Sustainable Design and Building Standards
for
Dakota County, Minnesota

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For:
Dakota County

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Introduction

Using Guidelines on Dakota County Projects

These Guidelines provide guidance to cost effectively reduce the environmental impacts of new building construction and renovations. The Guidelines are used for County projects during planning, design, demolition, construction, and occupancy phases. County criteria for selecting architectural and engineering consultants include the ability and willingness to use these Guidelines. Guidelines are intended to be consistent with Dakota County's *Design and Construction Standards*. Parts of the County Standards are incorporated into these Guidelines.

Sustainable Design

"Sustainability" is an approach to design that recognizes that every design choice has an impact on the natural and cultural resources of not only the local environment but also regional and global environments. It embraces the concept that human civilization is an integral part of the natural world and has a profound effect upon the environment.
While there is no one single definition of sustainability, the main principles include the following:

- Respects and responds to the unique characteristics of each site while recognizing its interdependence on the entire planet.
- Conserves energy by minimizing the amount required initially and secondly, by using energy efficient systems, fixtures, appliances and controls. Methods for reducing a building's energy load include: using natural daylighting and ventilation, siting the project to optimize solar orientation and using building mass to minimize internal temperature swings.
- Reduces the community's energy load by encouraging the use of mass transit and creating compact mixed-use neighborhoods to reduce vehicular transportation use.
- Uses environmentally responsible materials that are nontoxic, made with recycled materials, manufactured with low embodied energy, and come from renewable, salvaged and certified sustainable sources. Building materials are selected using a life cycle or cradle-to-cradle approach that analyzes the environmental impact throughout the product's life.
- Conserves water by using low flow fixtures and water saving cooling towers and irrigation systems. Conserves potable water by using rainwater and recycling gray water.
- Reduces consumption and eliminates waste by reusing materials and recycling. Recognizing that a building's function changes over time, designing for flexibility during original construction reduces the waste generated from future remodeling.
- Uses nontoxic building materials and proper ventilation to provide healthier environments.

Benefits of Using Sustainable Design include:

- Energy efficiency reduces operating costs.
- Water conservation reduces operating costs.
- Buildings are more durable and last longer.
- Construction/operational waste reduction and recycling efforts lower disposal costs.
- Indoor air quality and daylighting measures create healthy and productive work environments and reduce absenteeism.
- Communicates positive community relations.
- Natural resources are conserved for future generations.

Guideline's Organizational Structure

The Guidelines are organized into four major design phases:

- Planning
- Design
- Construction Documents
- Construction

The Guidelines are also organized by six environmental topics:

- Site,
- Energy Conservation,
- Indoor Air Quality,
- Building Materials,
- Water Conservation,
- Waste Reduction.

The Guidelines are for public and institutional buildings including office buildings, libraries, courts, detention facilities and public works facilities. They are also for new buildings as well as the renovation of existing. Guidelines that refer to renovations only are coded with an **R**.

Using the Guidelines as a Checklist

The Guidelines will be used as a Checklist to help designers record those guidelines they implement and implicitly identify those they do not. Brackets [ ] are provided to check guidelines as they are implemented.

The Role of Cost in Design Decisions

First Costs

Frequently, design decisions are based on the first costs of materials. While this is useful in determining a project's construction cost or in comparing otherwise similar products, basing design decisions on first costs overlooks most, if not all, of the considerations involved in making sustainable design decisions.

Life Cycle Costing

Life cycle costing is a method to evaluate the cost of a building over its useful "life", which is frequently considered to be 20 years for commercial buildings. Life cycle costing considers the operational and replacement costs of materials in addition to first costs. The use of this costing method often justifies the use of materials with higher first costs when:

- Their operational costs are lower than comparable products
- They do not require as frequent replacement, or
- Other factors such as lower disposal costs come into play.

Since the County owns buildings for up to 40 years or more, it is appropriate to consider a longer than customary period when applying life cycle cost analysis to County buildings. For construction of new County buildings, use 50 years. For major renovations use 20 years.

Life cycle costs, however, still overlook many of the considerations involved in making sustainable design decisions.

Environmental Cost to Society

In addition to considering the dollar costs of design decisions, sustainability involves considering the environmental and social costs in design decisions. While dollar costs can be determined for some environmental and social impacts, many cannot readily be assigned dollar costs. While efforts are being made to develop dollar values for many environmental and social considerations, the calculations are complex and little data is available at this time.

The designer should keep environmental and social issues in mind throughout the entire project. For example, when selecting a product, the issues to consider include:

1. Raw Materials:
   - Composition - what is the product content?
   - Where do the raw materials for the product come from, and what is the environmental impact of its extraction or harvesting?
   - Are the raw materials renewable, or finite resources?

2. Manufacturing:
   - What processing is involved with turning raw materials into the finished product?
   - What energy is used during the processing and what by-products, including pollution and toxins, are generated?

3. Transportation:
   - How are raw materials transported to the processing location and how are finished products transported to their place of use?
   - What energy is used during transport?
   - What by-products (pollution) are generated?

4. Installation:
   - What processes are required for the installation of the product?
   - What energy is used during installation?
   - Are there any health or pollution concerns involved with the installation process?

5. Operation/Maintenance:
   - What processes are involved with the operation and maintenance of the product in place?
   - What energy is used over the life of the product?
   - Are there any health or pollution concerns involved with the product's operation and maintenance?

6. Next Use - What happens to the product at the end of its life?
   - Can it be reused or recycled?
   - What energy, including transportation energy, is required in disposing of or reconstituting the product?
   - Are any potential toxins created by the disposal of the product?

Cost Synergies of Sustainable Design Decisions

When considering either the dollar costs or the environmental and social costs of design decisions, it is important to consider the project as a whole, rather than the sum of individual design decisions. Although individual decisions may not indicate it, truly sustainable design is a synergy between individual design components that makes the project work well as a whole.
An example is the inter-relationship involving the selection of windows, lighting and HVAC equipment.

Guidelines

I. Planning Phase Checklist

The primary goals of the Planning Phase are:

- Identify and address the project's environmental opportunities
- Establish overall building energy budget
- Educate design team about sustainable design goals
- Address space needs for environmental issues.

Reference Documents:

Dakota County, *Design and Construction Standards*
Dakota County Soil and Water Conservation District, *Low Impact Development*, http://www.dakotaswcd.org
Northern States Power, *Energy Assets*, http://www.northernstatespower.com/fb/fb_ps_as.htm
Dakota Electric Association, http://www.dakelec.com/
Minnesota Sustainable Design Guide site, http://www.sustainabledesignguide.umn.edu

A. Site

[ ] 1. Consider the regional impacts of the proposed development on natural and manmade systems such as surface drainage, geology, vegetation, topography, transportation, infrastructure and historical development patterns. Determine methods to mitigate any negative impacts.

[ ] 2. Consider the development's impact on the hydrology of the water. Dakota County Soil & Water Conservation District (SWCD) is committed to working with designers, land owners, developers and local governments to eliminate or minimize the impacts of urbanization on the local watershed through planning, decreasing runoff volume, and promoting natural processes. For technical assistance and possible financial incentives for qualified projects contact SWCD at 651.480.7777.

B. Energy Conservation

[ ] 1. Establish an energy conservation design team. The team membership should consist of the owner, project engineers, lighting designer, daylighting specialist, and architects with energy conservation expertise.

[ ] 2. Establish an overall energy budget for building design and operations. The budget will always be at or below the level set by the Minnesota State Energy Code. The budget should account for equipment cost and operating energy over the expected building life, and provides a mechanism for shifting energy costs outside of the construction budget where possible.

[ ] 3. Design team recommends energy efficient methods and technologies to local utilities.

[ ] 4. Contact Northern States Power (NSP) or Dakota Electric Association to research rebates, loans, grants, design tools, technical assistance and other incentives.

[ ] 5. Contact NSP Energy Assets and Energy Designer programs for computer modeling, consulting services and new construction rebates incentives.

[ ] 6. Contact Dakota Electric Association for consulting services, grants for upgrades, and loans for both new and existing buildings. (A subsidiary, Energy Alternatives offers consulting services,

turnkey operations for generator sets, and loans for geothermal heat pumps.) Dakota Electric evaluates technologies using a benefit/cost ratio equal to 2.00 or greater to qualify for Grants.

[ ] 7. Analyze information on climate such as temperature, humidity, solar insolation, wind, and weather patterns.

[ ] 8. Analyze impact of landforms, lakes, vegetation, adjacent buildings and groundcover upon the site's microclimate.

[ ] 9. Provide locked and conveniently located bicycle storage up to 5% of the building occupancy. Provide showers and changing areas for commuters.

[ ] 10. Identify peak parking demand for the building and consider constructing only the number of parking spaces actually needed for anticipated demand.

[ ] 11. Provide conveniently located parking explicitly for carpool or alternative fueled vehicles.

C. Indoor Air Quality

[ ] 1. Identify and address any activity, equipment or material usage that may adversely impact indoor air quality such as vehicle storage, copiers/printers or supply storage.

[ ] 2. Locate and evaluate the polluting characteristics of neighboring buildings and sites.

[ ] 3. Investigate and evaluate possible on-site sources of contamination in soil and ground water such as radon.

[ ] 4. Determine the impact of ambient outside air quality in the design of air filtration and treatment.

[ ] 5. Recommend commissioning using ASHRAE Guideline 1-1989 *Commissioning of HVAC Systems*.

D. Materials

No guidelines at this phase.

E. Water Conservation

[ ] 1. Explore a gray water system, which collects water from sinks and showers and reuses it for toilet flushing or irrigation.

[ ] 2. Explore waste treatment using biological systems and other alternative systems, such as constructed wetlands and composting toilets, instead of a municipal wastewater treatment plant.

[ ] 3. Explore opportunities for collecting rainwater to irrigate exterior or interior plant materials and other domestic uses.

F. Waste Reduction

[ ] 1. Evaluate the reuse and renovation of existing structures instead of building new.

[ ] 2. Establish aggressive goals to recycle or salvage as much of the building as possible when it must be demolished.

[ ] 3. Identify opportunities to share spaces such as conference rooms. Omit unnecessary spaces. Building less is the most sustainable and cost effective solution.

[ ] 4. Identify materials to be recycled or composted such as white paper, aluminum, glass, cardboard, and food waste. In the building program allocate space for material collection and handling by floor or area and at the loading dock.

Guidelines

II. Design Phase Checklist

The focus of the Design Phase is to explore and evaluate a wide variety of design solutions and select those that meet project sustainability goals.

