DEPARTMENT OF THE ARMY
ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
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WASHINGTON DC 20310-0600

DAIM-ZA

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MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Sustainable Management of Waste in Military Construction, Renovation, and Demolition Activities

1. References:

a. Army Strategy for the Environment, October 2004.

b. Memorandum, Office of the Assistant Secretary of the Army (Installation and Environment), Sustainable Design and Development Policy Update – SPiRiT to LEED Transition, 5 January 2006.

2. All military construction, renovation, and demolition projects shall include contract performance requirements for a 50% minimum diversion of construction and demolition (C&D) waste by weight, from landfill disposal. Compliance with this policy will ensure installations attain the goals of Reference 1.a and the SDD SPiRiT / LEED ratings mandated in Reference 1.b. This requirement applies to all unawarded contracts and solicitations issued 30-days after the date of this memorandum. Contract specifications will include submission of a contractor's C&D Waste Management Plan, preferably prior to the start of site clearance.

3. This policy applies to all construction, renovation, and demolition projects carried out under the Military Construction (MILCON) Army, MILCON Army Reserves, MILCON National Guard Bureau, Army Family Housing Construction, Facilities Reduction, and installation Operation and Maintenance programs. Construction, renovation, and demolition projects funded by other than the above programs are not subject to this policy. However, those exempt may use installation C&D waste facilities and services only when compliant with this policy.

4. Project cost estimates and documentation shall include expenses for the removal and disposal of building materials through demolition, recovery, reuse, and recycling techniques that will not otherwise be offset by revenue, savings, or cost avoidance within the contract. These contracts shall continue to be awarded on either a low cost or best value basis. Detailed implementation guidance is provided in the enclosure.

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SUBJECT: Sustainable Management of Waste in Military Construction, Renovation, and Demolition Activities

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Encl

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ENCLOSURE

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT

REQUIREMENTS FOR SUSTAINABLE MANAGEMENT OF WASTE IN MILITARY CONSTRUCTION, RENOVATION, AND DEMOLITION ACTIVITIES

13 January 2006

1. References.

a. Army Regulation (AR) 420-49, 28 Apr 1997, Utility Services, Chapter 3: Solid Waste Management *(Provides basic Army policy on solid waste management and recycling.)*

b. Army Strategy for the Environment, October 2004 *(Establishes the Army vision for meeting the mission today and in the future by making sustainability the foundation for the strategy. Lays out 6 long-term goals that form the building blocks of Army sustainability.)*

c. Deputy Assistant Secretary of the Army for Installations and Housing memorandum, Sustainable Design and Development Policy Update – SPiRiT to LEED Transition, 5 January 2006 *(Announces transition from SPiRiT rating to LEED system as of FY2008 MILCON program. Sets LEED Silver as the minimum sustainability rating for vertical New Construction (NC) projects. Prior year projects will continue to use SPiRiTand achieve a Gold level.)*

d. Assistant Chief of Staff for Installation Management memorandum, Military Construction, Army (MCA) Projects and One-for-One Demolition, 24 Apr 2003 *(Requires that an equal amount of facilities be disposed of or demolished for each square foot of new construction.)*

e. Assistant Secretary of the Army for Installations and Environment memorandum, Sustainable Design and Development, 18 March 2003 *(Sets SPiRiT Silver as the minimum sustainability rating for FY2006 MILCON projects under design and SPiRiT Gold for all other FY2006 and future year MILCON projects.)*

f. Assistant Chief of Staff for Installation Management memorandum, Sustainable Project Rating Tool (SPiRiT), 4 May 2001 *(Announces the Army-wide implementation of SPiRiT to self-evaluate the sustainability of facility construction and repair projects. Sets SPiRiT Bronze as the initial minimum sustainability rating for the Army.)*

g. Principal Deputy Assistant Secretary of the Army (Installations and Environment), DASA(I&E) memorandum, Deconstruction and Re-Use of Excess Army Buildings, 18

