Facilities Reduction Program
Best Practices Toolbox

UNITED STATED ARMY CORPS OF ENGINEERS

FACILITIES REDUCTION PROGRAM

Best Practices Toolbox

(Library Document)

FRP Guide to Best Practices

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FRP GLOSSARY OF TERMS, ABBREVIATIONS, AND ACRONYMS	
ITEM	**DEFINITION**
ACM	Asbestos-Containing Material. Asbestos-containing building materials (ACM) are one of the most commonly recognized materials requiring removal prior to demolition. ACMs are found in construction materials such as thermal system insulation, mastic, floor tile, ceiling tile, siding, transit board and roofing products
Abatement	In general terms, abatement is the intent to permanently eliminate associated hazards. Demolition and construction (including renovation) activities often consider LBP and ACM abatement. While LBP is generally never required for demolition, the requirements are often misunderstood (refer to LBP). Refer to ACM, LBP, or other applicable regulations for official definitions.
ACSIM	Office of Assistant Chief of Staff for Installation Management. The ACSIM mission is defined as: "Provide policy guidance and program management on all matters relating to overall management and resourcing of Army installations worldwide. Ensure the availability of efficient, effective base services and facilities." For more information, visit the ACSIM Home page.
Advanced Estimate	"Advanced Estimate" refers to the specific estimating tool located in the FRP Best Practices Toolbox. The "Advanced Estimate" is recommended for use by Installations to complete a Budgetary Estimate for FRP funding purposes. For more information, visit the FRP Best Practices Toolbox Advanced Estimate.
Army Diversion Policy	"Army Diversion Policy" refers to the policy set forth by the Army's Installation Management Authority (IMA) requiring at least 50% diversion of construction and demolition debris per project. Fore more information, view the Army Diversion Policy document.
Asbestos	"Asbestos" is a mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. EPA has banned or severely restricted its use in manufacturing and construction. Materials that contain asbestos are collectively referred to as ACM.
AST	Above-Ground Storage Tank. Refer to the EPA above ground storage tank program for additional details.

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Backfill	Backfill is any type of approved earth and/or inorganic material, including crushed concrete and masonry products, that are used to fill basements and/or excavations made to remove foundations and to achieve final grading requirements.
Budgetary Estimate	"Budgetary Estimate" refers to an estimate that has an acceptable range of variance and is used for general planning purposes. The best way to obtain a budgetary estimate for a FRP removal project is via the FRP Best Practices Toolbox.
C&D Waste (Debris)	Construction and Demolition Debris. Materials generated as a result of construction, renovation, demolition and/or removal projects.
CAAA	Clean Air Act Amendments of 1990. Visit the EPA CAA site for more details.
CATCD	DA Real Property Category Codes as defined by DA PAM 415-28.
CEHNC	Corps of Engineers, Huntsville Center. For more information, visit Huntsville Center's site.
CFR	Code of Federal Regulations. For more information about the Code of Regulations, visit the GPO Access site.
CMU	Concrete Masonry Unit. Commonly referred to as cinder blocks and/or concrete blocks, CMU construction is typically grouted where hollow CMU foundation stem walls and exterior load bearing walls are often filled with concrete reinforced with steel reinforcement bars (REBAR).
Construction	Engineering projects that involve construction, renovation, and/or repair activities.
CONUS	Continental United States
Crushing	"Crushing" refers to a process where masonry, asphalt, concrete. and/or stone material is fed through an impact or jaw crushing machine that crushes the material into much smaller pieces, which can then be re-used as aggregate or backfill material.

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Cultural Assessment	A "Cultural Assessment" provides a conclusion to an analysis of potential impacts to and steps required to protect known and potential cultural resources during facility removal activities.
CWA	Clean Water Act. The Federal Water Pollution Control Act Amendments of 1972, and later amended in 1977, is commonly referred to as the CWA. For more information about the Clean Water Act, visit the EPA web site.
Davis-Bacon Act	"Davis-Bacon Act" refers to the congressional act that established the federal guidelines for wages to be paid to various classes of laborers and mechanics employed under federal contract. For more information about the Davis-Bacon Act, visit the Department of Labor web site.
DECAM	Directorate of Environmental Compliance and Management
Deconstruction	"Deconstruction" is the planned and controlled disassembly of a building 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."
Demolition	"Demolition" is 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 rubble or debris. Demolition usually provides the quickest method of removing a facility and segregates the debris or rubble into various components for recycling wherever practicable.
Disposal	The act of landfilling or incineration of C&D waste.
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.
Dust Minimization	This is a standard process employed during demolition and handling of demolition debris whereby dust is minimized by two primary methods: (1) Selection of means and methods for doing the demolition that reduce the creation of dust particles and/or (2) Use of water to wet the demolition materials and suppress dusting.

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Endangered Species Assessment	An "Endangered Species Assessment" provides a conclusion to an analysis of potential impacts to and steps required to protect known and potential Endangered Species during facility removal activities.
Engineering Survey	Prior to demolition, OSHA Standard 1926.850(a) requires that an engineering survey of the structure must be conducted by a competent person. The purpose of this survey is to determine the condition of the framing, floors, and walls so that measures can be taken, if necessary, to prevent the premature collapse of any portion of the structure. Additionally, the Engineering Survey should also include inspection and verification of all potential hazards including contamination, insurance that utilities have been removed and/or terminated and that the work site security protects public safety.
Environmental Assessment	In accordance with the National Environmental Policy Act of 1969 (NEPA), a determination must be made as to whether or not a construction or demolition project will have "significant" impacts on the environment. A Record of Environmental Consideration is the minimum requirement, which may identify concerns requiring an Environmental Assessment.
EPA	Environmental Protection Agency. For more information, visit the EPA web site.
Facility Relocation	This term is used to identify means and methods that result in the complete relocation of a facility (i.e. house moving) that is an acceptable means of waste stream diversion to meet Army objectives.
FFP	Firm Fixed Price – used to describe a method of project contracting
FRP	United States Army Facility Reduction Program
Grading	Manipulation of a section of terrain to match existing topographic features, slope for adequate drainage, or other landscape requirements.
Grinding	Grinding is a technique used to support diversion where building materials are ground for alternative use. Common items typically include wood and gypsum that are ground to produce beneficial mulch, soil stabilization materials, soil amendments, etc.
Hazardous Waste	Hazardous Waste is a waste material that generally meets RCRA requirements and conditions as a listed waste (predefined

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	categories) or characteristic waste (exhibits certain characteristics). Characteristic wastes must exhibit characteristics associated with corrosivity, reactivity, ignitability, or toxicity. For a more detailed definition, visit EPA Hazardous Waste Information.categories) waste or characteristic (exhibits certain characteristics) waste. Characteristic wastes must exhibit characteristics associated with corrosivity, reactivity, ignitability, or toxicity. For a more detailed definition, visit EPA Hazardous Waste Information.
HAZMAT	Hazardous Materials - any solid, liquid, or gas that can harm people, other living organisms, property, or the environment. A hazardous material may be radioactive, flammable, explosive, toxic, corrosive, biohazardous, an oxidizer, an asphyxiant, an allergen, or may have other characteristics that make it hazardous in specific circumstances.
Historical Assessment	Historical Assessment refers to requirements to preserve historical resources per AR 200-4 Cultural Resources Management.
HQEIS	Headquarters Executive Information System. An ACSIM database for reporting real property data from installation IFS data. To obtain Real Property Inventory (RPI) data, logon to the HQEIS.
HUD	U.S. Department of Housing and Urban Development. For more information, visit the HUD web site.
IFS	Integrated Facilities System. IFS is an automated information evaluation system maintained at the installation level that encompasses the life cycle management of RPI resources. It is the only official source of real property information. IFS supports the business functions of RPI management and reporting, work request receipt and tracking, work/cost estimating, supply management, job cost accounting, contracted project development/management and credit card management.
IGE	Independent Government Estimate
IMA	U.S. Army Installation Management Agency. For more information, visit the IMA web site.
ISR	Installation Status Report. A database that provides an analytical process comparing and contrasting facility conditions on the installation by collecting and processing real property data against Army-wide standards (Infrastructure, Environment, and Services). The ISR, in turn provides data to be used in

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	management and decision support systems to rate the readiness of Army installations to meet their BASOPS support requirements. The ISR is the commander's annual report, developed, reviewed, and approved at installation-level and in turn forwarded to higher headquarters.
LBP	Lead Based Paint. Per AR 420-70, Where not otherwise specifically required by Federal, state, or local laws, the Army, recognizing that lead-based paint is not the only source of lead exposure, uses the more inclusive terms "lead-contaminated paint," "lead hazard management," and "lead hazard" instead of "lead-based paint," "lead-based paint management," and "lead-based paint hazard."
Lead Hazard Management	Refer to AR 420-70 Section 3 for additional information.
Lead-Based Paint	Refer to LBP
McKinney Act	United States Department of Housing and Urban Development McKinney-vento Act.
Mechanical Wrecking	A demolition term that refers to the use of heavy equipment to wreck buildings/structures and handle the demolition materials.
MFUS	Modified Facility Utilization Study. An effort conducted by CEHNC to evaluate the quality of RPI data at the installation level as reported through HQEIS.
MILCON	U.S. Department of Army Military Construction Program.
NAF	U.S. Department of Army Non-Appropriated Funding Construction Program.
NEPA	National Environmental Policy Act. For more information, visit the NEPA section of the EPA web site.
NESHAP	National Emissions Standards for Hazardous Air Pollutants. For more information about NESHAP, visit NESHAP FAQ's on the EPA web site.
NTP	Notice to Proceed
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration. For more information, visit the OSHA web site.