Reference Documents:

Dakota County, *Design and Construction Standards*
Northern States Power, *Energy Assets*, http://www.northernstatespower.com/fb/fb_ps_as.htm
Dakota Electric Association, http://www.dakelec.com/
Environmental Building News, *GreenSpec: the Environmental Building News Product Directory and Guideline Specifications,* http://www.ebuild.com/greenspec/

A. Site

[ ] 1. Preserve ecologically significant and/or sensitive areas of vegetation, wildlife habitat and topography. Preserve existing plant materials that have a positive ecological, economic, or user function .
[ ] 2. Minimize the area of the site dedicated to the building, parking, and access roads to provide green space
[ ] 3. Design the site to preserve and enhance wildlife habitats. Reconnect fragmented landscapes to establish contiguous networks with other natural systems both within the site and beyond its boundaries.
[ ] 4. Use plant materials to protect building in the winter and shade in the summer.
[ ] 5. Select native trees, shrubs, and plants to conserve water, minimize maintenance, and reduce yard waste. See Appendix D – Native Species List for Minnesota Native Plant Communities.
[ ] 6. Use alternative waste treatment systems, such as peat moss drain field, wetlands, consolidated systems, and composting toilets instead of sending waste to a treatment plant.
[ ] 7. Retain and use rainwater on site instead of discharging it into storm sewer system. Maximize use of permeable surfaces to allow rainwater to penetrate and remain on site.
[ ] 8. Minimize disturbances to the watershed. Use swales, sediment control ponds, pools and wetlands along drainage courses or infiltration basins to retain and treat stormwater on site.
[ ] 9. Design efficient irrigation systems, such as drip systems, to minimize water consumption. Install irrigation system on separate meter to measure water consumption.
[ ] 10. Establish irrigation system in zones and use a temporary irrigation system that won't be necessary once plants are established.
[ ] 11. Provide a landscaped pedestrian connection between shelter and building if building is located near a mass transit stop.
[ ] 12. Provide pleasant and safe landscaped connection(s) from parking lot(s) to building(s).
[ ] 13. Design integrated pest management systems to reduce cost and chemical applications.
[ ] 14. Follow Best Management Practices for soil erosion, stormwater management, and water pollution control. See Appendix A – Resources, Landscape Architecture for sources.
[ ] 15. Use sustainable, long-term landscape design. Avoid small, hard to maintain plant beds and turfed areas. They are not long-term solutions and require frequent replacement.

B. Energy Conservation

[ ] 1. Maximize opportunities to daylight building. Orient longest windowed building section along east/west axis.
[ ] 2. Use skylights, lightshelves, or light scoops to daylight building naturally and conserve electrical lighting energy. Integrate lighting with daylight sensors. Allow for thermal comfort in day-lit areas.
[ ] 3. Design facade to respond to building orientation. Allow for shading on sunlit elevations and adjustment of window sizes to respond to building orientation.
[ ] 4. Optimize facility glazing by using spectrally sensitive or "cool" glazing to balance visible transmission with shading coefficient of the glass. All glass should have the lowest practical Heat Gain Coefficient (SHGC), typically less than 0.58. It should not compromise the loss of visible transmission, which should be maintained above 0.65. All glass should have a "Glazing Luminous Efficacy" (Ke) of more than 1 (Ke = VT/SHGC).
[ ] 5. For small buildings consider naturally ventilating buildings using operable windows and skylights instead of air conditioning.
[ ] 6. Optimize design of the building envelope through insulation, high performance windows and control of air leakage.
[ ] 7. Develop detailed thermal envelope design. Provide adequate air barrier and moisture retarder. Avoid thermal bridging to prevent discomfort and condensation.
[ ] 8. Consider roofing color and the effect it will have on heating and cooling. Use light roofing colors to reflect light, reduce cooling requirements and diminish the facility's contribution to heat islands.
[ ] 9. Maximize efficiency of HVAC systems with efficient equipment and controls, variable air volume (VAV) distribution boxes, and heat recovery or rejection. Consider HVAC systems that use pre-cooled or pre-heated makeup air.
[ ] 10. Use energy efficient lighting such as compact fluorescents. Use task lighting to reduce need for ambient lighting and conserve energy. Use electronic ballasts and other efficient lighting solutions to reduce connected interior lighting load to less than 1.1 W/SF.
[ ] 11. Use direct digitally controlled energy management systems.
[ ] 12. Use renewable or alternative energy sources for all or part of the building's energy needs (e.g., wind generators and solar water heating).
[ ] 13. For building renovation restore daylighting features that have been removed or covered to capitalize on building's original daylighting and ventilating functions. Utilize existing shades, shutters, and awnings to control light level. Avoid blocking natural light by changing floor plans or interior spaces. **R**
[ ] 14. Evaluate the thermal performance and heat gain/loss characteristics of existing windows. Weather-stripping, caulking, interior storm sashes, and interior shading devices (blinds or curtains) are possible methods of improving their performance. **R**
[ ] 15. Rehabilitate and reuse existing mechanical systems whenever possible. Replace inefficient HVAC systems, motors and hot water heaters, which should be replaced with more efficient units. **R**

C. Indoor Air Quality

[ ] 1. Design ventilation systems to meet or exceed ASHRAE 62-1-1999 Ventilation Standards for Acceptable Indoor Air Quality. Determine whether it is appropriate to increase or decrease ventilation rate as user demands change.
[ ] 2. Zone buildings to isolate pollutant-generating activities such as garages, shops, printing facilities, laboratories, and manufacturing spaces. Consider options such as full isolation, ventilated vestibules, separated ventilation systems, and pressure differentials.
[ ] 3. Select ventilation systems that minimize pollution in the ventilation air path. Use return ducts rather than non-ducted plenums to reduce disturbance and dust contamination, maintain a balanced ventilation system, and select a system that facilitates cleaning.
[ ] 4. Provide the following minimum distances between air intakes and object:

Object	*Minimum Distance*
Property line	3'
Garage entry, loading area, or other areas where vehicles are standing and idling	25'
Driveway or street	10'
Limited access highway	25'
Mantles or ledges	3'
Landscaped grade	6'
Roof or grade	9 inches
Cooling towers (closest wetted surface)	15'

[ ] 5. Prevent the release of mineral fibers into the ventilation air path by insulating the exterior of ducts using coated mineral fiber duct liners. Eliminate internal duct linings and loose mineral fibers in plenums. Remove asbestos if found in existing buildings.
[ ] 6. Use product types that have low or no emission rates such as carpet and paint.
[ ] 7. Select air cleaning or filtration systems to meet or exceed the efficiency ratings of ASHRAE Standard 52.1, *Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size*.
[ ] 8. Ventilate blueprint and large copier rooms directly to the outside.

D. Building Materials

[ ] 1. Evaluate building materials and products based on their full environmental life cycle. See the following to select building materials:
[ ] a. Use recycled content building materials. See EPA recommendations, which are listed in Appendix B and required if applicable to project.
[ ] b. Use wood from sustainably-managed forests.
[ ] c. Use materials manufactured from renewable resources. Avoid materials from scarce or nonrenewable resources.
[ ] d. Use materials from manufacturing plants that are energy and water efficient, reuse waste in the production process and reduce air emissions.
[ ] e. Use materials that are packaged using minimal, recycled, or recyclable packaging.
[ ] f. Use materials that are manufactured locally to conserve shipping energy.
[ ] g. Use paints, adhesives, and sealants that are low emitting.
[ ] h. Use materials that are reusable, salvaged, recyclable or biodegradable.
[ ] i. Use durable, long lasting materials.

[ ] 2. See Appendix B – Selection Criteria for Building Materials for detailed material guidelines. It is organized by CSI division.

E. Water Conservation

[ ] 1. Avoid once-through systems, which are prohibited by Minnesota Statute 15.03.
[ ] 2. Select systems that maximize water conservation such as automated blowdown systems, conductivity probes, deduct water meters, and delimiters to reduce drift and evaporation.
[ ] 3. Use efficient water heating and recirculation systems or heat trace to conserve water.
[ ] 4. Replace toilets, faucets, and showerheads that do not meet water saving requirements of the Energy Policy Act of 1992 (EPACT). For toilets: 1.6 GPF, lavatory faucets: .5 GPM, kitchen faucets: 2.5 GPM, showerheads: 2.5 GPM. **R**

F. Waste Reduction

[ ] 1. Reduce the amount of materials used whenever possible. Design using standard-sized materials to minimize waste from cuts and trims.
[ ] 2. Design for adaptability since a building's function changes over time. Less waste will be generated in future renovations if interior elements are flexibly designed and installed.
[ ] 3. Design for easy access and end of life disassembly by using connection systems such as bolts instead of adhesives. Designing for disassembly increases the volume of materials that can be recycled or reused when the building is demolished.
[ ] 4. Design systems for easy maintenance access.
[ ] 5. Identify opportunities to use appropriate salvage materials, such as doors, sinks, and wood flooring. Where feasible, adjust design to accommodate what is available.
[ ] 6. Provide a separate room or space for reusable equipment, materials, and recycled materials. Locate it conveniently on the first floor. If appropriate, provide space for paper, cardboard, aluminum cans, glass, plastic and tin as well as food waste that can be composted.
[ ] 7. Do not specify any materials that contain asbestos.
[ ] 8. Recycle all fluorescent and high intensity discharge lamps.
[ ] 9. For new construction projects, develop a construction waste management plan. Identify the construction waste to be recycled (metals, wood, cardboard etc.), list recycling facilities that will recycle waste. Have a kick-off meeting to educate contractor and subcontractors about the waste recycling plan, its goals and a process to document volume of waste recycled.
[ ] 10. For demolition projects, develop a salvage and reuse plan that determines what material will be salvaged and reused on the project. Salvaged materials include brick, wood flooring, windows, doors, cabinets, plumbing fixtures, light fixtures and duct work. Re-use and nonprofit housing programs and salvage companies take discarded materials. Provide adequate time for salvage of materials or fixtures prior to actual demolition. **R**
[ ] 11. Identify demolition materials from existing construction to be recycled, such as metals, wood, and carpet. **R**

Guidelines

III. Construction Documents Checklist

The focus of the Construction Documents phase is to document the design in construction documents and specifications. The specification should include general environmental information from the Construction Specifications Institute (CSI) Division One and technical language from other CSI divisions outlining environmental performance of each product such as recycled content.

Reference Documents:
Environmental Building News, *GreenSpec: the Environmental Building News Product Directory and Guideline Specifications,* http://www.ebuild.com/greenspec/

A. Site

[ ] 1. Specify plant materials that are tolerant of existing conditions such as macro and microclimate, soil texture, soil fertility, moisture, and solar exposure in order to reduce water, fertilizer and pesticide use. Use existing or native plant materials. See Appendix D for list of native plant materials.
[ ] 2. Specify measures to protect existing plant materials during construction such as fencing up to a tree's drip line.
[ ] 3. Specify Minnesota Pollution Control Agency's Best Management Practices (BMP's) for soil erosion including use of locally produced compost and mulches. See Appendix A – Resources, Landscape Architecture.
[ ] 4. Specify organic soil amendments produced locally for seedbed preparation and planthole backfill. Organic soil amendments include yard waste compost and composted manure.
[ ] 5. Specify organic landscape mulch that includes mulch produced locally such as wood chips, shredded bark and pine needle mulch.
[ ] 6. Specify reuse of on-site material such as crushing rock for gravel and topsoil to the greatest extent possible if quantities justify the cost.
[ ] 7. Specify recyclable fill materials for landscape features such as street sweepings in landscape berms or mixed glass cullet for sub-base in parking lot or driveway paving.

B. Energy Conservation

[ ] 1. If used, run a new building energy use profile. Right size HVAC equipment and ductwork to take advantage of reduced internal heat loads.
[ ] 2. Develop detailed specifications for HVAC system. Specify that an operating manual must be provided.
[ ] 3. Specify timers, sensors, and other lighting control systems to conserve energy.
[ ] 4. Specify lightly colored wall and ceiling finishes. Slightly colored paints help distribute natural light and contain fewer VOC's.
[ ] 5. For cooling new and existing buildings specify environmentally safe, energy efficient refrigerant compounds with low toxicity levels which do not significantly contribute to ozone depletion (ODP) or global warming. The only acceptable refrigerant at this time is HFC-134a.
[ ] 6. Since all County building cooling plants use HCFC's - replace them with new energy efficient cooling equipment using HFC-134a or other proven safe, energy efficient refrigerant on a case by case basis.