January 2001 *(Requests ACSIM to issue policy and guidance for installations to work with non-profits and other non-traditional contract entities to plan and carry out building deconstruction activities.)*

h. Assistant Chief of Staff for Installation Management memorandum, Sustainable Design and Development (SDD) Policy, 26 May 2000 *(Forwards Army (DASA(I&H)) policy that SDD be incorporated into installation facilities planning decisions and infrastructure projects.)*

i. Unified Facilities Guide Specification (UFGS), UFGS-01572, Construction and Demolition Waste Management, February 2003 *(Provides detailed requirements for developing and implementing a C&D waste management plan to promote waste and debris diversion through source reduction, salvage, reuse, and recycling.)*

j. UFGS-02220, Demolition, September 2003 *(Provides general requirements for demolition or removal work, and salvage and recycling of materials and components.)*

k. UFGS-01355, Environmental Protection, February 2002 *(Provides general requirements for developing a recycling and solid waste minimization plan and non-hazardous solid waste diversion reports as part of the project's Environmental Protection Plan.)*

l. Unified Facilities Criteria (UFC), UFC 1-900-01, Selection of Methods for the Reduction, Reuse, and Recycling of Demolition Wastes, 1 December 2002 *(Provides guidance for recovery and recycling of demolition waste, and assists in determining the most feasible methods to reduce the amount of construction and demolition (C&D) waste materials disposed in landfills.)*

m. RCRA in Focus, Construction, Demolition, and Renovation, US Environmental Protection Agency, Office of Solid Waste and Emergency Response Publication EPA-530-K-04-005, September 2004 *(Provides a basic understanding of the regulatory requirements for hazardous Construction & Demolition waste; includes information on managing typical hazardous C&D wastes and a hazardous waste requirements checklist for C&D projects; also tips on reducing C&D waste and a fairly extensive list of contacts for the C&D industry.)*

2. Purpose and Applicability.

a. The management of construction and demolition (C&D) debris from the removal of millions of square feet of excess Army buildings is a major challenge. Installations are incorporating Sustainable Design and Development (SDD) principles into facility planning decisions to improve energy usage, quality of life, and the environment. Increasing costs of waste disposal, growing acceptability, and greater value of used

building materials makes the recovery, reuse, and recycling of C&D debris an important and cost effective component of SDD. Sustainable approaches to waste management can simultaneously provide benefits to the community and the environment, while cost effectively supporting construction, renovation, and demolition activities.

b. The requirements described within this document are for the development and implementation of programs to effectively manage waste generated during all construction, renovation, and demolition activities on Army installations. They are intended to minimize the amount of waste that is disposed of through landfilling and promote more efficient use of new construction materials. The objective is to ensure that sustainable practices of C&D waste management are fully integrated into the planning, design, development, and execution of processes for implementing Sustainable Design and Development (SDD) at the installation. The handling and disposal of hazardous waste materials, as defined below, is outside the scope of these requirements.

c. These requirements apply to all construction, renovation, and demolition projects funded by Military Construction (MILCON) Army, MILCON Army Reserves, MILCON National Guard Bureau, Army Family Housing Construction, Facilities Reduction, and installation Operation and Maintenance. Construction, renovation, and demolition projects funded and carried out by other than the above authorities are not currently subject to this policy. However, those exempt, such as Residential Communities Initiative, Army & Air Force Exchange Service, and Defense Commissary Agency, if they wish to utilize an installation's C&D waste facilities and services, may do so only if they comply with the requirements of this policy.

3. Definitions. The following terms are used throughout these requirements.

a. *Construction* – Engineering projects that involve construction, renovation, and/or repair activities.

b. *Construction and demolition (C&D) waste (debris)* – materials generated as a result of construction, renovation, demolition and/or removal projects (e.g., metals, wood, asphalt, concrete, brick, masonry, rocks, rubble, soil, paper, cardboard, plastics, glass, carpet, padding, and related equipment and/or fixtures).