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ITEM	**DEFINITION**
POC	Point of Contact
POL	Petroleum, Oils, and Lubricants
PPE	Personal Protective Equipment
RCRA	"RCRA" is an acronym for the Resource Conservation and Recovery Act. For more information about this act, visit the EPA web site.
REC	A Record of Environmental Consideration (REC) is a signed statement submitted with project documentation that briefly documents that an Army action has received environmental review. RECs are prepared for CXs that require them, and for actions covered by existing or previous NEPA documentation.
Recyclable Material	Materials that can be reused by others or remanufactured into new products.
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.
Relocation	See to "Facility Relocation"
RPAO	Real Property Accountable Officer
RPI	Real Property Inventory. The Army Real Property Inventory (RPI) is the "Official" data base or record for on-hand real property assets. It is maintained at the installation level by facility level of detail and is known as the on-hand inventory. Visit the ACSIM RPI site for additional information.
RPLANS	Real Property Planning and Analysis Tool. RPLAN is an integrated and automated master planning tool that provides planners with the capability to calculate facility mission space requirements and allowances, and compare (shortfall and excess) them to available real property assets.
Solid Waste	Solid waste has various technical definitions depending on the subject and focus. However, the RCRA definition is commonly accepted as the standard when dealing with regulatory compliance issues and is defined as "Any discarded material that is not excluded by section 261.4(a) or that is not excluded by variance granted under sections 260.30 and 260.31 (40 CFR 261.2).

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SOW	Statement of Work (sometimes Scope of Work). SOW is generally a description of services to be rendered under contractual agreements.
SSHASP	Site Specific Health and Safety Plan. Development of an SSHASP Plan is generally required for demolition and construction activities. For more detailed requirements of OSHA SSHASP requirements, refer to 29CFR1910
T&M	Time and Materials. This is a common method of contracting.
TCLP	Toxicity Characteristic Leaching Procedure. This is a particular test method that is commonly used to determine if a waste is hazardous as defined by RCRA.
Tipping Fee	Cost of disposal at a landfill. This is also referred to as Disposal Cost and is typically measured in $/tons or $/cubic yard.
TSCA	Toxic Substances Control Act. For more information about this act, visit the TSCA portion of EPA web site.
USACE	United States Army Corps of Engineers. For more information, visit the USACE web site.
USDA	United States Department of Agriculture. For more information, visit the USDA web site.
UST	Underground Storage Tank. A tank and any underground piping connected to the tank that has at least 10 percent of its combined volume underground. The federal UST regulations apply only to underground tanks and piping storing either petroleum or certain hazardous substances. Visit the EPA UST Overview page for more information.

HELPFUL FRP-RELATED PUBLICATIONS			
Publication No.	**Title**	**Type of Link**	
32 CFR 650	Army Solid Waste Management		PDF
AR 11-27	The Army Energy Program	HTML	PDF
AR 58-1	Management, Acquisition and Use of Motor Vehicles	HTML	PDF
AR 200-1	Environmental Protection and Enhancement		PDF
AR 210-20	Real Property Master Planning For Army Installations	HTML	PDF
AR 210-50	Housing Management	HTML	PDF
AR 385-10	Army Safety Program		PDF
AR 415-15	Army Military Construction Program Development and Execution	HTML	PDF
AR 415-19	Non-appropriated-Funded Construction Project Development and Approval	HTML	PDF
AR 420-10	Management of Installation Directorate of Public Works	HTML	PDF
AR 420-18	Facilities Engineering Materials, Equipment, and Relocatable Building Management	HTML	PDF
AR 420-49	Utilities	HTML	PDF
AR 420-70	Facilities Engineering Buildings and Structures	HTML	PDF
AR 420-72	Transportation Infrastructure and Dams	HTML	PDF
AR 420-90	Fire and Emergency Services	HTML	PDF
DA EM 385-1-1	Safety and Health Requirements	HTML	

HELPFUL FRP-RELATED PUBLICATIONS			
Publication No.	**Title**	**Type of Link**	
DA PAM 415-28	Guide to Army Real Property Category Codes		PDF
DA PAM 405-45	Real Property Inventory Management		PDF
DA PAM 420-11	Project Definition and Work Classification		PDF
DA PAM 200-4	Coordination of WWII Facilities		PDF
OSHA 29 CFR 1910	Occupational Safety and Health Standards	HTML	
OSHA 29 CFR 1926	Safety and Health Regulations for Construction	HTML	
OSHA 29 CFR 1960	Basic Program Elements for Federal Employee Occupational Safety and Health Programs and Related Matters	HTML	
PWTB 420-49-30	Alternatives to Demolition for Facility Reduction		PDF
PWTB 200-1-17	Recycling Interior Finish Materials		PDF
PWTB 420-49-12	Army Recycling Lessons Learned		PDF
PWTB 420-49-18	Direct Sale of Recyclables		PDF
PWTB 420-49-32	Reduction, Reuse, and Recycling of Demolition Waste		PDF
UFC 201-900-01	Select Methods, Reuse, Reduce, Recycle		PDF

INTRODUCTION

The purpose of this FRP Guide is to provide a better and more standardized understanding of the entire Facility Reduction process in order to reduce project costs, encourage more environmentally friendly means and methods, and achieve more successful projects. This Guide represents the collective thoughts, inputs, and recommendations of U.S. Army facility reduction managers at all levels, as well as the top professional contractors in the industry. Throughout this guide there are references to FRP processes, means, methods, techniques, and considerations that have been gleaned from many lessons learned. After reviewing and understanding the concepts and processes in this Guide, the FRP project manager should have a better idea of the FRP Best Practices that are essential to making more informed project decisions. Please keep in mind that this Guide is designed to provide a basic level of knowledge only and readers are encourage to pursue the more in-depth information located in the FRP Best Practices Toolbox Library or other resources.

This Guide is a living document and will change as new processes, procedures, and best practices evolve. Everyone, including personnel at the installation level, is encouraged to submit their comments, thoughts, questions, and ideas regarding FRP to CEHNC FRP Management (contacts provided in Toolbox), Toolbox feedback mechanism, or via email at FRP@hnd01.usace.army.mil .

1.0 FACILITY REMOVAL BASICS

1.1 Introduction to Facility Removal

There are multiple ways to successfully remove a building. The three most common options are:

- Demolition
- Deconstruction
- Relocation

Demolition is by far the most typical method of facility removal. Demolition can be accomplished in many different ways, but is usually dictated by the structural design of the building as well as the materials used in construction. There are several levels and techniques involved with demolition as presented in the Demolition Basics section. In summary, "Demolition" encompasses the removal of buildings and structures in the most cost effective manner while, at the same time, diverting as large a quantity of materials to the recyclers as economically feasible.

In some cases, the structural elements of a building may possess a residual salvage value. In many such cases, Deconstruction can often be an effective approach to remove the building to carefully remove the valuable components for reuse or recycle. Because of the meticulous labor involved in Deconstruction, it is not typically the most cost-effective means of facility removal.

With smaller buildings, like guard huts or even housing, Relocation is sometimes a viable means for removal. This method is achieved by simply moving the building, as a whole, to another location. This method of facility removal is typically the least common successful technique due to the labor and equipment often required for preparation, transport, and setup.

The means and methods typically associated with each of these removal techniques are discussed in more detail in Section 3.0: Execution.

1.2 Demolition Basics

1.2.1 Historical Perspective of Demolition

The concept of demolition has been around for thousands of years since ancient structures were dismantled to build other structures. Currently, in the USA, the demolition industry generates about $3.5 billion in annual revenues.

The demolition industry has changed dramatically in the past 50 years. Historically, most buildings were demolished by workers using hand tools, which allowed for salvage of most of the building's materials for resale. However in the post World War II era, demolition contractors moved from a labor intensive process to an equipment oriented

process, mainly due to the increasing cost of labor and technological advances in construction machinery.

In the commercial sector, explosives are used under certain conditions and only play an important part in about 1% of the total demolition work done. However, these projects often receive the greatest amount of recognition and publicity. Similar to the commercial sector, the use of explosives on U.S. Army installations is rare, but does prove feasible on occasion for particular projects.

Almost all wood buildings demolished today are brought down and prepared for hauling by using a large excavator equipped by a bucket and 'thumb' mechanism that literally chews the building apart and loads the materials into trucks for disposal at a landfill.