C. Indoor Air Quality

[ ] 1. Specify installation of wet and odorous work before dry/sink materials.
[ ] 2. Specify ventilation systems to meet or exceed ASHRAE 62.1 1999 *Ventilation Standards for Acceptable Indoor Air Quality*.
[ ] 3. Specify temporary ventilation during all construction activities including finishes and installation of furnishings prior to occupancy. Specify that the permanent HVACR systems cannot be used until Owner permission is granted in writing.
[ ] 4. Specify carpet that is off gassed before it is installed to reduce emissions. Use factory-cured water based carpet adhesive to eliminate VOC.

D. Materials

[ ] 1. Specify building materials and products based on their full environmental life-cycle. See Appendix B for detailed guidelines on material selection.
[ ] 2. Include all environmental requirements in the bid documents. Require that manufacturers certify in writing they comply with all requirements.

E. Water Conservation

[ ] 1. Specify that water collected from building roofs, sinks, showers and laundries be used for irrigation. Specify industry standard purple pipe and sprinkler heads for gray water systems to prevent cross contamination with potable water.
[ ] 2. Specify the following for heating systems:
- Contractor provides the services of an independent boiler chemical control company (e.g.., Nalco) to furnish and maintain a chemical control program for a term of 3 years following Owner acceptance to ensure energy efficiency of new system
- Automated blowdown and chemical additive systems to ensure that blowdown is done only when needed.

[ ] 3. Specify conductivity probes so that actual dissolved solid amounts can be measured and the blowdown cycle can be used only when necessary.
[ ] 4. Specify cooling towers with delimiters to reduce drift and evaporation.
[ ] 5. Specify deduct water meter to measure water which is not discharged to sewage system, such as for irrigation or evaporated from cooling tower. Contact water supplier to obtain water saving credit, if available.
[ ] 6. Specify water saving toilets, faucets, and showerheads that meet water saving requirements of the Energy Policy Act of 1992 (EPACT). For toilets: 1.6 GPF, lavatory faucets: .5 GPM, kitchen faucets: 2.5 GPM, showerheads: 2.5 GPM. **R**

F. Waste Reduction

[ ] 1. Specify construction waste recycling. Outline waste management plan in specification. Determine if construction waste will be co-mingled on-site or separated on-site. See Appendix E – Waste Materials Management and Recycling specification.
[ ] 2. Specify demolition waste recycling. Outline demolition plan in bid documents. See Appendix C – County Building Demolition Plan Checklist and Appendix F – Salvage, Reuse, and Recycling specification.

[ ] 3. Specify the use of salvaged building products, such as doors where possible. Contact Twin Cities sources of salvaged building products. See Appendix A – Resources for more information.

[ ] 4. Where applicable, specify that all packaging and shipping materials are reduced, have recycled content and are reusable.

[ ] 5. Recycle all carpet. For new installations, stockpile carpet from re-carpeting efforts in other buildings for return trip to the mill via same truck. See Appendix A – Resources for more information.

[ ] 6. Preserve existing trees, shrubs or plantings where possible. Relocate and heel-in smaller varieties (4" diameter and less) for re-incorporation into the site landscaping plan.

[ ] 7. For existing timber not preserved in construction plans, use for lumber, firewood or mulch. Include adequate lead-time in schedule to permit full use of all materials to be cleared and grubbed.

[ ] 8. Process yard waste generated from site demolition, clearing and construction process by contracting with an off-site composting company.

Guidelines

IV. Construction Checklist

During the construction phase, the approved design is materialized into the physical world. The environmental priorities of this phase are construction waste reduction, providing good indoor air quality through proper ventilation and materials selection and installation sequencing. Also, it is important for the design team to be vigilant that all environmental products, practices, and design solutions, detailed in the documents and specifications, are implemented.

Reference Documents:
Best Management Practices, Minnesota Pollution Control Agency,
http://www.pca.state.mn.us/water/stormwater-c.html#info

A. Site

[ ] 1. Phase excavation and construction to limit erosion.
[ ] 2. Chip or compost land clearing debris, such as tree stumps, shrubs, and sod strippings as appropriate.
[ ] 3. Stockpile existing topsoil for reuse on-site.
[ ] 4. Protect trees and sensitive areas such as creeks and wetlands.
[ ] 5. Shred wood for use as mulch and crush rock for gravel.

B. Energy Conservation

[ ] 1. Verify that all energy efficiency technologies are correctly installed and operate properly, such as occupancy and CO_2 sensors, to realize energy conservation objectives.
[ ] 2. Confirm that equipment efficiencies, specified during design phase, are met.

C. Indoor Air Quality

[ ] 1. Complete HVAC system commissioning according to ASHRAE Guideline 1-1989 *Commissioning of HVAC Systems* before occupancy.
[ ] 2. Vigilantly review indoor air quality impact and environmental characteristics of all construction materials.
[ ] 3. Be vigilant in confirming that IAQ material installation sequencing requirements are being met.
[ ] 4. Provide 100% outside fresh air or the maximum achievable by the system for a minimum of 2 consecutive weeks prior to building occupancy.
[ ] 5. Carpet should be installed with good ventilation. After installation, continue to ventilate for 48 to 72 hours and according to Carpet and Rug Institute and the Environmental Protection Agency.

D. Building Materials

[ ] 1. Verify that environmentally preferable building materials are provided as specified before contracts are finalized. Review proposed substitutions carefully to see that materials meet the environmental criteria specified.

E. Water Conservation

[ ] 1. Protect water sources from contamination.

F. Waste Reduction

[ ] 1. Educate contractors about construction and demolition recycling goals and procedures.
[ ] 2. Coordinate construction waste recycling procedures with contractor, such as size of dumpsters, schedule for bin pick-up and available space at the job site for bins (especially for source separation, which requires multiple bins). Identify staging area(s) for recyclables during construction.
[ ] 3. Document the type and volume of waste diverted from the landfill as well as transportation and landfill disposal costs to determine whether recycling saved or cost money at the end of construction. Publicize successful construction waste recycling programs.

Appendix A - Resources

For further resource information, see the bibliographies and links in the resources listed below. The Internet site at *http://www.ebuild.com/Biblio/Biblio.html is* also a source of additional references.

General Sustainable Design Information

Books

Barnett, Dianna Lopez and William D. Browning, *A Primer on Sustainable Building*, Rocky Mountain Institute (1995)

Public Technology, Inc., *Sustainable Building Technology Manual*, 1996

Internet Sites

Minnesota Sustainable Design Guide site, http://www.sustainabledesignguide.umn.edu

Building Environmental Science and Technology, http://www.nrg-builder.com/greenbld.htm

Center for Renewable Energy and Sustainable Technology (CREST), http://www.crest.org

Construction Specification Institute (CSI), http://www.csiwebapp.org

E Build, http://www.ebuild.com

E Design Online, http://edesign.state.fl.us/

Greening Federal Facilities Resource Guide, http://www.eren.doe.gov/femp/greenfed/

Lawrence Berkeley National Laboratory Center for Building Science, http://eande.lbl.gov/CBS/CBS.html

US Department of Energy Center for Sustainability, http://www.sustainable.doe.gov/

Periodicals

Environmental Building News (see *E Build* Internet site for subscription information)

Environmental Design & Construction, http://www.edcmag.com/

Building Material Selection and Product Lists

Books

American Institute of Architects, *AIA Environmental Resource Guide*, Demkin, J.A., Ed., John Wiley & Sons, New York, NY, 1996.

Environmental Building News, *GreenSpec: the Environmental Building News Product Directory and Guideline Specifications,* http://www.ebuild.com/greenspec/

Fuston, Andrew and Nadel, Kim, *Green Pages,* New York, New York. (718) 369-2578

Green Seal*, Choose Green Report,* http://www.greenseal.org

Harris, B J*, Harris Directory: A Database of Recycled & Pollution Preventing Materials for Home, Office, & Garden.* http://www.harrisdirectory.com/Drectory.html

Patterson, Doug and Walsh, Valerie eds. *Environmental Building News Product Catalog*, E Building, Inc. Brattleboro, VT. http://www.ebuild.com

Internet Sites

Minnesota Recycled Products Directory, http://www.moea.state.mn.us/berc/resprod/resprod.cfm

Minnesota Materials Exchange, http://www.mnexchange.org/

Minnesota Technical Assistance Program (Mn Tap), http://www.mntap.umn.edu/

Green Institute, http://greeninstitute.org

REDI Guide, http://www.oikos.com/redi/index.html

National Park Service Sustainable Design and Construction Database, http://www.nps.gov/dsc/dsgncnstr/susdb/

Certified Forest Products Council, http://www.certifiedwood.org/

Environmental Protection Agency Comprehensive Procurement Guidelines (CPG), http://www.epa.gov/cpg/

Construction Waste

Books

Minnesota Office of Environmental Assistance, *Construction Materials Recycling Guidebook*, Educational Clearinghouse, St. Paul, MN, 1993

Solid Waste Management Coordinating Board, *Resourceful Waste Management Guide*, (1999) (651) 222-7227

Kincaid, Judith, Cheryl Walker and Greg Flynn (1995) *WasteSpec, Model Specifications for Construction Waste Reduction, Reuse and Recycling*, Research Triangle Park, North Carolina: Triangle J Council of Governments

Internet Sites

California Integrated Waste Management Board, Construction and Demolition Recycling, http://www.ciwmb.ca.gov/ConDemo

Minnesota Pollution Control Agency, *Guidance on Environmental Concerns Associated with Building Demolition*, http://www.pca.state.mn.us/waste/pubs/w7-01.pdf

Energy Conservation

Internet Sites

Northern States Power, Energy Assets *http://www.northernstatespower.com/fb/fb_ps_as.htm*

Dakota Electric Association, http://www.dakelec.com/

Energy Efficiency and Renewable Energy Network, US Department of Energy, Office of Building Technology, http://www.eren.doe.gov/buildings/

Energy Star Programs, 1-888-STAR-YES, http://www.epa.gov/energystar

Green Lights Program, http://www.epa.gov/greenlights.html/

Federal Energy Management Agency, http://www.eren.doe.gov/femp/

Heat Islands, http://eetd.lbl.gov/heatisland

Indoor Air Quality

Internet Sites

Carpet and Rug Institute, http://www.carpet-rug.com/

Bay Area (San Francisco) Air Quality Management District, http://www.baaqmd.gov

South Coast (Los Angeles) Air Quality Management District, http://www.aqmd.gov

Landscape Architecture

Books

The Vegetation of Wisconsin; an Ordination of Plant Communities, Curtis, John T., Madison, University of Wisconsin Press, 1959.

Unpublished Report, Working Title*, Native Species Lists for Minnesota Native Plant Communities*, Minnesota Department of Natural Resources, St. Paul, Minnesota, 1999.

Internet Sites

Minnesota Pollution Control Agency, *Best Management Practices,* http://www.pca.state.mn.us/water/stormwater-c.html#info

Dakota County Soil and Water Conservation District, *Low Impact Development*, http://www.dakotaswcd.org

Designing for Flexibility

Brand, Stewart, *How Building Learn*, R.R. Donnelley & Sons, 1994

Environmental Rating Systems

Internet Sites

US Green Building Council, *Leadership in Energy and Environmental Design*, http://www.usgbc.org

Appendix B - Selection Criteria for Building Materials Specifications

Division 1 – Summary of Work and Special Requirements

[ ] 1. Include a description of the project's environmental goals and the general environmental procedures. In each division use language that enhances the environmental strategies for that particular product or system, such as salvage, recycled content, or VOC levels.

[ ] 2. Specify the following waste management/recycling requirements: the contractor is responsible for knowing and complying with all regulatory requirements – Federal, State, Local – pertaining to the legal disposal of all construction and demolition waste materials.