c. *Deconstruction* – planned and controlled building disassembly that preserves the integrity of the building materials and components so that they can be reused or recycled. When the type of construction does not lend itself to "disassembly," the term deconstruction means the breaking apart of building elements into their more basic constituents(steel, crushed concrete, etc.) and processing for potential reuse and or recycling. Also known as *"sustainable infrastructure removal."*

d. *Disposal* – the landfilling or incineration of C&D waste.

e. *Diversion* – the redirection of waste, ordinarily disposed of in a landfill or burned in an incinerator, to a recycling facility, to a composting yard, or to another destination for reclamation or reuse.

f. *Demolition (or "wrecking")* – an engineering project to reduce a building, structure, paved surface or utility infrastructure through manual and/or mechanized means, with or without the assistance of explosive materials to piles of mixed debris or rubble. Demolition is usually accomplished in a relatively short time frame with or without attempts to segregate the debris or rubble into its various components: wood, metal (steel/cooper), concrete/brick, etc. for recycling.

g. *Hazardous waste* – any waste substance, which is ignitable, corrosive, reactive, or toxic, or if improperly handled, poses a substantial threat to human health and/or the environment. At the federal level, hazardous wastes are principally governed by Subtitle C, Resource Conservation and Recovery Act (RCRA), the Toxic Substances Control Act (TSCA), the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), or the Asbestos National Emissions Standards for Hazardous Air Pollutants (NESHAPs) under the Clean Air Act. RCRA waste examples include lead and other heavy metals, spent solvents, paints, and thinners, while TSCA wastes would include such materials as PCBs and friable asbestos.

h. *Recycling facility* – an activity that specializes in collecting, handling, processing, distributing, or reclaiming usable materials from a waste stream for reused by others or remanufacturing into new products.

4. Sustainability Principles:

Army infrastructure projects must adhere to Sustainable Design and Development (SDD) principles. Installation waste and recycling program managers should become familiar with SDD principles and Army policies to ensure that C&D waste management requirements are properly considered and addressed during the planning, design, development, and execution of construction, renovation, and demolition projects. SDD integrates best building practices, technologies, energy conservation, and environmental considerations into installation planning and life-cycle management, including the recovery, recycling and reuse of C&D wastes. Information on SDD is available at the following websites:

ACSIM: http://www.hqda.army.mil/acsimweb/fd/linksSDD.htm

USACERL: http://www.cecer.army.mil/sustdesign/

5. Installation C&D Waste Management Overview.

a. Over 60% of the Army's non-hazardous solid waste stream for operations in the Continental United States consisted of C&D debris according to 2004 Army records (SWAR data). C&D debris can constitute up to 80% of the Army's non-hazardous solid waste volume at some installations with major construction and facility removal programs. As much as 15% of all materials used in a construction project will become waste and require disposal.

b. Disposing of C&D wastes in Army-owned landfills consumes capacity that is already in limited supply and dwindling fast. Disposing C&D wastes at a non-installation landfill can be costly in terms of transportation and tipping fees. Incinerating C&D wastes degrades local air quality and results in hazardous ash disposal problems.

c. Sustainable management of C&D waste demonstrates Federal leadership in responsible stewardship of natural resources and can help lower an installation's waste disposal costs, preserve limited landfill capacity, and reduce the need for virgin construction materials. This approach also offers opportunities for reducing the cost of removing facilities. Contractors can recover costs associated with salvage and recycling through their own use or sale of materials, which in a competitive environment will enable them to lower their price to the Government. Where the installation can utilize salvaged or recycled materials on-post, the cost of purchasing new products or virgin materials is avoided. Installations operating C&D landfills benefit from the reduced debris burden, extended landfill life, and associated cost savings.

d. Three significant cost factors in a C&D waste management program are labor, transportation and tipping/disposal fees. Installations that have their own on-site landfills often underestimate the true cost of owning and operating these facilities (capital, engineering, permitting, construction, operation, maintenance, future closure and long-term monitoring costs) by either providing disposal services at no cost or by failing to charge reimbursable customers and contractors enough to cover the true operating costs. Reimbursable customers and contractors shall be charged the full life-cycle cost of disposal at an installation landfill. If Installations are unable to easily calculate reasonable landfill life cycle costs, they shall apply the prevailing local commercial tipping fees as an alternative.