Concrete and steel structures are demolished using a variety of methods including cranes with 'wrecking balls' and large excavators equipped with hydraulic attachments such as shears, concrete processors and the bucket and thumb.

When cost and time are important factors, equipment demolition is the method of choice. If the building materials are of saleable quality and the contractor can make money by salvaging them, salvage will be implemented. It is desirable both as an environmental concern and as a practical matter to divert as great a quantity of demolition materials as possible away from landfills and recycle them. Recent regulations have required demolition diversion to the maximum extent "practicable," but this leaves much room for interpretation. The principle items commonly recycled are concrete, asphalt, masonry materials, steel and other metals, and solid large dimension lumber. Useable mechanical and electrical equipment is often profitable for salvage.

1.2.2 The Demolition Contractor

Today's successful demolition contractor has built a business by executing projects in the most efficient manner possible. Some buildings, or portions of buildings, can be economically salvaged using the old "Hand Wrecking" methods while others have little or no salvage value. The successful demolition contractor will, as part of normal work activities, salvage as much saleable materials as can be efficiently removed and sold. By maximizing salvage/recycle, it allows today's contractor to achieve success in an increasingly competitive environment.

1.2.3 Demolition Categories and Techniques

In general, demolition work includes such activities as:

- Demolition and removal of entire structures;
- Demolition and removal of building interiors for renovations;
- Selective demolition to preserve historical building components;
- Selective demolition to remove portions of buildings; and

- Disaster clean-up activities as the result of fire, floods, earthquakes and hurricanes.

The demolition project may encompass different types of building and ancillary structures such as sidewalks, driveways, parking lots, and may even require different types of equipment for effective execution. Common demolition projects encountered on an Army installation may likely include:

a. Site Demolition

Site demolition may include a wide variety of miscellaneous demolition such as sidewalks, out buildings and paving. This work is usually scheduled to be done when convenient – either before or after the primary demolition.

b. Demolition of Low-Rise Buildings

This category of buildings is the most common in the Army inventory of buildings to be removed. Typically, these structures are three stories or less. Most are single story structures. A hydraulic excavator equipped with a variety of attachments is typically the method of choice for most low-rise demolition. Front end loaders are also used. It is common practice to wreck low-rise buildings at a rate of at least 5,000 SF per day and rates of 10,000 – 15,000 SF per day can be achieved for larger low-rise buildings such as warehouses. The demolition operation relative to removal of low-rise buildings is generally a straight-forward process. Many demolition contractors have the ability to efficiently perform such work.

c. Demolition of Large, and/or High-Rise Buildings and Structures

Buildings and structures over three stories are usually demolished by one of the following methods:

- *Hi-reach excavators*. These are large excavators, usually in the 100,000 lb. weight class and larger, and have special extensions which allow them to effectively demolish buildings up to approximately 120 feet high. They are usually equipped with hydraulic concrete breakers or shears.

- *Cranes*. Cranes were the industry standard for demolishing high-rise structures from the 1950's until recently. The crane and wrecking ball have been the symbol of the demolition industry for the last half of the 20th century. Cranes still play an important part in the demolition industry since they are able to access greater heights than the high-reach excavators. Also, cranes are the primary means of dismantling high-rise structures such as missile launchers and industrial towers.

- *Implosion*. This is a term used to describe explosive demolition of high-rise structures. The basic mechanism of implosion is to design and place special types of explosive charges into and around building columns. The charges are

then electronically fired in close sequence so that the exact direction of collapse and fall is controlled by gravity. Although the Army does not have a large number of structures that are higher than four stories, the buildings and structures in this category can present significant challenges from both an environmental and demolition perspective. Typically, these buildings require significant communication and coordination with the FRP management team for cost-effective removal.

- *Floor-By-Floor* – The demolition of high-rise buildings that cannot be imploded because of their location are wrecked using the 'Floor-By-Floor' method. Using small equipment and hand labor, the buildings are demolished from the roof down to a level that can be reached by either cranes or excavators. Demolished materials are dropped through chutes or lowered to the load out level at either ground level or a lower level floor. Since the Army has very few structures in this category, this method will seldom be used.

d. Foundation Demolition

If new construction requiring new foundations is likely to occur on the site, the existing foundation should be completely removed. Otherwise, it is common practice to remove foundations to three (3) feet below adjacent grades. Slabs on grade below minus three should be sufficiently fractured to permit movement of ground water. The excavator with a hydraulic hammer (similar in operation to a large jackhammer), is usually used to break up foundations for removal. A crane and wrecking ball can also be used to accomplish this task.

e. Selective Demolition

Selective Demolition consists of removing portions of buildings either, interior or exterior, while protecting that portion of the structure that is to remain. Since many buildings are remodeled for a variety of reasons, selective demolition has become a significant part of the industry and can be relatively expensive. A number of specialized tools have been developed for this type of work and include skid steer loaders in the 2,000 to 5,000lb weight range; scissors lifts; small man lifts; robotic excavators with a variety of demolition attachments such as shears, grapples and breakers; pavement breakers; jackhammers; hydraulic concrete splitters; and expansive cements for cracking concrete. For worker access, scaffolding and swing stages and material hoists are commonly used.

f. Demolition Material Handling

There are many processes for handling demolition materials, however the most common are:

- *Waste Stream Separation*. This activity is the separation of demolished materials either as it is being wrecked or before it is either recycled on site or hauled off-site. An excavator, equipped with a bucket and thumb, and small

loaders with grapple buckets are commonly used to separate the various materials, i.e. metals, concrete, brick, wood, roofing, insulation and miscellaneous materials into stockpiles. For concrete demolition, the majority of the reinforcing steel is separated from the concrete in this operation.

- *Material Sizing*. Landfill materials need to be ground up to allow for easier loading and more compact loads. Large pieces of concrete often need to be broken into sizes that are acceptable for crushing. Metal materials, particularly steel beams and reinforcing bars, need to be cut into sizes acceptable by the metal recyclers.

- *Crushing*. Concrete recycling is accomplished by crushing the material either in an impact or a jaw crusher and is becoming a standard practice in the demolition industry. This method turns the broken concrete from buildings into a useful product that can replace imported fill material and be used as a base material for new construction, roads and a variety of other uses. For more information regarding concrete crushing, review "Concrete C&D Debris Diversion Policies, Best Practices, and Considerations."

- *Loading*. Loading is usually done with an excavator equipped with a bucket and "thumb" attachment that is able to grab and hold the material as it is being loaded. Loaders are also used. When performing selective demolition, drop chutes are often used.

- *Transportation*. Dump trucks are the primary method for removing demolition materials from the site. Occasionally, rail cars are used, particularly with large waste streams of recyclable steel. Drop boxes are also extensively used to remove demolition materials from the site. They are especially adaptable for use in downtown urban areas and for smaller amounts of material, as would be generated via the selective demolition process.

1.2.4 Demolition Equipment

A wide variety of equipment can be used for demolition of a facility. Some of the more basic and widely used equipment and its function will be described in this section. Having a basic knowledge of the equipment available and its common application may help evaluate a contractor's work plan, bid schedule, or other project element.

a. Wrecking/Deconstruction Equipment

Historically, a crane and wrecking ball was commonly a central tool for "smashing" a building to pieces small enough for hauling to the "trash" or solid waste handling facility. This approach is often referred to as smash-and-trash demolition and has perhaps tainted the modern perspective of the demolition industry from an environmental perspective. As society has become more aware of and sensitive to environmental issues that future generations may face, an attitude shift towards a more "responsible" method of handling waste and debris

has evolved in the U.S. today. Perhaps even more importantly, economics have driven today's demolition contractor to salvage materials in order to maintain a competitive edge in the current marketplace.

The smash-and-trash wrecking ball approach has been mostly replaced with a more controlled form of wrecking through the use of excavators. Excavators, with a wide variety of hydraulic attachments for various project applications, have increased wrecking efficiency and safety. With multiple attachments that have been become available, an operator may also be able to process materials for transport while dismantling the structure. For example, an operator using a hydraulic shear can cut steel beams into widths required for transport and processing at a recycling facility. This approach can sometimes result in more efficient and cost effective project execution. In some instances, the feasibility of using excavators may be diminished due to space restrictions or the facility may be more efficiently removed through explosives or other technique. Even in some of these instances, it may be possible to first use small skid steer loaders to "gut" or remove the internal components of a building, thereby leaving a pile of concrete and steel rubble during the final stages of wrecking that can be processed for diversion.

Most major construction equipment manufacturing companies produce excavators. A large excavator with a bucket and thumb attachment is shown below.