[ ] 3. For construction of new buildings, in addition to waste disposal, the contractor is required to recycle the following construction waste materials: wood, corrugated cardboard, metals (from banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel iron, galvanized sheet metal, stainless steel, aluminum, copper, zinc, lead, brass, bronze and other semi-precious metals), concrete and concrete masonry units (CMU). See Appendix E for specification language.

[ ] 4. For the renovation of existing buildings, salvage as much existing equipment, doors, bricks etc. as possible. See Appendices C and F for checklist and specification language.

[ ] 5. Use the following contact for guidance and resources for the above waste and non-mixed municipal solid waste recycling:

Metropolitan Solid Waste Management Coordinating Board
c/o Dakota County Environmental Management Department
952-891-7557
Dakota County Western Service Center
14955 Galaxie Avenue
Apple Valley, MN 55124-8579.

Division 2 - Site

[ ] 1. Specify the following materials which comply with or exceed the EPA's recommended (per Recovered Materials Advisory Notices I, II, & III) recovered (recycled) material content. See EPA website for more information or updates. http://www.epa.gov/cpg/

Material or Product	*Minimum Recovered Material Requirements*
Cement & concrete	Fly ash and ground granulated blast-furnace (GGBF) slag as per ASTM (C595, C150, C618, C311, C989) and AASHTO (M240, M302) specs
Patio blocks	
Rubber or rubber blends	90-100% post-consumer recovered material
Plastic or plastic blends	90-100% total recovered material
Playground surface (rubber/plastic)	90-100% total recovered material
Playground equipment	
Plastics	100% recovered content (90-100% post-consumer)
Plastic Composites	95-100% recovered content (50-75% post-consumer)
Aluminum	25 % post-consumer recovered content
Steel	25-100% post consumer recovered content
Picnic tables and park benches	

Plastics	100% recovered content (90-100% post-consumer)
Plastic Composites	100% recovered content (50-100% post-consumer)
Aluminum	25 % post-consumer recovered content
Concrete	15-40% covered content
Steel	100% recovered content (16-15% post-consumer)
Plastic lumber timbers and posts	
HDPE	75-100% recovered material (25-100% post-consumer)
Mixed plastics/sawdust	100% recovered materials (50% post-consumer)
HDPE/fiberglass	95% recovered materials (75% post-consumer)
Other mixed resins	95-100% recovered material (50-100% post-consumer)
Signage	
Plastic signs	80-100% post-consumer recovered material
Aluminum signs	25% post-consumer recovered material
Plastic sign posts/supports	80-100% post-consumer recovered material
Steel signs posts/supports	25-100% post-consumer recovered material
Running tracks (rubber or plastic)	90-100% total recovered material
Hydraulic mulch products	
Paper-based hydraulic mulch	100% post-consumer recovered paper
Wood-based hydraulic mulch	100% recovered wood and/or paper
Parking stops	
Plastic and/or rubber	100% post-consumer recovered material
Concrete containing fly ash	20-40% recovered material
Concrete containing GGBF slag	25-70% recovered material
Traffic channelizers, and delineators	
Channelizers, plastic	25-95% post-consumer material
Channelizers, rubber (base only)	100% post-consumer material
Delineators, plastic	25-90% post-consumer material
Delineators, rubber (base only)	100% post-consumer material
Delineators, steel (base only)	25-50% post-consumer material
Flexible delineators, plastic	25-85% post-consumer material
Plastic fencing	90-100% recovered material (60-100% post-consumer)
Garden hose (plastic &/or rubber)	60-65% post-consumer recovered material
Soaker hose (plastic &/or rubber)	60-70% post-consumer recovered material
Lawn/garden edging (plastic/rubber)	30-100% post-consumer recovered content

[ ] 2. Specify County mix for all non-sodded areas. The mix should reduce water, fertilizer and pesticide use.
[ ] 3. Specify broken concrete rubble or mixed glass cullet as sub-base fill for road pavement.
[ ] 4. Specify landscape edging made from recycled materials.
[ ] 5. Specify paving materials made from recycled materials.

Division 3 – Concrete

[ ] 1. Specify the cement & concrete with fly ash and/or ground granulated blast-furnace (GGBF) slag as per ASTM (C595, C150, C618, C311, C989) and AASHTO (M240, M302) specs

Division 4 – Masonry

[ ] 2. Specify salvaged brick.
[ ] 3. Specify stone products mined in Minnesota to reduce transportation costs and energy, such as Kasota stone and Cold Spring Granite stone.

Division 5 - Metals

[ ] 1. Specify the minimum recycled metal content required for structural steel, metal windows, and other metal products.

Division 6 - Wood and Plastics

[ ] 1. Specify the following materials which comply with or exceed the EPA's recommended (per Recovered Materials Advisory Notices I, II, & III) recovered (recycled) material content. See EPA website for more information and updates at http://www.epa.gov/cpg

Material or Product	*Minimum Recovered Material Requirements*
Structural fiberboard	80-100% post-consumer material
Laminated paperboard	100% post-consumer recovered paper

[ ] 2. Specify agricultural-based materials that are formaldehyde-free such as straw board or wheat board for sheathing, flooring substrate, cabinetry substrates, worksurfaces, or shelving instead of conventional fiberboard and particle board products.
[ ] 3. Specify certified sustainable-harvested and/or salvaged lumber, in particular oak architectural woodwork. Require documentation of certified wood.
[ ] 4. Specify exterior grade plywood for all plywood applications to minimize out-gassing from plywood adhesives.
[ ] 5. Specify ACQ and borate treatment, where feasible, for wood requiring treatment. Or specify naturally rot resistant woods, such as eucalyptus, to eliminate the need for treatment.
[ ] 6. Specify sealants and adhesives based on Bay Area (San Francisco) Air Quality Management District, Regulation 8, Rule 51 for VOC emission levels and architectural coatings based on Regulation 8, Rule 3. See website at http://www.baaqmd.gov for levels.

Division 7 - Thermal and Moisture Protection

[ ] 1. Specify recycled content material, in particular those complying with or exceeding the EPA's recommended (per Recovered Materials Advisory Notices I, II, & III) recovered (recycled) material content. See EPA website for more information or websites at http://www.epa.gov/cpg

Material or Product	*Minimum Recovered Material Requirements*
Building insulation	
Rock wool	75% slag
Fiberglass	20-25% glass cullet
Cellulose (loose-fill & spray on)	75% post-consumer recovered paper
Perlite composite board	23% post-consumer recovered paper
Polyiso/polyurethane rigid foam	9% recovered material
Foam-in-place polyurethane	5% recovered material
Glass fiber reinforced insulation	6% recovered material

Phenolic rigid foam board	5% recovered material

[ ] 2. Consider non-traditional low slope roofing materials, such as protected membrane roofing and low-slope metal roofing. The insulation in a protected membrane system can be reused when reroofing, and metal roofing, in addition to having recycled content, is recyclable. Built-up roofing and synthetic membranes have very limited, if any, recycling possibilities.

Division 8 - Doors and Windows

[ ] 1. Specify low-e glazing with a maximum U-factor of .32 and dual glazed sealed units.

Division 9 - Finishes

[ ] 1. Specify recycled content material, in particular those complying with or exceeding the EPA's recommended (per Recovered Materials Advisory Notices I, II, & III) recovered (recycled) material content. See EPA website for more information or updates at http://www.epa.gov/cpg

Material or Product	*Minimum Recovered Material Requirements*
Polyester carpet face fiber	25-100% post-consumer recovered PET
Backing for Nylon Broadloom	
Carpet and Carpet Tiles	100% total recovered content (35-70% post-consumer)
Carpet Cushion	
Bonded polyurethane	15-50% post consumer recovered material
Jute	40% post-consumer recovered content
Synthetic fibers	100% recovered content
Rubber	60-90% post-consumer recovered content
Floor tiles (heavy duty/commercial)	
Rubber	90-100% post-consumer recovered material
Plastic	90-100% total recovered material
Reprocessed and consolidated latex paints	
Reprocessed: white, & pastel colors	20% post-consumer latex paint
Reprocessed: dark colors	50-99% post-consumer latex paint
Consolidated latex paint	100% post-consumer latex paint

[ ] 2. Minimize use of carpet as a floor finish material. Carpet acts as a "sink," absorbing dirt and VOCs, only to re-emit them later.

[ ] 3. If carpeting is used, specify those that conform to the Carpet and Rug Institute's Indoor Air Quality requirement, which is total VOC emission rate of 0.5 milligrams per square meter per hour (1.102 x 10-6 lb. per 10.764 square feet per hour.)

[ ] 4. If carpeting is used, consider using wool, sisal, or other natural fiber carpeting rather than synthetic carpeting. Natural fibers are renewable resources, off-gas less than synthetics, and are attractive in their undyed state (as well as dyed). Wool is naturally fire-resistant.

[ ] 5. Avoid glue-down carpet. If it is used, specify water-based adhesives for installing carpeting and resilient flooring.

[ ] 6. Specify carpeting from a manufacturer with a carpet recycling program such as Collins & Aikman, DuPont or BASF or carpet from a carpet leasing program that recycles used carpet.

[ ] 7. When using synthetic carpet, specify recycled-content carpet. Commercial grade recycled-content nylon carpeting is available. Based on durability considerations, recycled-content polyester carpeting may be suitable only for residential and light-traffic commercial uses.

[ ] 8. Specify natural (jute, hair, etc.) or recycled content (fiber or rubber) carpet padding.
[ ] 9. Specify tackless or other non-adhesive carpeting installation methods to avoid indoor air quality issues associated with adhesives.
[ ] 10. Specify water-based finishes for wood floors.
[ ] 11. Specify natural linoleum instead of vinyl where resilient flooring is used. If vinyl flooring must be used, specify vinyl tiles rather than sheet goods since tiles use less plasticizers in their manufacture, and, thus, emit less VOCs.
[ ] 12. Specify low-VOC adhesive for vinyl cove.
[ ] 13. Specify zero-VOC paints to avoid off gassing. Consider recycled content paint. See Resources for sources of recycled content paint such as Minnesota Materials Exchange and Minnesota Technical Assistance Program.
[ ] 14. Non-VOC containing materials are preferred over VOC compliant materials.

Division 10 - Specialties

[ ] 1. Specify recycled content material, in particular those complying with or exceeding the EPA's recommended (per Recovered Materials Advisory Notices I, II, & III) recovered (recycled) material content. See EPA website for more information or updates at http://www.epa.gov/cpg

Material or Product	*Minimum Recovered Material Requirements*
Shower and Restroom Dividers/Partitions	
Steel	20-30% recovered material (16% post consumer)
Plastic	20-100% post consumer recovered material

Division 11 - Equipment

[ ] 1. Consider waterless urinals.
[ ] 2. Consider composting toilets.
[ ] 3. Specify infrared faucets sensors, delayed action shut off or automatic mechanical shut-off valves.
[ ] 4. Specify domestic dishwashers which use 10 gallons a cycle or less.
[ ] 5. Specify commercial dishwashers (conveyor) which use 120 gallons per hour.
[ ] 6. Specify horizontal-axis (generally front loading) washing machines, which use less water.

Division 12 - Furnishings

[ ] 1. Specify recycled content material, in particular those complying with or exceeding the EPA's recommended (per Recovered Materials Advisory Notices I, II, & III) recovered (recycled) material content. See EPA website for more information or updates at http://www.epa.gov/cpg

Material or Product	*Minimum Recovered Material Requirements*
Floor mats	
Rubber	85-100% recovered material (75-100% post consumer)
Plastic	100% recovered material (10-100% post consumer)
Rubber/plastic composites	100% post-consumer recovered material
Office recycling & waste receptacles	
Plastic	20-100% total recovered material

Paper	35% post-consumer recovered paper

Division 14 – Conveying Systems

[ ] 1. Specify environmentally responsible elevators. In low rise applications, consider using regenerative elevator drives instead of hydraulic elevators.