As an added incentive to reduce and divert (instead of demolish) C&D wastes from Army landfills through reduction, recovery, reuse, and recycling, installations are encouraged to offer contract options or performance rebates for levels of diversion that are achieved beyond 50% by weight within each contract or project.

e. Significant waste reduction can only occur through a strategic and deliberate approach to the design, planning, and execution construction, renovation, and

demolition activities. Early planning to incorporate more efficient facility design and construction processes can reduce the total amount of waste generated, handled and ultimately disposed of in landfills. Best Management Practices during construction and demolition will reduce the amount of waste material generated. Table 1 describes typical C&D debris generated during the various phases of a typical construction project. Successful waste management programs must be comprehensive and pro-actively include the full participation of the installation engineering, contracting, and environmental disciplines as well as all contractors, subcontractors, vendors, and suppliers involved in the project. Installation sustainable management of C&D activities will include, but are not limited to, facility design and construction efficiency, salvage (recovery) for reuse and resale, recycling, disposal, and packaging waste minimization.

Table 1. Types of C&D Debris Generated in Various Phases of a Construction Project

Project Phase	C & D Debris
Construction	Mixed rubble, wood, roofing, wall board, insulation, carpet, pipe, plastic, paper, bricks, lumber, concrete block, metals
Demolition	Mixed rubble, concrete, steel beams, bricks, wood, lumber, wallboard, insulation, carpet, pipes, wire, equipment, fixtures
Excavation	Earth, sand, stones, wood
Roadwork	Asphalt, concrete, earth
Site Clearance	Trees, brush, earth, top soil, concrete, mixed rubble, sand, steel, paper, plastic, garbage, rubbish

6. C&D Waste Management Program Requirements

a. Contract Requirements.

1) All future military construction, renovation, and demolition activities shall include C&D waste management performance requirements in solicitation documents. Contract bid specifications shall either reference the following Unified Facilities Guide Specifications (UFGS), or language as appropriate to the program's solicitation document format by editing these UFGS provisions to the specific project. Explicit designation as UFGS is not required:

- UFGS-01355, *"Environmental Protection"*
- UFGS-01572, *"Construction and Demolition Waste Management"* and
- UFGS-02220, *"Demolition"*

NOTE: These UFGS's may be downloaded from the Construction Criteria Base web site: http://www.ccb.org/docs/ufgshome/UFGSToc.htm

(a) UFGS-01355 requires contractors to develop and provide a recycling and solid waste minimization plan and non-hazardous solid waste diversion reports as part of the project's Environmental Protection Plan.

(b) UFGS-01572 requires contractors to submit a C&D Waste Management Plan for government approval within 15 days after contract award and prior to initiating any site clearance activities. The purpose of the plan is to minimize the generation of C&D waste and to ensure that the maximum amount of C&D waste (including materials generated during clearing of the site, demolition of existing structures, and new construction activities) is salvaged for future resale, reuse, or recycling into new products. Installations with on-site C&D disposal facilities may make these facilities available to the demolition/removal contractor at the prevailing tipping fee for the area, or the actual all-inclusive, on-post cost per ton, if known.

(c) General demolition specifications are contained in UFGS-02220 and include the preparation of a demolition plan and the filing of notices to appropriate authorities concerning hazardous materials, explosives, safety and traffic control, etc.

2) These UFGS documents provide general contract performance requirements and depend on the installation's planner or designer to specify further project and site specific requirements. These documents, when completed, should clearly define ownership of property between the government and the contractor. Ensure the solid waste minimization and non-hazardous solid waste provisions of the Environmental Protection Plan, the C&D Waste Management Plan, and the Demolition specifications are coordinated to prevent conflicts.