Excavator With Thumb-and-Bucket Attachment

There are many models and varieties for execution of small to large demolition projects. The booms and attachments have been extended for high-reach

excavators to distances that just a few years ago were almost unthinkable. Attachments allow the excavator to:

- Crush, split, and pulverize concrete/masonry products;
- Cut and Shear rebar, beams, and other metals;
- Load C&D debris and recyclable materials for transport

b. Material Handling Equipment

Due to increasing market values and associated incentives for recycling and landfill diversion, it is often cost effective to control manner in which a building and its components will be dismantled and sorted for processing. During or after dismantlement, it is sometimes advantageous to have specialized equipment available for handling waste and recyclable C&D materials. In a small to medium demolition job, it may be common to demolish and load equipment with an excavator equipped with a thumb and bucket. However, for larger jobs or where a large excavator could be more effectively used at another job site, additional equipment may be utilized to reduce a contractor's operating costs. The overall trend in the demolition industry has been more recycling, less landfill disposal, and reduced relative demolition costs due to increased efficiency.

The skid-steer loader can serve many demolition needs and has become a mainstay of many demolition crews' equipment lineup. A typical skid-steer loader is show below.

Typical Skid-Steer Loader

Preliminary partial or interior demolition may be effective for certain building or structures to reduce commingling of materials. For large buildings with significant recyclable components, select interior demolition may be first executed with a small skid-steer loader to minimize material separation and sorting after dismantlement. Obviously, loading capacity of a skid-steer is much less than a large excavator. However, skid-steer loaders offer several advantages at some demolition sites including maneuverability; small footprint; low weight chassis than can traverse multi-story buildings and is easily towed; relatively low costs; and relatively high reach for loading in a roll-off waste container or truck's dump bed.

A crane or excavator with a magnetic grapple attachment can often perform the job of two separate attachments: Sorting of ferrous metals and loading of debris. This multi-functional capability can be time saving depending on the nature of the structures to be demolished.

An excavator with a "thumb" on the bucket is one of the most prevalent demolition machines used a job site for material handling. Extensive use of the excavator in demolition is due, in part, to the multitude of attachments that been developed for the demolition-based excavator. Several other variations and configurations of material handling equipment exist on the market today. Many of them can be used as a substitute for another and may or may not affect the overall project cost. In general, the types of building materials to be processed during demolition seem to have the greatest determining factor in selecting the most efficient machine. For example, a building with lots of concrete and masonry materials may warrant an on-site crushing operation which would need to be loaded perhaps after dismantlement. An excavator may be used for coarse crushing, whereas smaller, perhaps multiple loaders could be used to further process the chunks into smaller uniform materials. Since different size crushers have different feed rates, the loader or machine selected would need to be sized accordingly to maintain minimum production standards. In general, a bona fide demolition contractor will have several machines available to most efficiently manage the project.

c. Material Processing Equipment

Site demolition may include a wide variety of miscellaneous demolition related activities to increase efficiency or reduce costs including shearing, grinding, crushing, pulverizing, compacting, filling, hauling, relocating, and others. In consideration of current Army initiatives to reduce demolition C&D in landfills by 50% or more, additional consideration may need to be given to a contractor's ability to properly process debris from a removal project. One of the most overlooked opportunities for waste stream diversion often comes from all sources of concrete including continuous concrete footings, piers, stem walls, bricks, and other CMU/concrete materials that can easily be segregated. These materials are often processed efficiently off-site when local "recycling" centers are located nearby to offset the cost of hauling.

On-Site Material Processing Equipment

d. HAZMAT/Environmental Equipment

Several specialized pieces of equipment are typically necessary to execute all types of environmental remediation. Selecting a contractor with the capability to execute the demolition and environmental portion is easier to manage due to cross-liability, work flow interruption when environmental issues are discovered during demolition, and a host of other reasons. However, it is not necessarily uncommon for these activities to be segregated and subcontracted separately due to the specialized knowledge and equipment required to comply with laws and regulations. Common environmental issues that must be addressed include equipment related to HAZMAT, refrigerants, air handling, dust minimization, risk mitigation equipment such as Personal Protection Equipment (PPE), sampling equipment, and others required to achieve environmental assessment and general compliance with local, state, and federal laws.

e. Site Preparation/Restoration Equipment

Site demolition may include a wide variety of miscellaneous demolition. For this reason, it may be necessary to consider special preparation of items such as temporary removal of overhead utilities, removal and capping of site-specific utilities, landscape preservation and restoration, and many other considerations.

Such careful considerations should be provided in the submitted demolition plan by a qualified demolition contractor.

1.2.5 Demolition-Related Activities

A number of construction activities are closely associated with the demolition of buildings and structures including:

- Mechanical wrecking;
- Asbestos abatement;
- Hazardous materials removals (other than asbestos);
- Utility work;
- Excavation, backfill and grading;
- Salvage of re-useable equipment and building components; and
- Site restoration.

1.2.6 The Demolition Budget Estimate

Perhaps one of the most critical aspects of facility removal under the FRP is driven by the budgetary estimate. If the budgetary estimate does not fall within expected or normal ranges, it could result in delayed funding and execution. One of the best ways to obtain an estimate is by using the FRP Toolbox. The FRP Toolbox is a web-based application that can be accessed by anyone with an Army Knowledge Online (AKO) account. The Toolbox is located the following URL:

https://eko.usace.army.mil/frptoolbox/

Estimating will be described in greater detail in the Planning and Coordination section of this document.

1.3 Deconstruction

1.3.1 Introduction to Deconstruction

There are different interpretations of exactly what is meant by the term "Deconstruction." A recent memorandum released by the Department of Army on February 06, 2006 with a subject line of "Sustainable Management of Waste in Military Construction, Renovation, and Demolition Activities" defines 'deconstruction' as follows:

> *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."*

Deconstruction is essentially the reverse of construction. That does not mean, however, that the labor cost for deconstruction is equivalent with that of construction. Deconstruction is a process whereby building materials are carefully dismantled or removed from structures so they may be reused or recycled. Because deconstruction is a manual process that involves carefully removing materials to retain their value, more labor and longer project duration may result when compared to other techniques. However, these costs can be offset by lower equipment costs since the process relies primarily on hand tools and small machinery. Equipment rental and/or purchase costs can potentially be lower than when demolishing a structure through conventional means and methods. In addition, money earned through salvaging, reuse, or recycling can offset deconstruction costs. It should be noted that deconstruction might not always be the most cost effective method for building removal. Planners should carefully weigh deconstruction costs with the economic benefits that may be realized.

From an environmental standpoint, deconstruction reduces the burden on non-renewable resources by reusing and/or recycling materials, as well as diverting materials from space-limited landfills. Before beginning any deconstruction effort, it is important to identify outlets for reusable and recyclable materials. In some areas of the country, specialty private sector and not-for-profit organizations dealing in second-hand building materials have emerged. The by-products of deconstructing a building can result in a number of reusable materials, such as lumber, doors, cabinets, windows, bricks, HVAC equipment, bathroom stalls, and plumbing fixtures. When considering deconstruction, it is also important to remember that some building materials require special handling.

The most important part of assessing the feasibility of deconstruction is a detailed inventory of how and of what the building is constructed. In addition, it is imperative to conduct an environmental assessment in order to identify and characterize hazardous materials on site before deconstruction or demolition. Environmental issues and costs can substantially impact the decision to deconstruct or demolish.

In general, buildings exhibiting one or more of the following characteristics may be good deconstruction candidates.

- Wood-frame with heavy timbers and beams, or with unique woods such as Douglas fir, American chestnut, and old growth Southern Yellow pine.

- Constructed with high-value specialty materials, such as hard wood flooring; multi-paned windows; architectural molding; or unique doors, plumbing, or electrical fixtures.

- Constructed with high-quality brick and laid with low-strength mortar, to allow relatively easy break-up and cleaning.

- Buildings constructed mainly of concrete and/or steel may be good candidates for partial deconstruction, or the “stripping” of salvageable materials. Stripping out these materials may make recycling the concrete and steel easier as well.

1.3.2 Total Deconstruction

Total deconstruction is the careful removal of an entire building, beginning at the roof and ending with the first floor support beams. Such a procedure may be practical when there is a large amount of reusable material throughout the building. This procedure is very labor intensive and requires a maximum risk management effort.

1.3.3 Partial Deconstruction

Partial deconstruction has been and is a common procedure associated with demolition. The most easily salvageable and valuable building materials are carefully removed using both heavy equipment and hand labor. Once items have been removed that offset or exceed labor costs, the remaining non-reusable materials are disposed of as part of the demolition C&D waste stream.

1.3.4 Deconstruction Salvage Markets

There are specialized firms that buy and sell used building materials salvaged from demolition projects. Contractors and private parties are also buyers. A list of resources for cost effective deconstruction, salvage, recycling, and reuse or resale of building materials is provided in the "Sustainable Management of Waste in Military Construction, Renovation, and Demolition Activities" Enclosure Item 8(i).

1.3.5 Deconstruction Environmental Considerations

From an environmental standpoint, deconstruction reduces the burden on non-renewable resources by reusing and/or recycling materials, as well as diverting materials from space-limited landfills. Before beginning any deconstruction effort, it is important to identify outlets for reusable and recyclable materials. In some areas of the country, specialty private sector and not-for-profit organizations dealing in second-hand building materials have emerged. The by-products of deconstructing a building can result in a number of reusable materials, such as lumber, doors, cabinets, windows, bricks, HVAC equipment, bathroom stalls, and plumbing fixtures. When considering deconstruction, it is also important to remember that some building materials require special handling.