Division 15 – Mechanical

[ ] 1. Specify on spot electric water heaters in rest rooms to conserve energy.
[ ] 2. When required, use hard surfaced interior insulation in ductwork.
[ ] 3. Specify variable volume air controllers.
[ ] 4. For air cleaning, specify bag plus disposal air filters. Specify pre-filter AAF AMER-frame with 1-inch disposable blue type S media.

Division 16 – Electrical

[ ] 1. For interior lighting, specify fluorescent instead of incandescent such as compact fluorescent lighting for spots, less than 25% harmonic distortion.
[ ] 2. For linear fluorescent, specify a combination of T-5 or T-8 lamps and electronic ballast. For electronic ballast specify 90% power factor.
[ ] 3. Specify high specular reflectors and parabolic reflectors.
[ ] 4. Specify universal pulse start metal halide for high bay areas.
[ ] 5. Specify universal pulse start metal halide or high-pressure sodium lamps for exterior lighting.
[ ] 6. Specify motion detectors, timers, photocells and other lighting control systems to conserve energy. Specify memory sensor occupancy sensors for private and open offices and public areas.
[ ] 7. Specify timed switches at boiler, electrical, and mechanical rooms.
[ ] 8. Specify LED (light-emitting diodes) exit signs.
[ ] 9. Specify energy efficient K-type transformers.
[ ] 10. For ½ HP and above, specify 3-phase energy efficient motors. Specify motors 95% or greater efficiency.
[ ] 11. Specify on/off lighting controls as part of energy management system.
[ ] 12. For exterior light poles, specify cut-off shields to avoid light spillage into adjacent areas.
[ ] 13. Specify 95% power factor capacitors.
[ ] 14. Specify EPA Energy Star-rated appliances and office equipment.

Appendix C – Building Demolition Plan Checklist

BUILDING DEMOLITION PLAN CHECKLIST
Capital Planning and Project Management 651-438-4544
COUNTY PROPERTIES

The following is a checklist derived from the rules and regulations in existence as of the revised date for the demolition of any structures or buildings on County property. They are not meant to be all-inclusive. Contact the appropriate Agencies for further information. Prior to initiating any demolition on County property, as a minimum, notify the heads of the Risk Management 651-438-4489 and Environmental Management Departments 952-891-7557.

1. Asbestos

If the building or structure was completed prior to 1980:

- ☐ Hire an Independent Contractor to identify all asbestos containing construction materials and types of asbestos used.
- ☐ Have Contractor provide certification for Asbestos Abatement for firm and workers with MN Dept. of Health
- ☐ Perform thorough inspection of all areas with special attention to the following:
- ☐ Pipe, duct and boiler insulation
- ☐ Ceiling tiles, textured spray, fireproofing, scratch coats or other treated areas.
- ☐ Cement-asbestos board/transite siding material, also ceiling and walls.
- ☐ Vinyl asbestos (vat) floor tile, old linoleum, and other resilient floor coverings
- ☐ Notification form to MPCA Asbestos Team 10 working days prior to any demolition. Generally handled by Asbestos Abatement Contractor.
- ☐ If asbestos containing materials are present, contract with an Asbestos Abatement Company for removal prior to and during any construction activities or include notification of the presence of asbestos and removal in the bid documents for new construction or renovation.

2. Hazardous wastes

As defined by MPCA check for any waste that displays one or more of the following characteristics - remove, separate, recycle, reuse of if necessary – legally dispose of all materials prior to demolition activities:

- ☐ Ignitable at less than 140 F, i.e., solvents, petroleum products and thinners.
- ☐ Oxidizes, i.e., chlorine, fluorine and iodine.
- ☐ Corrodes, i.e., concrete cleaner, paint stripper and bleach
- ☐ Reactive, i.e., carbides, sodium hydrosulfide, magnesium and potassium
- ☐ Lethal - orally, dermally or by inhalation

- ☐ Toxic as determined by a toxic characteristics leaching procedure (TCLP) test
- ☐ Separate hazardous and special hazardous wastes for legal disposal.
- ☐ Follow MPCA and MN Dept of Health requirements for legal disposal, recycling or re-use of hazardous materials.

3. Special Hazardous wastes

- ☐ Check for the presence of any of the following materials:
- ☐ Dry cell batteries
- ☐ Antifreeze
- ☐ Circuit boards
- ☐ Old electrical equipment
- ☐ PCB – polychlorinated biphenyl's, i.e., ballasts/capacitors/transformer oils
- ☐ Photographic negatives
- ☐ Mercury in any form i.e. lamps, thermostats, manometers and gauges
- ☐ Lead – if lead is suspected in the construction materials, contract with a Licensed Lead Risk Assessment firm to determine scope and extent of lead abatement prior to demolition work.

4. Mixed Municipal Sold Waste

- ☐ Perform site tour and identify debris, etc. visible on site that meet these criteria.
- ☐ Site pickup: Contact Sentence to Service probation personnel to schedule work crew if quantities warrant.
- ☐ Schedule dumpster delivery and pickup to site.
- ☐ If any questionable containers or materials are encountered, contact Dakota County Environmental Management Dept. and Risk Management for assessment, guidance and management.

5. Underground storage tanks

- ☐ Identify number size, location and contents of any aboveground or underground tanks.
- ☐ Notify Dakota County Risk Management Office.
- ☐ Notify County Environmental Management Dept. Attn: Director – number, type, size and contents of each tank.
- ☐ Notify, confirm registration, or register tank(s) with the MPCA
- ☐ Hire a licensed underground tank removal company
- ☐ Ensure that all MPCA requirements followed
- ☐ Test soils below and in the general area of the removed tanks.

- ☐ Contractor to use PID and FID detection equipment at the site to determine level of sampling needed.
- ☐ If contamination is found, contract with a State licensed contractor and work with the MPCA to contain, recover, excavate and treat contaminated soils.
- ☐ Have contractor furnish a certificate of final disposition to confirm tank was legally disposed.
- ☐ Have tank removal contractor complete notice of tank removal form for County submission to the MPCA

6. Spills and Leaks

During the demolition process, if a spill should occur:

- ☐ Contact the Minnesota Pollution Control Agency (651.649.5451) to determine if spilled materials meet reporting criteria. The following critical information is required:
  - Spill location – road number or name, nearest intersection or mile marker, City.
  - Description of spilled material
- ☐ Anyone with knowledge of must report spills of toxic, flammable, corrosive and dangerous industrial or hazardous materials and any other environment damaging materials. Limit for petroleum is any quantity over five gallons.

7. Wells

By law a well must be in use, be under a maintenance permit, or be sealed by a licensed contractor if the well is not in use, contaminated, was improperly sealed in the past, threatens the quality of groundwater (intrusion or injection system) or otherwise poses a threat to health or safety. If a property has been in use over a number of years – it is likely that multiple wells may exist near former houses, barns and out buildings prior to availability of city water.

- ☐ Find out when structures were built and when city water was installed.
- ☐ Consult with former owners or people who have lived in the area for a long time.
- ☐ Look at old photos of property – i.e. County Survey office in Apple Valley for locations of windmills, houses, barns or out-buildings.
- ☐ Consult well disclosure certificate available from MN Dept. of Health – required for all property transfers in MN since Nov. 1, 1990.
- ☐ Locate all wells on property – look for physical evidence such as casing pipe, water pump, small unidentified rooms or buildings in or outside buildings, a windmill, yard pump or a depression in the yard. Drilled wells generally have a metal pipe casing 1 ¼" to 6" in diameter. Wells that were dug appear as a ring made of concrete, tile, bricks or rocks in the ground or a pit.

- ☐ ID and report any non-registered wells with MN Dept. of Health Well
- ☐ Management Unit and others as may be required.
- ☐ Seal wells – State law requires that the sealing be done by a licensed well contractor. Do not try to seal any wells. Look in the yellow pages under "Well Drilling and Service" of contact the Minnesota Dept. of Health for a list of licensed contractors.

8. Refigerants/CFCs/HCFCs

Check for and recover, recycle or legally dispose of refrigerants from the following:

- ☐ Refrigerators
- ☐ Room Air Conditioners
- ☐ Freezers
- ☐ Dehumidifiers
- ☐ Vending machines
- ☐ Chillers
- ☐ Central Air Conditioners
- ☐ Heat pumps
- ☐ Ice Machines
- ☐ Food display cases
- ☐ Water coolers

9. Fire Extinguishers

- ☐ Remove and recover halon prior to demolition

10. Demolition landfill

- ☐ To the greatest extent possible recycle demolition materials.
- ☐ Ensure all unacceptable materials are source separated from the acceptable materials and legally disposed.

Appendix D – Native Species List for Minnesota Native Plant Communities

HYDRIC CONDITIONS (WET)

Ferns
Dryopteris cristata (crested wood fern, buckler fern)
Osmunda cinnamomea (cinnamon fern)
Osmunda regalis (royal fern)

Forbes (annuals/biennials)
Gentianopsis crinita (fringed gentian)

Forbes (perennials)
Acornus calamus (sweet flag, calamus)
Asclepias incarnata (swamp milkweed)
Caltha palustris (marsh marigold, cowslip)
Cornus canadensis (bunchberry)
Geum rivale (purple avens, water avens)
Helenium autumnale (common sneezeweed)
Iris versicolor (blue flag)
Nuphar lutea (yellow pond lily, cow lily, spatter dock)
Physostegia virginiana (obedient plant, false dragonhead)
Senecio aureus (golden ragwort)
Verbena hastata (blue verbena, blue vervain)
Veronicastrum virginicum (Culver's root)

Grasses/grass-like plants
Distichlis spicata (seashore saltgrass)
Glyceria grandis (American mannagrass, tall mannagrass, reed mannagrass)
Leersia oryzoides (rice cut grass)
Panicum virgatum (switchgrass)
Spartina pectinata (prairie cordgrass, freshwater cordgrass)
Carex stricta (tussock sedge)
Carex utriculata (beaked sedge)
Eleocharis palustris (creeping spikesedge, spike rush)
Juncus effusus var. solutus (soft rush)
Juncus interior (inland rush)
Scirpus acutus (hardstem bulrush)
Scirpus atrovirens (dark green bulrush)
Scirpus cyperinus (wool grass)
Scirpus maritimus (alkali bulrush, prairie bulrush, bayonet grass)
Scirpus tabernaemontani (great bulrush)
Typha latifolia (cattail)

Shrubs (deciduous)
Aronia melanocarpa (black chokeberry)
Cephalanthus occidentalis (buttonbush)
Cornus amomum ssp. obliqua (swamp dogwood, silky dogwood)
Physocarpus opulifolius (ninebark)
Salix bebbiana (Bebb willow, long-beaked willow)
Spiraea alba (meadow sweet)
Spiraea tomentosa (steeplebush, hardhack)
Staphylea trifolia (bladdernut)
Vaccinium uliginosum (alpine blueberry, bog blueberry)

Shrubs (evergreen)
Andromeda polifolia var. glaucophylla (bog rosemary)
Kalmia polifolia (swamp laurel, bog laurel)

Trees (deciduous)
Betula nigra (river birch)
Larix laricina (tamarack, American larch)

Trees (evergreen)
Picea glauca (white spruce)

MESIC CONDITIONS (BETWEEN WET AND DRY)