3) The Corps of Engineers, Engineering and Support Center in Huntsville, AL publishes a number of Public Works Technical Bulletins in the PWTB 200-1 and 420-49 series, focusing on construction and demolition debris topics. Internet address to access PWTB's: http://www.hnd.usace.army.mil/techinfo/CPW/pwtb.htm. For example: PWTB 200-1-23, Guidance for the Reduction of Demolition Debris through Reuse and Recycling, and PWTB 420-49-30, Alternatives to Demolition for Facility Reduction.

b. Contract Administration/Oversight

1) The installation staff offices responsible for solid waste and/or recycling shall review the required C&D waste management plan for installation-managed projects and participate in the review and approval of C&D waste solicitation documents and waste management plans for projects being performed on the installation by others, such as the Corps of Engineers.

2) For each construction, renovation, or demolition project, installations shall document and monitor implementation of the approved plan. Actual diversion shall be

monitored throughout the construction or demolition project and conformance with the approved Waste Management Plan and contract performance requirements shall be verified and recorded.

3) Installations will ensure that C&D activities and quantities are captured and reported annually in the Solid Waste Annual Reporting System, Web-version (SWARWeb) SWARWeb is accessible via the Army Environmental Reporting Online (AERO) portal at https://aero.agpea.army.mil. See Table 2 on page 14 for specific C&D diversion data requirements for SWARWeb. Huntsville Corps of Engineers, as program manager for FRP, will issue through HQs IMA detailed guidance for reporting FRP diversion data via SWARWeb. C&D diversion data for other programs shall be reported in a similar manner.

4) Managers of new construction, major renovation, facilities reduction or other demolition projects will report their C&D activities to the designated installation POC. Organizations that disposed of their C&D wastes off the installation will also comply with this reporting requirement.

c. Methods for Managing Demolition Wastes

1) When non-historical elements of the built environment are old, obsolete, and excess to current and forecasted needs, they are removed to either make way for a replacement facility or to restore the open space for some future use. All removal activities are comprised of a combination of traditional demolition and material recovery, reuse, and recycling techniques.

(a) Traditional demolition is most often accomplished by contracting practices using standard specifications. This is a relatively quick, uncomplicated process, but results in major quantities of waste and debris that must be disposed of in either on-site or off-site landfills.

(b) Appreciable waste stream diversion during demolition can be achieved at no additional cost through proper planning and execution. Historical data shows that the majority of debris materials can be diverted from wood-framed, steel framed, concrete framed, concrete masonry, and pre-engineered metal buildings. Most quantities of concrete, masonry, and metals from any building type can be diverted from landfilling, excluding contaminated materials. The majority of structural material from wood framed buildings can also be diverted through salvage for reuse or recycling, again excluding contaminated materials. Further information and guidance to accomplish appropriate waste stream diversion rates are found in a Best Practices Toolbox located on the Engineering Knowledge Online (EKO) website. The website link will be provided at a later date and updated on a regular basis.

(c) Material recovery, reuse, and recycling techniques are relatively new concepts when compared to demolition. But these techniques are quickly becoming a more desirable way to remove excess buildings, especially when time constraints are not a major consideration. These methods can be performed under a contract with a firm often specializing in this type of work. Material recovery, reuse, and recycling also lends itself to the use of innovative approaches such as the use of an open auction or sealed bidding process that sells the excess buildings. This method of removal is frequently followed by the use of a supplemental demolition contract to remove and dispose of the remaining non--recycled components. These auctions and sales generate interest from private individuals, small business entrepreneurs, and specialty firms looking to harvest quantities of usable building materials for their own use.

(d) Another innovative approach that can be used for diverting high levels of material from the landfill includes active partnering with non-profit organizations that provide low-cost/no-cost deconstruction and salvage services to further their charitable purposes. Besides generating revenue from the value of the materials reclaimed and reused, there are real dollar savings from the equivalent amount of waste that does not have to be hauled away and landfilled.

(e) The use of on-site mobile concrete and masonry crushing operations can not only reduce waste transportation and disposal requirements but also provide a significant cost avoidance of future requirements by not purchasing new aggregate for construction and/or installation training requirements if required in economical quantities and are at appropriate locations.