It is imperative to conduct an environmental assessment in order to identify and characterize hazardous materials on site before deconstruction or demolition. Environmental issues and costs can substantially impact the decision to deconstruct or demolish. For example, it may not be practical or environmentally safe to reuse lumber with lead-based paint, especially if it is resized. All the circumstance must be carefully evaluated for each project of this type.

1.4 Facility Relocation

In some cases, the cheapest and most efficient method of removing a facility is to move the entire structure in tact. Small buildings, such as guard shacks or storage sheds, are a prime candidate for relocation if a suitable location can be found. Housing is also, typically, a good candidate for relocation. The structures can also be sold and moved off

the installation for reuse in the community. In all instances, it is required by federal law to announce the availability structures/fixtures for utilization by homeless people/programs as required by the HUD McKinney-vento Homeless Assistance Act (McKinney Act). The McKinney Act will be covered in more detail in Section 5 of this document.

1.5 Solid Waste Disposal/Management

1.5.1 General Considerations

Traditionally, Construction and Demolition (C&D) materials were either hauled to landfills or recovered for on-site recycling. However, with the advent of modern technologies and recent governmental regulations, recycling has become mandatory for several construction and facility removal projects. A recent U.S. Army policy for "Sustainable Management of Waste in Military Construction, Renovation, and Demolition Activities" has recently established a waste management policy for diverting 50% (by weight) for construction, renovation, and demolition projects. The policy will require careful planning and coordination to achieve the 50% goals and will be discussed in greater detail in the Planning and Coordination section of this document.

There are several options for handling demolition C&D debris including:

- Landfill;
- Salvage/Recycling Facilities;
- On-site recycling of concrete;

1.5.2 Definition and Classification of Solid Waste

Waste of any kind, whether or not such material comes from a demolition project, is any material that has no value for resale.

Each local landfill operation may have its own rules for debris they will accept, even if the debris is not considered hazardous. In many cases, state and local regulations are the same as federal regulations, but some states have made addendums to the existing federal mandates. It is important to know that state and local regulations are an extension of the more broad federal mandates, and as such, are generally more stringent.

Basic requirements for a removal project that relate to solid waste management for Construction and Demolition (C&D) include:

- 32 CFR 650
- AR 420-49 (Utility Services)
- AR 200-1 (Environmental)

Solid waste resulting from a demolition project is typically referred to as C&D debris. Several government agencies have published guidelines for handling C&D debris, some of which have been included in the Toolbox Library. In addition to conventional C&D debris, some wastes may be classified as hazardous and require special handling and treatment. Since some projects may require removal of special structures that contain liquid wastes, such as petroleum, oil, and lubricants (POL) products, it will be important to work within the scope of requirements typically managed by the installation Directorate of Environmental Compliance and Management (DECAM). Environmental considerations should be addressed on a case-by-case basis in accordance with appropriate federal, state, and local laws. Hazardous wastes or other non-conventional C&D wastes should be handled in an appropriate manner.

1.5.3 Waste Disposal Fees

Disposal fees are commonly referred to as landfill "tipping" fees for conventional C&D debris. Fees for non-hazardous wastes can vary significantly in the general range from $10 to over $100 per ton. Therefore, to improve the accuracy of a budgetary estimate, it is important for the user to input the approximate fee associated with local disposal. Fees for disposal of hazardous waste can vary significantly and should be considered on a case-by-case basis.

1.5.4 Diversion, Recycling, and Reuse

Recycling and reuse of demolition and deconstruction products is a common practice where it is economically feasible, environmentally acceptable or mandated. 32 CFR 650.108 issues policy regarding "recovery and recycle" and establishes a requirement that these practices be implemented to the "maximum extent practicable." Such a requirement is very subjective in nature and leaves much room for legal interpretation. A recent Army policy has taken a more prescription approach and specifies that projects shall include performance requirements for 50% diversion, by weight, of the project C&D waste. In some cases, it may be necessary to package a set of buildings to achieve diversion success. For instance, an all-wood building, which typically has minimal divertible materials, can be packaged with a concrete structure, which typically has maximum divertible materials. Because the percentage is based on a total diversion for all buildings in the contract/project, the diversion goal can be more easily achieved.

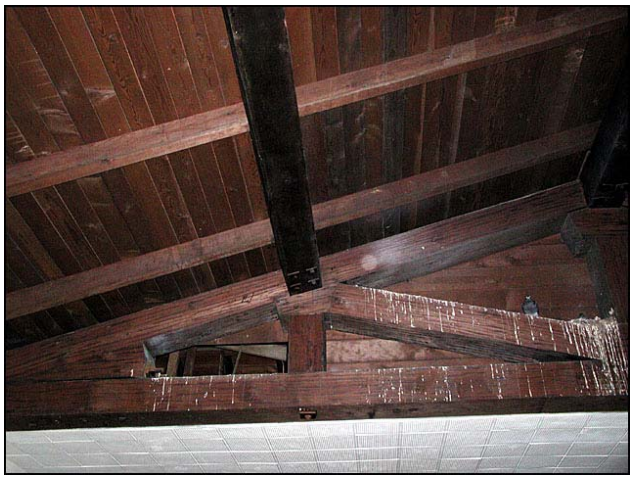
Recycling makes sense when it minimizes the use of non-renewable resources, diverts demolition waste projects from landfills or other waste streams, and provides a source of materials for agencies or non-profit groups who have few resources other than voluntary labor. Often, the economic feasibility of a reuse or recycling program depends on whether the associated added costs (such as increased time, effort, and equipment) are less than the avoided costs (such as tipping fees, surcharges, labor, hauling fees, maintenance, permit fees and taxes).

Most facilities typically contain the types of materials categorized in the following table. Many of these materials have a recyclable or reusable benefit. However, the market

varies from location to location. Items that are contaminated by some environmental hazards may be recyclable, but many are not.

POTENTIAL RECYCLABLE MATERIALS	
Category	**Material**
Wood	*Forming and Framing Lumber, Stumps, Plywood Laminates, Scraps, Railroad Timbers*
Drywall	*Sheet Rock, Gypsum, Plaster*
Metals	*Pipes, Rebar, Flashing, Steel, Aluminum, Copper, Brass, Railroad Tracks*
Plastics	*Vinyl Siding, Doors, Windows, Floor Tile, Pipes*
Roofing	*Asphalt and Wood Shingles, Slate, Tile, Roofing Felt*
Rubble	*Asphalt, Rock, Earth*
Masonry Products	*Bricks, Decorative Blocks, Ceramic Tile, Concrete Masonry Unit (CMU) blocks, Concrete footings, walls, and slabs*
Glass	*Windows, Mirrors, Lights*
Equipment	*Air Conditioners, Small Boilers, Well Pumps, Electrical Panels and Transformers*
Miscellaneous	*Architectural Features, Carpeting, Fixtures, Insulation, Ceramic Tile*

Examples of recyclable or reusable building components are depicted below.



Large Dimension Timbers

Recyclable interior roofing and trusses (LBP is absent). These materials have a relatively high market value because of the large dimension timbers present. In general,

Railroad Ties, Railroad Tracks, Gravel, and Brick

Exterior of WW II era train tracks and warehouse painted with LBP. Brick firewall dividers, railroad ties, railway, and gravel have potential for reuse/recycle.

Mobile Crushing Equipment

Concrete slabs from sidewalks and concrete blocks can be crushed and used as filler or bedding material for paved areas. Large amounts of concrete can be processed by mobile crushing equipment that is manufactured by many various companies. This type of system crushes large pieces of concrete, removing metals such as rebar using magnetic conveyors, which makes it ideal for crushing foundations, walls, slabs, and other steel reinforced concrete.

Mobile Crusher Being Fed By Excavator

In some instances, it may be practical to use grinding equipment to divert wood materials from the landfill. For example, clean scrap lumber can be processed and used for landscaping, compost, or boiler fuel. This method of diversion is most practical when large quantities of wood can easily be separated from other materials. Instances where separation of wood for grinding becomes less practical includes wall studs with gypsum attached, roof decking with asphalt shingles attached, and other instances where extensive labor would be required to isolate the wood components for feed into a grinder.

Grinding Equipment

Metals such as aluminum, copper, steel, and brass can be sold to scrap metal yards. Materials could be reused in other projects on base, or in the redevelopment taking place after deconstruction is complete.

Assorted Project Metals

Waste Characterization document – This is a method for documenting the waste from a demolition project by defining both the description of the materials and the quantities expected to be produced.

1.6 Environmental/HAZMAT Considerations

1.6.1 General Environmental Considerations for Facility Removal

Various environmental factors are associated with facility removal projects. The presence of materials that could be considered hazardous to personnel or result in hazardous waste generation are among the most prevalent factors to consider in a

removal project due to significant impacts on project costs. It is not uncommon for the environmental factors to more than double the costs associated with removal projects.