Ferns

Adiantum pedatum (northern maidenhair fern)
Athyrium filix-femina (lady fern)
Botrychium virginianum (rattlesnake fern)
Cystopteris bulbifera (bladder fern)
Cystopteris fragilis (fragile fern)
Dryopteris carthusiana (shield fern, toothed wood fern, spinulose shield fern)
Gymnocarpium dryopteris (oak fern)
Matteuccia struthiopteris (ostrich fern)
Onoclea sensibilis (sensitive fern, bead fern)
Osmunda claytoniana (interrupted fern)
Phegopteris hexagonoptera (broad beech fern)
Polystichum acrostichoides (Christmas fern)

Forbs (annuals/biennials)
Campanulastrum americanum (American bellflower, tall bellflower)

Forbs (perennials)
Actaea pachypoda (white baneberry)
Allium cernuum (nodding onion)

Allium tricoccum (wild leak)
Anemone canadensis (Canada anemone, windflower)
Asarum canadense (wild ginger)
Aster puniceus (red-stem aster, swamp aster)
Astragalus canadensis (milk vetch, Canada milk vetch)
Baptisia alba (white false indigo)
Caulophyllum thalictroides (blue cohosh)
Chelone glabra (turtlehead)
Claytonia caroliniana (broad-leaved spring beauty)
Claytonia virginica (narrow-leaved spring beauty)
Clintonia borealis (clintonia, blue-bead lily)
Coptis trifolia ssp. groenlandica (goldthread)
Dicentra cucullaria (dutchman's breeches)
Erythronium americanum (eastern trout lily, yellow trout lily)
Eupatorium maculatum (spotted Joe-pye weed)
Eupatorium perfoliatum (boneset)
Euthamia graminifolia var. graminifolia (grass-leaved goldenrod)
Galium triflorum (sweet-scented bedstraw)
Gentiana alba (cream gentian, yellow gentian)
Gentiana andrewsii (bottle gentian)
Geranium maculatum (wild geranium, cranesbill)
Glycyrrhiza lepidota (wild licorice)
Hepatica nobilis var. acuta (sharp-lobed hepatica)
Hydrastis canadensis (golden seal)
Hydrophyllum virginianum (Virginia waterleaf)
Hypericum ascyron (great St. John's wort)
Iris virginica var. shrevei (blue flag)
Liatris cylindracea (dwarf blazing star, gayfeather)
Liatris pycnostachya (prairie blazing star, gayfeather)
Lilium michiganense (Turk's cap lily, Michigan lily)
Linnaea borealis (twinflower)
Lobelia cardinalis (cardinal flower)
Lobelia siphilitica (great blue lobelia)
Lysimachia ciliata (fringed loosestrife)
Maianthemum canadense (wild lily-of-the-valley)
Maianthemum racemosum ssp. racemosum (false Solomon's seal, false spikenard)
Maianthemum stellatum (starry Solomon's seal)
Mertensia virginica (bluebells)
Mitchella repens (partridgeberry)
Osmorhiza claytoni (sweet cicely, sweet jarvil)
Phlox divaricata ssp. laphamii (blue phlox, sweet william)
Podophyllum peltatum (May apple)
Polemonium reptans (Jacob's ladder, Greek valerian)
Polygonatum biflorum (Solomon's seal)
Potentilla arguta ((white cinquefoil, prairie cinquefoil, tall cinquefoil)
Potentilla simplex (common cinquefoil)

Pycnanthemum virginianum (mountain mint)
Pyrola elliptica (shinleaf)
Rudbeckia laciniata (cut-leaf coneflower)
Sanguinaria canadensis (bloodroot)
Silene stellata (starry campion)
Solidago ulmifolia (elm-leaved goldenrod)
Streptopus roseus (rosy twisted stalk)
Thalictrum dasycarpum (tall or purple meadow rue)
Thalictrum dioicum (early meadow rue)
Thalictrum thalictroides (rue anemone)
Trientalis borealis ssp. borealis (starflower)
Trillium cernuum (nodding trillium)
Uvalaria grandiflora (bellwort, merrybells)
Uvalaria sessilifolia (wild oats, merrybells)
Viola canadensis (Canada violet)
Viola conspersa (American dog violet)
Viola missouriensis (Missouri violet)
Viola pubescens (downy or smooth yellow violet)
Zizia aurea (golden alexanders)

Grasses/Grass-like plants
Calamagrostis canadensis (bluejoint grass)
Deschampsia cespitosa (tufted hairgrass)
Elymus hystrix var. hystris (bottlebrush grass)
Hierochloe odorata (sweet grass)
Carex aquatilis (water sedge)
Carex plantaginea (plantain-leaved sedge)
Carex stipata (awl-fruited sedge)

Shrubs (deciduous)
Alnus incana (speckled alder, mountain alder)
Amorpha fruiticosa (false indigo, indigo bush)
Cornus alternifolia (pagoda dogwood, alternate-leaved dogwood)
Cornus racemosa (gray dogwood)
Cornus sericea (red-twig dogwood, red-osier dogwood)
Corylus americana (American hazelnut, filbert)
Corylus cornuta (beaked hazelnut, filbert)
Crataegus douglasii (black hawthorn)
Diervilla lonicera (bush honeysuckle)
Dirca palustris (leatherwood, ropebark)
Eleagnus commutata (silverberry, wild olive, wolf willow)
Euonymus atropurpurea (wahoo, burning bush)
Lonicera dioica (limber, wild honeysuckle)
Rhus hirta (staghorn sumac)
Ribes cynosbati (prickly gooseberry, dogberry)
Rubus parviflorus (western thimbleberry)

Salix discolor (pussy willow)
Sambucus canadensis (elderberry, common elder)
Sambucus racemosa var. pubens (scarlet elderbery, red-berried elder)
Shepherdia argentea (silver buffaloberry)
Symphoricarpos albus (snowberry)
Viburnum edule (moosewood viburnum)
Viburnum opulus var. americanum (high-bush cranberry, American cranberrybush viburnum

Shrubs (evergreen)
Gaultheria hispidata (creeping snowberry)
Taxus canadensis (Canada yew)
Vaccinium vitis-idaea (mountain cranberry, lingonberry, cowberry)

Trees (deciduous)
Acer rubrum (red maple)
Acer saccharinum (silver maple)
Betula papyrifera (paper birch)
Carpinus caroliniana (blue beech, hornbeam, musclewood)
Carya cordiformis (bitternut, swamp hickory)
Carya ovata (shagbark hickory)
Celtis occidentalis (hackberry)
Crataegus punctata (dotted hawthorn, white thorn)
Fraxinus americana (white ash)
Fraxinus pennsylvanica (green ash)
Gymnocladus dioica (Kentucky coffee-tree)
Juglans cinerea (butternut, white walnut)
Juglans nigra (black walnut)
Malus ioensis var. ioensis (prairie crabapple)
Ostrya virginiana (ironwood, hophornbeam)
Populus deltoides (eastern cottonwood)
Populus tremuloides (quaking aspen)
Prunus americana (wild plum)
Prunus nigra (Canada plum)
Quercus alba (white oak)
Quercus bicolor (swamp white oak)
Quercus macrocarpa (bur oak)
Quercus muhlenbergii (chinkapin oak, chestnut oak)
Quercus rubra (red oak)
Salix amygdaloides (peachleaf willow)
Salix nigra (black willow)
Sorbus americana (mountain-ash)
Tilia americana (American linden, basswood)
Ulmus americana (American elm)
Ulmus rubra (red elm, slippery elm)

Trees (evergreen)
Abies balsamea (balsam fir)
Thuja occidentalis (arborvitae, northern white cedar)
Tsuga canadensis (eastern hemlock)

Vines (deciduous)
Celastrus scandens (American bittersweet)
Clematis occidentalis var. occidentalis (purple clematis)
Clematis virginiana (virgin's bower)
Vitis riparia (riverbank grape)

XERIC CONDITIONS (DRY)
Cactus
Opuntia macrorhiza (common prickly pear)

Ferns
Asplenium platyneuron (ebony spleenwort)
Asplenium trichomanes (maidenhair spleenwort)
Dryopteris marginalis (marginal wood fern)
Woodsia ilvensis (rusty woodsia)

Forbs (annuals/biennials)
Euphorbia marginata (snow-on-the-mountain)
Helianthus annuus (common sunflower)
Helianthus petiolaris (plains sunflower)
Linum rigidum (yellow flax)
Oenothera rhombipetala (diamond-petal primrose, four-point evening primrose)
Rudbeckia hirta (black-eyed Susan)
Corydalis sempervirens (pale corydalis)
Lobelia spicata (pale lobelia)
Oenothera biennis (common evening primrose)
Senecio plattensis (prairie ragwort, prairie groundsel)

Forbs (perennials)
Ageratina altissima var. altissima (white snakeroot)
Allium canadense (wild garlic)
Allium stellatum (wild pink onion)
Anaphalis margaritacea (pearly everlasting)
Anemone caroliniana (Carolina anemone, southern thimbleweed)
Anemone cylindrica (thimbleweed, candle anemone)
Anemone multifida (early thimbleweed, cut-leaf anemone, Pacific anemone)
Anemone virginiana (thimbleweed, tall anemone)
Antennaria spp. (pussytoes, everlasting)
Apocynum androsaemifolium (spreading dogbane)
Aquilegia canadensis (columbine)

Arisaema triphyllum (Jack-in-the-pulpit, Indian turnip)
Asclepias speciosa (showy milkweed)
Asclepias tuberosa (butterfly weed)
Asclepias verticillata (whorled milkweed)
Aster ericoides (heath aster, white wreath aster)
Aster laevis (smooth aster)
Aster novae-angliae (New England aster)
Aster oblongifolius (aromatic aster)
Aster oolentangiensis (sky blue aster)
Aster pilosus (frost aster)
Aster sericeus (silky aster)
Baptisia alba var. macrophylla (cream false indigo, plains wild indigo)
Campanula rotundifolia (harebell)
Castilleja sessiliflora (downy painted cup)
Coreopsis palmata (stiff coreopsis)
Dalea candida (white prairie clover)
Dalea purpurea (purple prairie clover)
Desmodium canadense (Canada tick-trefoil, Canada tickclover)
Desmodium illinoense (Illinois tick-trefoil, Illinois tickclover)
Dodecatheon meadia (shooting star)
Echinacea angustifolia (narrow-leaved purple coneflower)
Epilobium angustifolium (fireweed, willow herb)
Eryngium yuccafolium (rattlesnake master, button snake-root)
Euphorbia corollata (flowering spurge)
Fragaria virginiana (wild strawberry)
Geum triflorum (prairie smoke, purple avens)
Helianthus maximiliani (Maximilian sunflower)
Helianthus pauciflorus ssp. pauciflorus (stiff sunflower)
Helianthus strumosus (woodland sunflower)
Heliopsis helianthoides (ox-eye sunflower, false sunflower)
Heterotheca villosa var. villosa (golden aster)
Heuchera richardsonii (alum root)
Hieracium longipilum (hairy hawkweed)
Houstonia longifolia var. longifolia (long-leaved bluets, pale bluets)
Lespedeza capitata (roundheaded bush clover)
Liatris aspera (rough blazing star, gayfeather)
Liatris punctata (dotted blazing star, gayfeather)
Lilium philadelphicum (wood lily)
Lithospermum canescens (hoary puccoon)
Lithospermum caroliniense (hairy puccoon, hispid gromwell)
Lithospermum incisum (fringed puccoon, narrow-leaved puccoon)
Lupinus perennis (wild lupine)
Monarda fistulosa (wild bergamot, horsemint, beebalm)
Nothocalais cuspidata (prairie dandelion)
Osmorhiza berteroi (mountain sweet cicely)
Penstemon albidus (white beardtongue)