2) Unified Facilities Criteria (UFC 1-900-01), "*Selection of Methods for the Reduction, Reuse, and Recycling of Demolition Waste*" provides guidance for recovering and recycling building demolition wastes, by assisting in the process to determine the most feasible methods to reduce the amount of C&D waste that finally is disposed of in a landfill. This UFC is available at the following UFC website: http://65.204.17.188/report/doc_ufc.html

Guided by the UFC, installation planning personnel shall develop a decision matrix, specific to each project situation, which explores as many alternatives as required, using conventional demolition methods as the benchmark for comparison purposes. Many factors and constraints are considered in the matrix, such as type of construction, time constraints from a follow-on MCA project, contracting mechanisms, availability or lack of recycling markets, as well as costs.

3) Precautions must be taken if hazardous materials (e.g., asbestos, lead based paint, or polyaromatic hydrocarbons (PAHs from parquet floor glues), PCBs, mercury-containing material, ozone-depleting substances, Underground and Aboveground Storage Tanks, petroleum contaminated soil) are suspected to be present. Prior to

undertaking any demolition activities, consult experts in the containment, removal and disposal of these kinds of materials. In addition, consider inclusion of the requirements for testing of materials in the new construction contract specifications, to assure that they will not be hazardous for recycling or reuse purposes.

4) An Army-owned on-site landfill may be used by a construction or demolition contractor for disposal of materials generated under a contract, contingent on the lack of alternative disposal sites within a reasonable (say, 50-100 miles) driving distance, and the payment of a fee, which is equivalent to the tipping fee prevailing in the area or the actual full life-cycle cost of disposal on-site, whichever is less. The full cost for using the installation landfill must be included in the comparison for all alternatives in order to determine which is most cost effective. The installation, at its discretion, may offer to charge the contractor lower disposal fees for attaining higher diversion rates, above the 50 percent minimum.

7. Integrated Solid Waste Management Plan:

a. Installations shall update their Integrated Solid Waste Management Plan (ISWMP) to incorporate C&D waste management principles and requirements. Updates should be completed within 180 days for ISWMP's that have not been updated within the past 5 years and within 1 year for all others. ISWMPs will be checked by higher headquarters when making periodic on-site compliance reviews.

b. Guidance on ISWMP preparation is available from the U.S. Army Center for Health Promotion and Preventative Medicine and the U.S. Army Engineering and Support Center, Huntsville. USACHPPM guide, TG-197, for preparing ISWMPs is at: http://chppm-www.apgea.army.mil/documents/TG/TECHGUID/TG197.pdf. The Corps of Engineers TECHINFO website maintained by the U.S. Army Engineering & Support Center, Huntsville, Alabama is also a source of solid waste and recycling technical guidance. In addition to published Public Works Technical Bulletins, the TECHINFO site has an electronic template for tailoring an ISWMP for a specific installation: http://www.hnd.usace.army.mil/techinfo/CPW/pwtb.htm.

8. Other Considerations

a. MCA project cost estimates should include the cost and schedule impacts on the DD 1391 for removal of buildings, structures and underground utilities within the "footprint" of the new facility and for non-footprint 1 for 1 structures, whether by traditional demolition methods or through material recovery, reuse, and recycle of building materials. Consideration must be given to any impacts on initial cost or schedule that would not ordinarily occur with traditional demolition scenario, but would result in an overall net savings or benefit to the Government, even if outside the MCA contract. Addressing these issues early in the project development cycle should enable

the installation and supporting USACE District to accommodate cost and schedule impacts without adverse effect on the project's execution. Any initial cost to be supported by the construction contract price must be included in the DD 1391.

b. As part of the garrison's oversight responsibilities for all facilities projects on the installation, including those funded by private parties, such as RCI, and separately-funded tenant organizations, the installation planning, engineering, solid waste/recycling and environmental staffs must ensure that C&D waste management issues are addressed. For example, installations should work to have the RCI Community Development Master Plan include requirements equivalent to those in this policy, whenever possible.