The most common potential "hazardous" components resulting from demolition and/or deconstruction are lead-based paint (LBP), asbestos-containing materials (ACM), mercury, and PCBs. Diversion of chemically treated wood such as creosote and CCA may also be problematic in some locations. It is important to note that buildings constructed up until mid-1970 are suspect candidates to contain LBP. This poses a significant problem because of the number of World War II era structures yet to be removed. However, with careful examination and proper knowledge of handling projects involving LBP, the need for abatement can usually be avoided. The IMA LBP policy can be found in the Toolbox library. In addition to the hazards mentioned above, there are numerous special use facilities that contain a wide range of "exotic" substances that require special handling prior to facility removal.

The magnitude of the environmental abatement challenge impacting the Facility Removal Program can be gleaned from the following projections:

- Over nine million cubic feet of treated lumber is projected from CONUS Army wide demolition and renovation of buildings over the next 15 years.

- Demolition and renovation of buildings at CONUS Army installations is projected to generate greater than 440,000 square feet of friable ACM and 160 million square feet of non-friable ACM over the next 15 years. Asbestos is suspected to be present in most structures; non-friable ACM is the major component of the asbestos stream, while friable ACM is still present as pipe insulation or surfacing material in some buildings.

- In excess of 30 million square feet of LBP is anticipated from CONUS Army installations over the next 15 years. LBP was noted in almost all World War II–era buildings surveyed.

To further complicate the environmental impact on deconstruction and demolition activities, all DoD agencies and organizations follow policy that directs compliance with Federal, State, and local regulations, as well as EPA regulations. The guidelines can vary between locations and require careful research before proceeding, because some states are much more stringent than others, and set guidelines more stringent than federal levels.

1.6.2 Regulatory Overview

Typically, environmental regulations can be located in the Code of Federal Regulations (CFR) Title 40 – Protection of the Environment. Other considerations such as worker safety are typically addressed in CFR Title 29 – Labor.

Specific legislative acts that typically govern most removal projects include:

- The Resource Conservation and Recover Act (RCRA) of 1976;

- The National Environmental Policy Act (NEPA) of 1969;
- The Clean Air Act Amendments (CAAA) of 1990;
- The Clean Water Act (CWA) of 1977; and
- The Toxic Substances Control Act (TSCA) of 1988
- OSHA.

Handing and disposal of hazardous wastes are generally regulated under the 1976 Resource Conservation and Recover Act (RCRA). This law sets standards for solid waste management and identifies certain solid wastes as hazardous wastes. RCRA requires special management for hazardous wastes from generation to final disposal and is commonly referred to as "cradle to grave" management. RCRA promulgated regulations that can be located in 40 CFR Parts 260-282.

The most common hazardous material components from the demolition and deconstruction of military facilities are ACM, LBP, and chemically treated wood. Disposal of wastes containing these materials require proper management and may include tracking, permitting, potential storage, transportation, proper final disposal techniques, and the additional fees associated with these practices.

1.6.3 ACM Overview

Asbestos-containing building materials (ACM) are one of the most commonly recognized materials requiring removal prior to demolition. ACMs are found in construction debris in furnace and pipe insulation, insulation, mastic, floor tile, ceiling tile, siding, transit board and roof shingles. There is a health concern when it is exposed, disturbed, and considered friable. By definition, friable indicates asbestos that is easily crumbled, or reduced to powder by hand pressure. Friable ACM requires full containment, monitoring, proper notification, and disposal at a special hazardous waste landfill. Non-friable (not producing powder with hand pressure) can be removed with minimal containment. The FRP Best Practices Toolbox "Library" provides additional information regarding ACM considerations, policy, regulations, and common practices.

1.6.4 ACM Regulatory Requirements

The EPA requirements associated with ACM-related demolition are defined under the National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations (40 CFR 61). These regulations specify emission limitations and control procedures. The EPA defines an ACM as a material that contains more than one percent asbestos. The presence of asbestos in a material is determined using a polarizing light microscope. Friable ACM materials must be removed, labeled as such, and disposed of in an authorized landfill. Non-friable ACMs are not regulated at the federal level; however, individual states may have limitations that are more stringent. As long as proper labeling and containers are used, asbestos waste that is wetted during removal can typically be disposed of in a landfill permitted to accept friable and non-friable ACM waste. The landfill should be contacted to determine its waste acceptance protocol.

Materials containing asbestos must not be recycled and must be disposed of in accordance with state and local landfill regulations. Demolition that involves handling of ACM must be in accordance with DA regulations and requirements, OSHA, TSCA, and the Clean Air Act, per 40 CFR 61, Subpart M. The Clean Air Act, Section 112, defines requirements for precautionary procedures against fiber release during deconstruction processes.

1.6.5 Lead Hazard Management

The purpose of lead hazard management is to prevent lead exposure to children under the age of six years, pregnant women, and workers. Many structures built before 1978 are coated with Lead Based Paint. LBP was commonly applied in kitchens, baths, wood trim, and siding. During deconstruction and demolition processes, debris is generated that contains lead contamination. The wastes generated during demolition processes are generally commingled and are not typically considered a hazardous waste under Resource Conservation and Recovery Act (RCRA). This is because LBP-coated demolition debris usually does not contain a high lead concentration when composite samples are collected and can commonly be disposed of in "regular" non-hazardous landfills. Incineration of LBP debris is not an accepted practice due to potential violations of the Clean Air Act. The FRP Best Practices Toolbox Library provides additional information regarding IMA LBP policy, considerations, regulations, and common practices.

1.6.6 LBP Regulatory Requirements

The regulatory requirements are in a transition mode from management under EPA RCRA to TSCA. Title IV of the TSCA, Lead Exposure Reduction, requires compliance with state and local LBP regulations. As of August 2000, the EPA considered LBP-coated debris from residential buildings altered by homeowners to be non-hazardous by definition. With this ruling, EPA considers lead paint debris generated by contractors in households to be considered a 'household waste' and is therefore excluded from RCRA Subtitle C hazardous waste regulations.

The testing procedure for the hazardous identification of lead is Toxicity Characteristic Leaching Procedure (TCLP). The federal regulatory standard for lead is five milligrams per liter (5 mg/L). If the concentration of lead is greater than 5 mg/L, the waste is considered a RCRA hazardous waste. OSHA provides procedures for proper demolition and safety precautions and the Clean Air Act requires appropriate monitoring of the release of lead dust and exposure. HUD guidelines provide technical information on how to identify LBP hazards and how to address safety issues. Many states will maintain all requirements of the federal program, but will enforce their own guidelines for the overall handling, treatment, and disposal of lead-containing materials. For demolition, a federal regulation provided by the Occupational Safety & Health Administration (or OSHA) concerns lead exposure in construction/demolition, and applies to all construction work where an employee may be exposed to lead.

1.6.7 Mercury/PCB's Overview

Some structures may have mercury-containing light tubes and PCB containing ballasts that are leaking (and cannot be recycled). Transformers, including interior and exterior pole or ground-mounted transformers may house a significant amount of PCB-containing oil. Light tubes should not be crushed or broken for shipping.

Transformers, including interior and exterior pole or ground-mounted transformers may also house a significant amount of PCB-containing oil.

1.6.8 UST/AST Overview

Both Underground and Aboveground storage tanks slated for demolition have typically been in use for a significant amount of time, and small pockets of ground or soil contamination tends to occur due to small but chronic refilling spillage. As a rule of thumb, it is generally recommended to expect to remove at least a cubic yard of contaminated soil with any UST/AST demolition, but in some instances, this number could be much greater and the extent of contamination must be determined by DECAM and/or other environmental professionals.

1.6.9 Treated Wood Overview

Wood found in buildings may be treated with chemicals such as pentachlorophenol, creosotes, and arsenic compounds, which results in a hazardous waste classification if the chemicals present exceed regulatory levels for landfill disposal.

The majority of this wood can be salvaged and reused for purposes similar to its original use. Reuse applications include signposts, landscaping timbers, parking barriers, retaining walls, and fences.

1.6.10 Treated Wood Regulatory Requirements

Regulatory requirements of wood treated with chemicals fall under air permitting, local regulatory agencies, drinking water rules, and the US Department of Agriculture (USDA). Rules such as 40 CFR Parts 9, 141, and 142 regulate drinking water standards and limitations for components like arsenic.

Chemically treated wood is not necessarily considered a hazardous waste. States such as Washington have a Dangerous Waste Designation Process (Chapter 173-303-071 WAC) that should be followed to ensure that proper handling and classifications occur. Demolition landfills are not permitted to burn chemically treated wood due to air permitting requirements, but can grind the wood to be reused as products like mulch.

1.6.11 Site Environmental Control

Site Environmental Control typically includes such activities as erosion control, storm water management, dust control, noise control and hazardous material migration control

1.6.12 Hazardous Materials Handling

Handling includes, as a minimum, such activities as removal/handling/disposal of asbestos, PCB's, dangerous accumulations of lead-based paint, mercury, dangerous levels of heavy metals, biological hazards, i.e. bird droppings, radiological hazards, toxic levels of hydrocarbons, petroleum contamination and dangerous industrial chemicals.