Penstemon grandiflorus (large-flowered penstemon)
Pentaphylloides floribunda (potentilla, shrubby cinquefoil)
Phlox pilosa (prairie phlox, downy phlox)
Ranunculus hispidus (early buttercup, tufted buttercup)
Ratibida columnifera (prairie coneflower, long-headed coneflower, Mexican hat)
Ratibida pinnata (gray-headed coneflower, yellow coneflower)
Sibbaldiopsis tridenta (three-toothed cinquefoil)
Silphium laciniatum (compass plant)
Sisyrinchium angustifolium (narrow-leaved blue-eyed grass)
Sisyrinchium campestre (white-eyed grass, prairie blue-eyed grass)
Solidago canadensis (meadow goldenrod)
Solidago juncea (early goldenrod, plume goldenrod)
Solidago missouriensis (Missouri goldenrod, prairie goldenrod)
Solidago nemoralis (gray goldenrod, old-field goldenrod)
Solidago rigida (stiff goldenrod)
Solidago speciosa (showy goldenrod)
Tephrosia virginiana (goat's rue)
Tradescantia ohiensis (Ohio spiderwort)
Vernonia fasciculata (ironweed)
Viola pedata (bird-foot violet)
Viola pedatifida (prairie violet)
Viola soraria (common blue violet, meadow violet)
Zizia aptera (heart-leaved golden alexanders)

Grasses/Grass-like plants

Agrostis scabra (ticklegrass, fly-away grass)
Andropogon gerardii (big bluestem)
Aristida purpurea var. longiseta (red three awn)
Bouteloua curtipendula (sideoats grama)
Bouteloua gracilis (blue grama)
Bouteloua hirsuta (hairy grama)
Bromus kalmii (prairie brome, wild chess)
Buchloe dactyloides (buffalograss)
Calamovilfa longifolia (sandreed grass, prairie sandreed)
Danthonia spicata (poverty grass)
Elymus canadensis (Canada wild rye)
Eragrostis spectabilis (purple lovegrass, tumblegrass)
Koeleria macrantha (June grass)
Melica nitens (three-flower melic grass)
Oryzopsis hymenoides (Indian ricegrass)
Pascopyrum smithii (western wheatgrass)
Schizachyrium scoparium (little bluestem)
Sorghastrum nutans (Indian grass)
Sporobolus compositus var. compositus (tall dropseed)
Sporobolus cyrptandrus (sand dropseed)
Sporobolus heterolepis (northern prairie dropseed)

Stipa comata (needle-and-thread grass)
Stipa spartea (porcupine grass)
Trisetum spicatum (spike trisetum)
Carex pensylvanica (Pennsylvania sedge)

Shrubs (deciduous)
Amelanchier alnifolia (saskatoon, western serviceberry, Juneberry)
Amelanchier arborea (downy serviceberry, shadbush, Juneberry)
Amorpha canescens (leadplant)
Amorpha nana (dwarf wild indigo)
Artemisia frigida (prairie sagewort, fringed sage)
Ceanothus americanus (New Jersey tea, red root)
Comptonia peregrina (sweet fern)
Prunus pumila var. besseyi (sand cherry)
Prunus virginiana (chokecherry)
Rhus glabra (smooth sumac)
Rosa arkansana (prairie rose)
Rosa blanda (early wild rose, smooth rose)
Rubus idaeus ssp. strigosus (red raspberry)
Rubus occidentalis (black raspberry, thimbleberry)
Shepherdia canadensis (buffaloberry)
Vaccinium angustifolium (low-bush blueberry)

Shrubs (evergreen)
Arctostaphylos uva-ursi (bearberry, kinnikinnik)
Gautheria procumbens (wintergreen, checkerberry)
Juniperus communis (common juniper)
Juniperus horizontalis (creeping juniper, creeping savin)
Ledum groenlandicum (Labrador tea, muskeg tea)

Trees (deciduous)
Acer negundo (box-elder)
Acer saccharum (sugar maple)
Acer spicatum (mountain maple)
Crataegus mollis (downy hawthorn)
Hamamelis virginiana (common witchhazel)
Populus grandidentata (large-toothed aspen)
Prunus pensylvanica (fire cherry, pin cherry)
Prunus serotina (black cherry)
Quercus velutina (black oak)

Trees (evergreen)
Juniperus virginiana (eastern red cedar)
Pinus resinosa (red pine, Norway pine)
Pinus strobus (eastern white pine)

Vines (deciduous)
Parthenocissus quinquefolia (Virginia creeper)
Parthenocissus quinquefolia var. quinquefolia (woodbine)

Appendix E – Model Specification – Waste Materials Management and Recycling

SECTION 01690

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of each prime Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. Section Includes: This Section includes required recycling and recovery of the following waste materials and applies to listed waste materials produced during the Work:

1. Land Clearing Debris: Solid waste generated solely from land clearing operations, such as stumps and trees.

2. Concrete and Masonry: Clean concrete, brick, rock, and masonry.

3. Metals: Metal scrap including iron, steel, copper, brass, and aluminum.

4. Untreated Wood: Unpainted, untreated dimensional lumber, timber beams, engineered wood products, plywood, oriented strand board, Masonite, particleboard, wood shipping pallets, and crates.

5. Gypsum Wallboard Scrap: Excess drywall construction materials including cuttings, other scrap, and excess materials. [Edit to suit project.]

6. Paper and Cardboard: Discarded office refuse including unwanted files, correspondence, etc. Clean, corrugated cardboard used for packaging, etc.

B. Non-Recyclable Waste: Collect and segregate non-recyclable waste for delivery to an permitted landfill site.

1. Mixed Solid Waste: Solid waste commonly collected as a municipal service, exclusive of waste materials listed above.

1.3 DEFINITIONS:

A. Waste Materials are defined as large and small pieces of listed materials which are excess to contract requirements and generally include materials to be recycled and/or recovered from existing construction and items of trimmings, cuttings and damaged goods resulting from new installations, which can not be effectively used in the Work.

B. Recycling is defined as the process of collecting and preparing recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials in a manner that precludes further use.

C. Recovery is defined as any process that reclaims materials, substances, energy, or other products contained within or derived from waste on-site. It includes waste-to-energy, composting, and other processes.

1.4 SUBMITTALS:

A. Construction Waste Management Plan: Before start of construction, submit a construction waste management plan for approval of Contracting Officer's Representative indicating how Contractor proposes to collect, segregate, recycle, and recover at least 75% of construction wastes and debris generated by the Work. Submit documentation indicating compliance with regulations specified under "Quality Assurance" article below. Include a list of recycling facilities to which indicated recyclable materials will be sent for recycling. Identify materials that are not recyclable or otherwise recoverable that must be disposed of in a landfill or other means acceptable under governing State of Minnesota and local regulations. List permitted landfills and/or other disposal means to be employed. Indicate instances where compliance with requirements of this specification does not appear to be possible and request resolution from the Contracting Officer through the Contracting Officer's Representative.

B. Delivery Receipts: Provide to the Construction Quality Manager delivery receipts for waste materials salvaged and sent to permitted waste materials processors or recyclers within 48 hours of delivery that indicate the location and name of firm accepting recyclable waste materials, types of materials, net weights of each type, date of delivery and value of materials.

1.5 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable requirements of the State of Minnesota and applicable local ordinances and regulations concerning management of construction, demolition, land clearing, inert, and yard trash debris and subsequent modifications and amendments to same.

B. Disposal Sites, Recyclers, and Waste Materials Processors: Use only facilities properly permitted by the State of Minnesota and by local authorities where applicable.

C. Pre-Construction Waste Management Conference: Prior to beginning work at the site, schedule and conduct a conference to review the Construction Waste Management Plan and discuss procedures, schedules and specific requirements for waste materials recycling and disposal. Discuss coordination and interface between Contractor and other construction activities. Identify and resolve problems of compliance with requirements. Record minutes of the meeting, identifying conclusions reached and matters requiring further resolution. Maintain waste management as an agenda item at future construction meetings.

1. Attendees: Contractor and related Contractor personnel associated with work of this section, including personnel in charge of the waste management program; Construction Quality Manager; Architect; material suppliers where appropriate; and such additional Owner personnel as Owner deems appropriate.

2. Plan Revision: Make revisions to Construction Waste Management Plan agreed upon during the meeting and incorporate resolutions agreed to be made subsequent to the meeting. Submit revised plan to Architect for approval.

D. Implementation: Designate an on-site party responsible for instructing workers and implementing Construction Waste Management Plan. Distribute copies of Construction Waste Management Plan to job site foreman and each subcontractor. Include waste management and recycling in worker orientation. Provide on-site instruction on appropriate separation, handling, recycling, and recovery methods to be used by all parties at the appropriate stages of the work at the site. Include waste management and recycling discussion in pre-fabrication meetings with subcontractors and fabricators. Also include discussion of waste management and recycling in regular job meetings and job safety meetings conducted during the course of work at the site.

1.6 STORAGE AND HANDLING:

A. Site Storage: Remove materials for recycling and recovery from the work location to approved containers or storage area as required. Failure to remove waste materials will be considered cause for withholding payment and termination of Contract.

B. Position containers for recyclable and recoverable waste materials at a designated location on the Project Site. If materials are sorted on site, provide separate collection containers or storage areas for not less than the following materials:
   1. Concrete and masonry.
   2. Metals.
   3. Untreated lumber.
   4. Gypsum wallboard scrap. [Edit to suit project.]
   5. Paper and cardboard.

C. Change-out loaded containers for empty containers as demand requires.

D. Handling: Deposit indicated recyclable, and recoverable materials in storage areas or containers in a clean (no mud, adhesives, solvents, petroleum contamination), debris-free condition. Do not deposit contaminated materials into the containers until such time as such materials have been cleaned.

E. If the contamination chemically combines with the material so that it can not be cleaned, do not deposit into the recycle containers. In such case, request resolution by the Construction Quality Manager for disposal of the contaminated material. Directions from the Construction Quality Manager do not relieve the Contractor of responsibility for compliance with all legal and regulatory requirements for disposal, nor shall such directions cause a request for modification of the Contract.

1.7 PROJECT/SITE CONDITIONS:

A. Environmental Requirements: Transport recyclable and recoverable waste materials from the Work Area to containers and carefully deposit in the containers without excess noise and interference with other activities, to minimize noise and dust.

   1. Do not place recyclable waste materials on the ground adjacent to a container.

B. Existing Conditions: Coordinate with "Instructions to Bidders" and "Supplementary Conditions".

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 WASTE MANAGEMENT:

A. General: Implement waste management procedures in accordance with approved Construction Waste Management Plan. Maintain procedure throughout the life of this Contract.

B. Source Separation On- or Off-Site: Either separate, store, protect, and handle at the project site all identified recyclable and recoverable waste products to prevent contamination of materials and maximize recyclability and recoverability of materials. Or mix all identified recyclable and recoverable waste products for separation off-site.

C. Collection: Arrange for the regular collection, transport from the site, and delivery to respective approved recycling centers of indicated recyclable waste materials. Maintain records accessible to the Architect for verification of construction waste materials recycling and recovery.

D. Delivery Receipts: Arrange for timely pickups from the site or deliveries to approved recycling facilities of designated waste materials to keep construction site clear and prevent contamination of materials. Keep and maintain records of deliveries to recycling facilities and pickups of waste materials at the site by others as specified above.

3.2 RECYCLABLE WASTE MATERIALS HANDLING: [Note to author: Edit the following to meet project requirements.]

A. General: The following paragraphs supplement handling requirements for various of the materials identified for classification and recycling listed in Part 1 "Summary" article above. (Note to author: If the following materials are not recyclable in your area, delete them from the specifications.)