c. DoD 4160.21-M, Defense Material Disposition Manual. Screening for reutilization of excess or surplus property should be completed prior to reclamation or disposal through C&D activities.

d. Prior to waste disposal on an installation owned and operated landfill, C&D debris should be reduced in volume where economically possible in order to help preserve landfill capacity. Contracting for the service or partnering with another installation may be more economical than purchasing and operating the equipment outright.

e. Schedule Considerations

1) Diversion activities can usually be performed with no adverse schedule impact if they are addressed during project development, i.e. during the planning, design, and contract document development. In this way, the Government is able to incorporate C&D waste diversion activities into the overall project completion objectives with minimal impact on scheduling and unexpected costs. Bidders and offerors can then incorporate salvage and recycling activities when developing their demolition and construction schedules.

2) In isolated cases, the project delivery schedule or construction schedule may constrain or even rule out salvage, recycling, and diversion activities on the demolition or construction site. Externally imposed project completion requirements such as a late addition to the MILCON program, or a previously established Beneficial Occupancy Date for a new Unit of Action may be such examples. Timely completion of the mission-critical project shall take precedence over meeting the minimum diversion criteria of this policy where missing the Beneficial Occupancy Date is directly attributable to debris diversion activities. In these cases, it is incumbent on the contracting agency to attain the highest diversion rate the project schedule will allow.

3) Wood frame buildings have been removed from the footprint volumetrically and in panels or sections, and have even been "felled" (controlled collapse) to reduce the time necessary to clear the site. On-site materials segregation, off-site materials segregation, scrap utilization and waste reduction programs, packing and packaging reduction, and disposing of debris at C&D recycling facilities are options that can achieve diversion requirements without prolonging demolition activities. Apply the C&D Waste Management Plan to ensure that contractor has evaluated all diversion options when developing the Plan, and is making a good-faith effort to achieve the highest diversion rate practical within the project schedule.

f. Budget Considerations

1) Army experience shows that significant debris diversion can be accomplished within the established budgets. However, low cost cannot be guaranteed in all cases. Cost variables include the types and scope of facilities being removed, hauling costs and tipping fees, labor rates, salvaged materials' condition and markets, and other local factors.

2) There may be cases where the effort and cost to salvage materials for reuse or recycling may exceed the savings associated with diversion. Preserving the ability to award a contract without compromising project scope shall take precedence over meeting this Policy Memorandum's diversion criteria where the cost of achieving the minimum diversion rate is significantly greater than the cost of conventional demolition and landfilling, and the risk of exceeding the available contract amount can be attributed to the difference in cost between conventional demolition, and achieving the minimum diversion rate. Note that the cost of diversion includes the initial cost, offset by salvaged and recycled materials' value, cost savings from reduced hauling and tipping fees, cost avoidance by using recycled materials in lieu of purchasing new materials, and life cycle landfill savings if the installation has an on-post C&D landfill. In these cases, it is incumbent on the contracting agency to ensure the highest diversion rate the project budget will allow. Apply the C&D Waste Management Plan to ensure that the contractor has evaluated all diversion options when developing the Plan, and is making a good-faith effort to achieve the highest diversion rate practical within the project budget.

g. The means and the methods to combine techniques of traditional demolition and disposal versus material reduction, reuse, and recycling rests solely with the garrison. Decision-makers should, however, carefully consider all the pertinent factors that would affect successful project completion and attainment of Army waste policy diversion goals.

h. Networking with the other Services, local communities, and non-profit / charitable groups may help identify resources that may wish to purchase or otherwise obtain installation C&D wastes. Local and/or regional advertising may help determine the

marketability of excess materials. Any contracts or agreements governing the sale/transfer of these materials must be legally reviewed. Depending on the approach chosen, such parties may be able to purchase buildings through auction or bid, contract for deconstruction services, or subcontract with a conventional demolition contractor to salvage materials. State and county departments of natural resources (or similar agencies) should be consulted to identify any directories, exchanges or referral services for recycling and salvage firms they may maintain. UFC 1-900-1 provides a compendium of resources for building materials salvage, recycling, reuse, and deconstruction.

i. There are many organizations throughout the United States that may provide resources needed for cost effective deconstruction, salvage, recycling, and reuse or resale of building materials. The following are examples of the types of resources available to Army personnel. This list is not intended to be comprehensive. Other organizations and resources are available as well.