1.6.13 Cultural/Endangered Species

This includes conducting an investigation to determine if there is any reason to suspect that the project may impact historic architectural sites or endangered species.

1.7 Site Restoration

Upon successful removal of the facility, it is often required that the contractor perform certain site restoration activities. The contract specifications and drawings usually set forth the general condition of the site after the removal and hauling operations are completed. In general, the following tasks may be addressed:

- Backfill – Most demolition projects will require some amount of compacted backfill for voids created by basements and foundation removals. Wherever possible, crushed concrete, from the project, should be considered to supply the backfill needs. Compaction requirements depend on the final use of the property.

- Grading – Final grades are established by the drawings so that surface water drainage is in compliance with regulations and the clients needs. In some cases, a storm drain system is installed.

- Seeding – Most bare sites resulting from removal of buildings should be seeded to control erosion and improve the aesthetics of the site. Ground cover such as native grasses should be planted as soon as possible after the site has been graded.

- Fencing – Fencing is often required to isolate the site until its future use is accomplished.

2.0 PLANNING AND COORDINATION

2.1 Permitting

Depending on the size of the project and its location, there are several permits that may be required for a demolition project. An Army installation may not be subject to local and state permits. Common permits for commercial projects typically include:

- Demolition Permit
- NPDES Storm Water Permit and/or Erosion Control Plan
- Asbestos Abatement permits, including notifications and disposal permits
- Hot Work Permit – for use of cutting torches and welding equipment
- Street Use Permit
- Utility Work Permit
- Excavation Permit

2.2 Environmental Planning and Coordination

2.2.1 Identification of Environmental/HAZMAT Issues

With some removal projects, the costs associated with environmental/HAZMAT issues can exceed the base costs for removing an otherwise uncontaminated building. Therefore, it is important to adequately assess the environmental and hazardous materials that may exist for a project.

There are four main hazardous building elements common to most structures that need to be addressed prior to demolition. Additionally, there are other less common hazardous materials that may exist. Notification to the contractor that these materials exist, or may exist in the structure, is required. These common hazardous materials generally include:

- Asbestos Containing Material (ACM)
- Mercury
- Lead
- Polychlorinated Biphenyl (PCB)
- Other HAZMAT

a. Asbestos-Containing Materials (ACM's)

ACM's are required to be removed from the structure prior to demolition. Common ACM's include resilient flooring, cement asbestos shingles (siding and roofing), thermal system insulation, textured or acoustic ceiling material, ceiling

tiles, and plaster. A survey is required to be performed prior to demolition to identify these materials.

b. Mercury

Mercury containing light tubes, thermostats, and switches need to be removed and either recycled or treated as hazardous waste.

c. Lead

Lead flashing, floor pans, exhaust pipe covers, and other "solid" lead materials should be removed either prior to or during demolition. These materials can be recycled. Lead-containing paint does not usually need to be abated prior to demolition; however, special training, handling and sampling of the demolition debris may be required. For additional information, refer to the IMA policy on lead based paint.

d. Polychlorinated Biphenyl (PCB)

PCB containing ballasts and transformers need to be removed prior to demolition and treated as hazardous waste. Light ballasts should be presumed to contain PCB's unless labeled as "No PCB's". PCB-containing oil is typically removed from large transformers, and then the transformer metal can be recycled.

e. Other HAZMAT

There are several other hazardous materials unique to specific structures that may require removal prior to demolition or special handling. These materials may typically include:

- **Refrigerant** associated with air conditioners or water coolers**;**
- **Chlorine** associated with chillers or building use processes**;**
- **Mercury, Cadmium,** or **Chromium** associated with special paints or coatings;
- **Batteries** associated with emergency power or lighting systems;
- **Radioactive energy sources** associated with smoke detectors;
- **Heating oil/**tanks; and
- **Hazardous contaminants** remaining from the building use.

Vacant buildings can harbor bat or bird colonies which may result in significant amounts of excrement. These buildings may also be in significant disrepair, exhibiting rotten floors, stairs, and walls, sub-grade water accumulations, in-operable doors, etc. These issues may not significantly increase the cost of the demolition; however they are important safety concerns and will also affect the demolition plan. These issues are usually identified either in the hazardous

materials survey (animal excrement) or the OSHA engineering survey (stagnant water, structural stability, etc.).

A thorough hazardous materials survey should be performed during the planning stages to ascertain cost and time impacts. This survey should include a building history review to uncover any potential building use contamination. The installation DECAM or equivalent should be consulted prior to execution of any demolition activities.

2.2.2 Environmental Surveys

In many cases, the installation DECAM will conduct an environmental survey prior to solicitation of a demolition contract. The environmental survey often provides the foundation by which a contract can be developed to accommodate potential abatement, remediation, and hazardous material disposal. It is important to note that remediation costs are not typically funded with FRP funds.

There is one important thing to note when contracting a project with respect to environmental costs: NOT ALL HAZMAT/ENVIRONMENTAL ISSUES ARE VISIBLE DURING AN ENVIRONMENTAL SURVEY. A survey typically includes a non-invasive survey of the facility, however, some proactive installations may take core samples from floors, walls, and ceilings in an attempt to identify ACM or other common materials that have historically been present. The contractor's pre bid walk-through should occur when the building is vacant and accessible. This allows the contractor to investigate all conditions without restraint. Frequently, selective demolition performed during this phase reveals materials that can then be subject to the base bid, as opposed to becoming part of a change-order. Also, this opportunity for access and investigation (whether the contractor avails himself of it or not) precludes the contractor from arguing (at a later date) that conditions were not fully disclosed to him. Also, somebody involved in the survey, either performing it or reviewing it, should be experienced in surveys and building construction, etc. Environmental issues may still be missed, but generally they will be small.

Whenever possible, it is a good idea to develop unit costs for environmental remediation in the event that an issue is discovered during demolition. This can prevent costly delays and may also reduce base costs since a contract service cost may be more competitive prior to project award.

2.3 Work Plans

2.3.1 Environmental Work Plan

It is important to have a well prepared Environmental Work Plan submitted as part of the project contract requirements. A good work plan will address environmental issues properly and effectively to prevent complications that can arise from multi-party contract execution. When abatement is required, a demolition contractor may subcontract this portion of the work. A good Environmental Work Plan will address policies and procedures to prevent or minimize cross-liability in the event that additional hazardous materials are identified as part of the project. Also, an Environmental Work Plan

submitted as part of the contract bid package will provide an additional basis to judge a contractor's experience.

2.3.2 Safety Plan (SSHASP)

In addition to the contractors Corporate Health and Safety Program (HASP), it is important to supplement this safety plan with a Site Specific Health and Safety Plan (SSHASP) which addresses the Job Hazard Analysis for each project. The SSHASP will identify health and safety requirements or conditions specific to the site including the extent and types of hazards and associated risk mitigation. For more detailed requirements of OSHA SSHASP requirements, refer to 29CFR1910.

2.3.3 Demolition Work Plan

The Demolition Work Plan is the submittal document that sets forth the contractors plan for accomplishing the demolition work. It is a project-specific plan that describes the means and methods for accomplishing the demolition.

2.3.4 Quality Control/Assurance

The need for a QC/QA program depends on several factors such as project stakeholders, project complexity, regulatory requirements, and other considerations. Refer to Section 5 for additional details and considerations.

2.4 Engineering Survey

The Engineering Survey is required by OSHA (refer to 29CFR1926.850) and it is the responsibility of the demolition contractor to inspect the site and complete the form he chooses to use that is within the guidelines of the OSHA requirements. The general requirement for the engineering survey is stated as follows from 20CFR1926.850(a):

> *Prior to permitting employees to start demolition operations, an engineering survey shall be made, by a competent person, of the structure to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. Any adjacent structure where employees may be exposed shall also be similarly checked. The employer shall have in writing evidence that such a survey has been performed.*

2.5 Facility Removal Estimates

2.5.1 Typical Project Cost Drivers

Typical factors that affect the cost of a removal project include:

- Local labor rates
- Local disposal fees

- Environmental factors
- Construction method
- Recycle/Re-use/Diversion
- Salvage value of materials

Each of these variables, and their consideration for building estimates in the FRP Toolbox are provided in this section.

a. Local Labor Rates

Labor costs can vary widely, even within a select geographic region. For this reason, the Toolbox estimator provides adjustment of historical project data. In general, a "coefficient" is used to adjust normalized data for a specific location. Additionally, certain assumptions have been made to develop general labor costs associated with facility removal. The demolition industry is widely recognized as supporting union labor. In general, assumptions include application of Davis-Bacon Act labor rates for a removal project.