B. Landclearing Debris: Pile wood debris from landclearing in a clean storage area free from large amounts of dirt and other non wood materials. Chip smaller size tree limbs on site and use as plant mulch. Cut larger tree limbs and trunks into 16 inch lengths and advertise as green firewood if hardwood or softwood suitable for burning. Transport other wood including tree roots to a County waste and recycling center.

C. Concrete and Masonry: Free of metals, woods and other contaminates. If possible during demolition, crush existing concrete and concrete masonry units on-site into aggregate size. Store crushed material on-site in clean area to avoid contamination from other materials or building processes. Reuse on-site crushed material for fill, for stabilizing soils, or as base and subbase materials. If crushing on site is impractical, store material during demolition processes on site in clean, uncontaminated area. Transport concrete and masonry materials to a certified concrete recycler as needed.

D. Metals: Cut items to lengths and sizes to fit within the container provided when necessary. Where there is sufficient quantity of a specific recyclable waste item (for example; salvaged metal roofing or duct work), make special arrangements for items to be bundled, banded or tied, and stack in a designated location for a special pick-up. Coordinate special arrangements with the Construction Quality Manager.

E. Untreated Wood: Salvaged wood materials to be free of metals, concrete, gypsum wallboard, insulation, and other contaminating materials. Stack dimensional wood into like piles. For example, store 2x4s with other 2x4s, and 2x6s with other 2x6s. Also, if quantity is sufficient, separate piles into lengths of 4-foot increments. Reuse lumber on site as studs, backing, blocking or other uses where appropriate. Stack non-dimensional wood in piles for possible reuse on-site or transport off-site. Depending on size of lumber, recycle or chip wood for plant mulch. If wood materials can not be used on site, transport to a certified wood recycler or reuse center.

F. Gypsum Wallboard Scrap: Separate gypsum wallboard from other wastes. Dispose of waste gypsum wallboard off-site at a gypsum reclamation or recycling facility, or on-site as a soil amendment.

1. For on-site application as a soil amendment, incorporate waste gypsum wallboard in landscape areas under construction, at a rate of 50 pounds per 1000 square feet, or approximately one ton per acre.

a. Material must be unpainted gypsum wallboard from new construction, ground to reduce material to a fine particle size (70% passing a 100 mesh screen), and must be fully incorporated into the soil surface.

G. Paper and Cardboard: Classify and handle waste paper goods as follows:

1. Bond Paper: General office quality paper used for specifications, correspondence, copiers, PC laser printers, and FAX machines. Collect in separate container at each workstation and deposit loose in appropriate recycle container as required.

2. Newsprint: Newspapers and tabloid style advertising (slick finish magazines and advertising materials are not typically recyclable). Collect in single location and deposit as required in appropriate recycle container.

3. Diazo Prints (drawings): Set up single location for collection. Roll together to minimize space. Deposit as required in appropriate recycle container.

4. Cardboard and paperboard cartons and boxes: Knock-down, fold flat and deposit in appropriate recycle container.

H. Other Items: Where recyclability classification of any given waste material is unclear, verify with the Construction Quality Manager.

END OF SECTION

Appendix F – Model Specification – Salvage and Reuse and Recycling

SECTION 02061

(**Note to author:** This Specification does not replace Demolition Section 02060. Instead it is used in conjunction with it when there is salvage, reuse and/or recycling of building materials and equipment.)

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.02 SUMMARY:

A. Section Includes:
   1. Dismantling, moving or salvaging of designated structures, materials and fixtures. Refer to Drawings for specific locations and construction limits.

B. Sorting materials for salvage, re-use, recycling and recovery.

C. Salvage work by Owner

D. Related Work
   1. Section _____ *01690*: Waste Materials Management and Recycling
   2. Section _____ *02060*: Building Demolition
   3. Section _____ *02110*: Site Clearing

1.03 DEFINITIONS:

A. Salvage is defined as the recovery or reapplication of product for uses similar or identical to its originally intended application, without remanufacturing or preparation processes that significantly alter the original package or product. Salvage refers to materials that are recovered for reuse off-site and sold or donated to a third party.

B. Reuse is defined as the recovery of a package product for uses similar or identical to its originally intended application, without remanufacturing or preparation processes that significantly alter the original package or product. Reuse refers to materials or equipment that are reused on-site.

C. Recycling is defined as the process of collecting and preparing recyclable materials and reusing them in their original form or in manufacturing processes that do not cause the destruction of recyclable materials in a manner that precludes further use.

D. Recovery is defined as process that reclaims materials, substances, energy or other products contained within or derived from the waste. It includes waste-to-energy, composting, and other processes.

1.04 SUBMITTALS:

A. Submit dismantling and removal procedures and schedule in accordance with Waste Materials and Recycling Section.

B. Materials Salvage and Reuse Management Plan: Before the start of demolition, submit for the approval of Contracting Officer's Representative Materials Salvage and Reuse Management Plan for all materials designated to be salvaged or reused. The Plan shall indicate how the Contractor proposes to salvage and reuse demolition waste.

1. The Contractor must salvage, reuse, recycle and recover at least 80% of demolition waste by volume.
   a. Include a list of salvage and reuse outlets where salvageable materials will be sent.
2. Identify materials that are not recyclable or otherwise not recoverable that must be disposed of in a landfill or other means acceptable under State of Minnesota and local regulations.
   a. List permitted landfills and/or other disposal means to be employed for building waste that cannot be recycled.
3. Indicate instances where compliance with requirements of this specification does not appear to be possible and request resolution from the Contracting Officer through the Contracting Officer's Representative.

C. Submit landfill tipping receipts which provide volumes per Materials Management and Recycling Section.

D. Submit receipts for materials types, weight or volume, and revenues from salvage, reuse and recycling per Materials Management and Recycling Section.

E. Submit inventory of items or materials that were salvage and reused.

F. Submit inventory of significant landscape features, including assigned penalties as described in 1.08, Habitat Protection

1.05 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with all applicable requirements of the State of Minnesota and applicable local ordinances and regulations concerning management of demolition and land clearing and subsequent modifications and amendments to same.

B. Pre-Construction Salvage and Reuse Management Conference: Prior to the beginning of Work at the site, schedule and conduct a conference to review the Materials Salvage and Reuse Management Plan and discuss procedures, schedules, and specific requirements for materials to salvage, reuse, recycle, or dispose of. Discuss coordination and interface between the Contractor and other construction activities. Identify and resolve problems of compliance with the plan and other requirements. Record minutes of the meeting, identifying all conclusions reached and matters requiring further discussion and resolution.

1. Attendees: Contractor and related Contractor personnel associated with work of this section, including personnel in charge of materials to be salvaged and reused; Construction Quality Manager; Architect; and additional Owner personnel as the Owner deems appropriate.

2. Plan Revision: Make revision to Materials Salvage and Reuse Management Plan agreed upon during the meeting and incorporate resolutions agreed to be made subsequent to the meeting. Submit revised plan to Architect for approval.

C. Implementation: Designate an on-site party responsible for instructing workers and implementing Materials Salvage and Reuse Management Plan. Distribute copies of the Materials Salvage and Reuse Management Plan to job site foreman and each appropriate subcontractor. Provide on-site instruction on appropriate salvaging, removing, recovering, and handling procedures to be used by subcontractors at appropriate stages of the work at the site. Also include discussion of Materials Salvage and Reuse Management Plan in regular job meeting when appropriate to do so.

1.06 STORAGE AND HANDLING:

A. Site Storage:

1. Remove salvaged materials from site to a location designated by Owner.

2. Where salvaged materials become property of Contractor, remove from site immediately upon completion of salvage operations.

3. For material to be reused, Contractor has option to store on site with Owner's approval, or to store off-site until it is required. If material is to be stored, provide secure location, protected from damage or theft. Include items of specific monetary value as items on Owner's Builders Risk or Property Insurance policy.

B. Handling: Remove and handle salvaged materials with care. Move salvaged materials so that no damage, dirt, adhesives, solvents, or other contaminates come in contact with them. If materials become contaminated, request resolution by the Construction Quality Manager to remedy conditions.

1.07 EXISTING CONDITIONS:

A. Follow demolition procedures described in Building Demolition Section for salvage work.

1.08 HABITAT PROTECTION:

A. The Owner shall identify and tag significant landscape features and assign penalties for damaging each feature. Following is a list of significant features and assigned penalties.
(Note to author: List existing trees, bushes, wetlands areas, and other significant natural features to be preserved and assign a value for their disruption.)

PART 2 PRODUCTS

2.01 SALVAGED AND REUSED MATERIALS:

A. The following paragraphs supplement materials to be salvaged or reused listed in Part 1, 1.01 Summary article above: (Note to author: The following is a list of items typically salvaged or reused in a project. Edit to suit project.)

1. Building(s): [Move] or [Dismantle and relocate] or [Donate].

2. Building components and fixtures:

a. Windows
b. Doors
c. Cabinets, millwork, trim
d. Paneling and other similar interior finishes
e. Hardware
f. Electrical fixtures, motors, switch gear, and other similar equipment
g. Plumbing fixtures: [Salvage] or [crush porcelain plumbing fixtures for fill]
h. Suspended ceiling grid
i. Acoustical ceiling tiles
j. Interior steel partition studs
k. Gypsum board.
l. Copper pipe

3. Wood: Sort by type and size for salvage.

a. Clean, dimensional wood.
b. Timber, micro and laminated beams.

PART 3 EXECUTION

3.01 PREPARATION:

A. Follow Building Demolition Section for procedures concerning demolition and dismantling of structure.

3.02 EXECUTION:

A. Contractor Responsibilities: Ensure appropriate governmental entities, such as Minnesota Pollution Control Agency (MPCA) or local authorities are notified of work.

B. Except materials designated for reuse on site, immediately relocate, recycle or dispose of demolished material in accordance with Building Demolition Section.

C. When the drawings indicate tree removal, chip demolished vegetation and deliver to staging site designated by Owner.

D. Archeological relics, antiques, and similar objects remain property of Owner. Notify Owner when such items are discovered and obtain approval regarding method of relocation.

E. Remove and store reusable materials to be reinstalled or retained in manner to prevent damage. Store and protect in accordance with requirements of Building Demolition Section.

F. Remove demolished materials from site in accordance with Building Demolition Section as work progresses. Leave site in clean condition.

G. Conduct dismantling and demolition to minimize damage to trees, plants, and landscape elements.

3.03 CONSTRUCTION WASTE MANAGEMENT:

A. Recycled Materials: Comply with the Waste Materials Management Plan.

3.04 SCHEDULES:

A. Materials for reuse, salvage, recycling, or recovery:
   1. Windows
   2. Doors
   3. Cabinets, millwork, paneling, trim, and other similar interior finishes
   4 Hardware
   5. Electrical fixtures, motors, switch gear and other similar equipment
   6. Plumbing fixtures and copper piping
   7. Wood: palettes, dimensional wood and timbers
   8. Packaging

B. Relocate, store, and protect for reinstallation the following reusable materials and equipment:

1. [_____]
2. [_____]
3. [_____]

C.1. Relocate the following material and equipment to be salvaged by the Owner. Deliver to [location agreed upon] [_____].

1. [_____]
2. [_____]
3. [_____]

C.2. Relocate, store, and protect for salvage the following materials and equipment:

1. [_____]
2. [_____]
3. [_____]

C.3. Relocate, store, and protect for reuse/relocation the following plant materials:

1. [_____]
2. [_____]
3. [_____]

C.4. Relocate, store, and protect for recycling and/or recovery the following materials and equipment:

1. [_____]
2. [_____]
3. [_____]

END OF SECTION