As described in contract documents, the contractor will:</p> <ul style="list-style-type: none"> a. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to designated areas. b. Do not disturb topsoil and vegetation outside of the area indicated in drawings. c. Provide erosion control and seeding with native plant species to protect slopes. Provide protected on-site storage for excavated rock, soil and vegetation. 	<p><i>In this space or by a supplemental report, the design professional or Specifiers will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 13 – Special Construction

Section 13600 – Renewable Energy Systems

Objective:

The objective of this section is to utilize best practices for implementing renewable energy systems in environmental infrastructure. Once energy efficiency is maximized for a project, providing the required energy via clean, renewable resources is more sustainable than using fossil fuels which are finite in supply and incur environmental impacts. The primary obstacle for the use of renewable energy systems is the high initial cost, although price reductions are continuing. However, these environmentally friendly systems are more cost-effective when compared on a basis that includes hidden costs such as damage to the environment caused by the sourcing, processing, transporting, using, and disposal aspects of power sources such as coal, oil, nuclear, and natural gas. The planning/design professional will evaluate the opportunities to incorporate appropriate renewable energy systems for the operation of the environmental infrastructure project.

DESCRIPTION	APPLICABILITY	APPLICABILITY
Planning	<p><u>Alternatives Analysis - Site Selection and System Layout</u> In this phase the planning professional will analyze site selection/layout alternatives that consider the following criteria, as applicable:</p> <ul style="list-style-type: none"> a. Access to alternative power resources such as sun, wind, and on-site process by-products. b. Space requirements for constructing and operating renewable energy systems. 	<p><i>In this space or by a supplemental report, the planning professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Design Criteria Selection</u> In this phase the planning professional will identify design criteria which support the use of best practices for the use of renewable energy systems.</p>	
	<p><u>Special Consideration in Design</u> In this phase, the planning professional will identify:</p> <ul style="list-style-type: none"> a. Availability of alternative energy resources to sustain operational requirements – sun, wind, on-site process by-products. b. Hidden costs, as defined in the section objective above, should be considered in the evaluation of energy source alternatives. To the extent possible, use qualitative comparisons and, at a minimum, provide a discussion of the hidden costs and any influence it has on the energy source recommendation. c. Local regulations regarding the use of alternative energy sources including land use and height restrictions. d. Rebates, partnerships or other incentives offered by local government or local utilities for incorporating renewable energy sources in the proposed project. 	

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DIVISION 13 – Special Construction

Section 13600 – Renewable Energy Systems

Design	<p><u>Facilities and Process Design</u> In this phase the design professional will complete the following activities for the selected site(s), as applicable:</p> <ol style="list-style-type: none"> a. Evaluate the ability to achieve maximum energy efficiency for a project. b. Consider the use, capability, and reliability of renewable energy systems to accommodate the requirements for operations, such as: <ul style="list-style-type: none"> o water pumping needs o power for irrigation systems and controls o power to help ventilate outlying buildings o power for entry gates or communication devices such as emergency telephones o lighting c. Evaluate at least the following alternative energy sources: <ul style="list-style-type: none"> o Photovoltaic (PV) cells – semiconductor devices that convert sunlight into electricity. o Wind Turbines o Energy derived from biomass d. Evaluate the cost-effectiveness of full-scale or hybrid renewable energy systems to sustain the required power needs. 	<p><i>In this space or by a supplemental report, the design professional will briefly explain how these guidelines were incorporated in the planning/design process or, if appropriate, the rationale for why they were not addressed.</i></p>
	<p><u>Construction Plans and Specifications</u> The <i>GreenSpec Directory</i> provides CSI section models that may be used as a basis for developing project-specific construction specifications. In developing the project-specific documents, the design professional will ensure the activities listed below have been considered for the selected site(s) and incorporated into the construction documents, as applicable.</p> <ol style="list-style-type: none"> a. Specify materials that are protective of the natural environment. b. Specify native materials which meet the design criteria for use as landscaping materials. c. Identify landscaped areas, natural habitat, or other sensitive areas which will be protected or utilized during construction. d. List vendors of renewable energy system products. e. Include provisions in the bid documents for adding or deducting labor or material costs for reclaimed on-site materials. f. Evaluate the concepts described for the Construction stage, below, as well as other applicable products and practices to improve the environmental sustainability of the work required for this section. 	
Construction	<p>Following the format of the CSI specification models, the construction practices specified shall include, but are not limited to, the following concepts:</p> <p><u>Part 1 – General</u> As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ol style="list-style-type: none"> a. Submit a list of proposed local materials and any recycled/reclaimed products for approval by the owner representative prior to implementation. Local products are defined as those that are located in proximity to the project site and will not 	<p><i>In this space or by a supplemental report, the design professional or Specifiers will briefly explain how these guidelines were incorporated in the construction documents or, if appropriate, the rationale for why they were not addressed.</i></p>

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DIVISION 13 – Special Construction

Section 13600 – Renewable Energy Systems

	<p>required extensive transportation.</p> <ul style="list-style-type: none">b. Submit invoices, product information, and manufacturer documentation to recommend the use or substitution of materials.c. Implement measures to protect existing habitat.	
	<p><u>Part 2 – Products</u></p> <p>As described in contract documents, the contractor will complete the following activities for the selected site(s):</p> <ul style="list-style-type: none">a. Obtain required materials and products as specified for masonry work.b. Recommend alternative green products, as applicable.	
	<p><u>Part 3 – Execution</u></p> <p>As described in contract documents, the contractor will:</p> <ul style="list-style-type: none">a. Implement resource management in preparation for external verification of the operations, including:<ul style="list-style-type: none">o Energy Efficiency: Verify equipment is properly installed, connected, and adjusted. Verify that equipment is operating as specified.o Renewable Energy: Verify proper operation in all modes of system operation by testing. Verify proper operation under a wide range of conditions to verify energy delivery as calculated for those conditions.b. Plan equipment and vehicle access to minimize and confine soil disturbance and compaction to designated areas.c. Do not disturb topsoil and vegetation outside of the area indicated in drawings.d. Provide erosion control and seeding with native plant species to protect slopes. Provide protected on-site storage for excavated rock, soil and vegetation.	

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