1) The US Department of Agriculture Forest Products Laboratory, in partnership with the University of Florida Center for Construction and the Environment, has published a Directory of Wood Framed Building Deconstruction and Reused Building Materials Companies *(http://www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf)*

2) USEPA maintains a recycling commodities exchange through their Jobs Through Recycling programs. *(http://www.epa.gov/epaoswer/non-hw/recycle/jtr/comm/exchstat.htm and http://www.epa.gov/jtr/jtrnet/brokers.htm)*

3) State and local Environmental Protection Agencies, or Departments of Natural Resources, Solid Waste Management or Pollution Prevention divisions or directorates frequently maintain recycled materials directories, materials exchanges, advisory services, and other forms of supports that installations can consult to support C&D materials' diversion. Some selected examples of these services include:

- California Integrated Waste Management Board, California Materials Exchange Network *(http://www.ciwmb.ca.gov/CalMAX/)*
- State of Georgia Pollution Prevention Assistance Division *(http://www.p2ad.org/)*
- King County WA Construction Recycling Directory *(http://www.metrokc.gov/dnrp/swd/construction-recycling/documents/cdlguide.pdf)*
- State of North Carolina Recycle Products Directory *(http://www.p2pays.org/DMRM/start.aspx)*

- Recycle Texas Online (http://www.tnrcc.state.tx.us/exec/sbea/rtol/index.html)
- Many Habitat for Humanity Affiliates operate used building materials stores (typically called ReStores) and deconstruction services. (http://www.habitat.org/). See http://www.habitat.org/env/restores.aspx for the ReStore directory.
- Non-profit organizations can be useful in identifying services and outlets for salvaged and recycled materials. These include, but are not limited to:
- Pollution Prevention Resource Exchange (http://www.p2rx.org/aboutUs/aboutP2Rx.cfm)
- WasteCap, located in several states (example: http://www.wastecapwi.org/)
- Reuse Development Organization REDO (http://www.redo.org/FindReuse.html)
- GreenGoat (http://greengoat.org/whatwedo.html)

Table 2 - C&D Diversion Data Elements

CONSTRUCTION / DEMOLITION SWARWeb PICKLIST		
MAJOR CATEGORY	SUB-CATEGORY	DEFINITION
Wood		
	Structural	TBD
	Finished	TBD
	Treated	TBD
	Other (C/D Wood)	TBD
Metal		
	Steel	TBD
	Copper	TBD
	Aluminum	TBD
	Mixed Metal	TBD
	Other (C/D Metal)	TBD
Masonry/Asphalt/Concrete/Stone		
	Asphalt	TBD
	Brick	TBD
	Concrete	TBD

	Concrete Block Unit	TBD
	Stone	TBD
	Other (C/D Masonry/Asphalt)	TBD
Land Clearing Debris		
	Top Soil	TBD
	Sub Soil	TBD
	Petroleum-Contaminated Soil	TBD
	Non-Hazardous Lead-Contaminated Soil	TBD
	Vegetation/Timber (tree trunks & limbs)	TBD
	Crushed Stone/Base	TBD
	Other (C/D Land Clearing)	TBD
Other		
	Siding	TBD
	Composition Roof	TBD
	Insulation	TBD
	Doors/Windows/Stairs/Cabinets	TBD
	Ceiling Tile	TBD
	Gypsum/Plaster	TBD
	Plastic	TBD
	Glass	TBD
	Paper	TBD
	Other (C/D Other)	TBD
Additional Information		
Project Number		
Building Number(s)		
Reuse (Installation)		
Reuse (Off-Site)		
Recycle (Installation)		
Recycle (Off-Site)		
Bury (Installation)		
Bury (Off-Site)		
Dispose (Installation)		
Dispose (Off-Site)		
Other		