b. Local Disposal Fees

There are two primary types of demolition materials: (1) Recyclable, which includes such items as salvageable metals, concrete and other masonry items that can be sold or crushed for re-use; and (2) Debris that must be disposed of in a landfill. Construction & Demolition (C&D) debris disposal costs can be the single most expensive component of the demolition estimate, exclusive of the environmental items. Installation landfill sites are commonly being closed and much landfill material is being hauled to commercial disposal facilities. The cost of disposal can vary between $10 per ton to over $100 per ton. The Toolbox allows the user to input the debris disposal cost (commonly referred to as "tipping" fees) for a particular project location. The Toolbox assumes that recyclable concrete, asphalt and masonry materials can be crushed on-post for use as aggregate or hauled to a commercial crushing station off-site. It is also assumed that large quantities of steel will be recycled or otherwise diverted from landfill disposal. These factors are reflected in the unit prices for each particular type of building.

c. Environmental Factors

Environmental costs associated with building demolition projects are sometimes the largest component of the total demolition cost. The estimator should consult the installation DECAM (or equivalent) to obtain whatever information is available with regard to environmental surveys and recent quotations for the unit prices to perform the work. The Toolbox contains average unit price estimates for use in compiling the environmental component of the demolition estimate.

d. Construction Type

The type of construction can have significant impacts on removal project costs. In general, a building with more recyclable materials such as steel and concrete will have a lower disposal cost, thereby reducing the overall removal costs for a demolition project.

e. Recycle/Re-Use/Diversion

From a conservation perspective, it is always favorable to recycle material to the maximum extent possible. However, costs associated with preparing a material for recycle sometimes make the effort unfavorable. Concrete and steel are typically good recycle candidates. Concrete can be ground and separated from steel reinforcement and the aggregate can be used for many purposes. Depending on market demand, steel can have significant salvage value. Aside from salvage or recycle value, diversion from a landfill or fee-dependent disposal site also adds the advantage of reduced disposal fees. It is important to note that a certain quantity of recycle/diversion is commonly required for Army removal projects.

f. Salvage Value of Materials

The value of most salvageable materials is driven by market demand. Sometimes, in particular with the case of large dimension or older lumber, it may be possible to transition from a commodity market to a collector's market due to the demand for particular types of wood used in classic Army structures. However, such cases of rare or exotic materials are likely to be very rare or the structure may be specified as having high historic significance. In general, the bulk of materials that will be salvaged throughout the Army real property inventory will include concrete and steel. The market value of crushed concrete, as an example from an actual project, could reduce $60 per ton for landfill costs to $8 per ton for crushing and reuse. Current global markets for metallic items often create a positive benefit for recycling most steels and metals. In many cases, the salvage operation may not result in a direct profit, but will result in a cost-avoidance. The added benefit is that materials are reduced in local landfills, which is likely a cost-avoidance for future generations.

2.5.2 Preparing Budgetary Estimates

The preferred method to develop a budgetary estimate is to use the EKO Best Practices Toolbox "Advanced Estimate" tool. The estimator allows a user to build and estimate for multiple facilities and specify known environmental/HAZMAT issues. It is also cost-adjusted for the user's location and allows input of local tipping fees if applicable.

A general goal of the Toolbox is to present the majority of Army buildings and structures for the purposes of generating estimates. If a project contains low inventory quantity buildings or a construction configuration for a building has not been identified, please contact the appropriate CEHNC regional manager or submit a request in the Toolbox for additional assistance in preparation of a budgetary estimate to remove buildings/structures with FRP funds.

3.0 PROJECT EXECUTION

3.1 Site Security

Prior to commencing any operations on a military installation, it is imperative that a security program be implemented. This may involve several factors such as fencing, traffic controls, and guard services. Site security and demolition activities must be coordinated with installation security personnel. The removal contract should address site security issues that are acceptable to satisfactorily complete the project within the allocated schedule and budget.

3.2 Execution of Environmental Components

In most instances, environmental assessment and characterization will be completed prior to demolition operations. Whenever plausible, it can be much easier to contract demolition and environmental remediation to a single contractor. This reduces potential liability issues resulting from cross-contamination, improper assessment, or other issues that could result in a questionable liable act. As an example, if previously unknown ACM is encountered during the demolition process and the ACM contractor is not on site, the project may be stopped until the ACM contractor is brought back to the site. If the ACM removal is under the control of the demolition contractor, such delays and additional costs are minimized.

3.3 Execution of Demolition/Deconstruction Projects

The execution of demolition and deconstruction projects should be described in reasonable detail in the Demolition Work Plan to be submitted and approved prior to beginning work. In general, the Demolition Work Plan should address the following:

- Permitting
- Engineering Including Special Requirements for Blasting in Applicable
- QA/QC
- Safety – Site Specific
- Haz/Mat Work
- Mobilization
- Training
- Security
- Utility Terminations
- Salvage for Owner or Resale
- Demolition/Deconstruction Means and Methods
- Material Handling, Including Diversion/Recycling and Disposal
- Site Restoration

3.4 Execution of Relocation Projects

The relocation of a structure by moving it to another location will seldom be an alternative for Army FRP work. However, in those instances where moving is a viable option, the Relocation Moving Plan should include at a minimum, the following:

- Permits
- Analysis of Building Code Compliance
- Engineering
- HAZMAT Work
- Utility Terminations
- Clearing of Overhead Obstructions
- Traffic Requirements
- Means and Methods for the Move
- Foundation Removal
- Site Restoration

4.0 REPORTING AND DATA COLLECTION

4.1 Reporting Requirements

Reporting requirements can be specified at several levels in a contract. Obviously, a requirement to over report activities is not beneficial to either party and will increase the project costs. For certain project activities, daily reporting completed every work day and delivered to the COR by 0800 the following morning may be warranted. For other activities, a single final report may be adequate.

Reporting requirements may be driven by liability, regulation, ordinance, or governing laws at the local, state, or federal level. Select reporting activities that may require consideration include:

- Worksite entry log
- Environmental sampling chain-of-custody records
- Waste/Recycle/HAZMAT receipts/manifests
- OSHA required safety meeting attendees
- Personal Protection Equipment (PPE) use
- Other required activities

4.2 Safety Reports

Safety reports should be completed as set forth in the contract specifications and the SSHASP. Generally, daily/weekly safety meetings are required by OSHA requirements. General record keeping and reporting requirements should be specified in the SSHASP.

4.3 Data Collection

Depending on the nature of the demolition project, various data elements are required to be maintained. Environmental remediation or abatement typically involves collection of various data for liability and/or regulatory purposes. It is prudent to keep records that demonstrate compliance with Army's diversion goals and policies. It is often good policy to implement certain requirements for data collection into a removal project statement of work (SOW).

Various proactive installations have developed methods to capture and store facility removal project data for future use/reference. In general, a review of a historical project SOW may not identify individual efforts involved, segregate various costs components, or provide costs for total facility removal. Therefore, collection of such data can prove useful for future estimating, tracking, and verification efforts.

4.4 Deconstruction Reporting and Data Collection

With continuing efforts of the Army to reduce C&D waste in landfills, deconstruction will likely become a more prevalent means of facility removal in the current facility

removal process. Data should be collected with respect to the weight of Salvage and Reuse items. In general, it is anticipated that concrete will account for a major portion of all C&D diverted to accomplish current Army diversion goals. In certain instances, additional incentive may be invoked by requiring a contractor to submit their plan for achievement of diversion goals as part of the Demolition Work Plan.

4.5 Environmental Reporting and Data Collection

Typical data collection and reporting requirement resulting from environmental abatement or remediation can vary considerably from project to project. In some instances, a demolition or deconstruction project may be impacted by plans developed by other contractors. For this reason and many other, the contract SOW should dictate overall requirements to properly manage and comply with environmental requirements.

4.6 Waste Management Summary

Efforts to manage C&D waste from a removal project should be documented daily/weekly and a finally summary report could be implemented as a contractual requirement. This activity is typically completed at the end of the project and included as a part of the Final Report. This report summarizes the type (i.e. concrete, wood, steel, mixed debris, etc.) and tonnage of all material resulting from the demolition.

4.7 Progress Photos

Before and after photos of the project and progress photos of larger buildings are good methods to track the progress of the work and the final look of the site. Such photographic history has proven useful for various reasons in the past. In some instances, a contractual requirement for photographs may provide a good method for verification of proper contract execution.

4.8 As-Built Drawings

An important document for any construction project is the production of As-Built Drawings. In the case of demolition work, a site plan noting the location and depth of utility terminations and location and the depth of any remaining foundations should be documented for future reference.

4.9 Final Report

The Final Report is a summary of the project including those elements listed herein. The project specifications may require other documentation to be included in this report.

- National Demolition Association – A useful tool for reference regarding demolition projects is the website of the National Demolition Association (NDA) at www.infodemolitionassociation.com . There are references to demolition safety issues and various ‘White Paper’ on subjects of interest to the demolition industry.

- Safety: Collectively, the following references are the primary guide to safety and health with respect to demolition operations.

  - DA EM 385-1-1: Safety and Health Requirements
  - AR 385-10: Army Safety Program
  - OSHA 29 CFR 1910: OCCUPATIONAL SAFETY AND HEALTH STANDARDS
  - OSHA 29 CFR 1926: SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION
  - OSHA 29 CFR 1960: BASIC PROGRAM ELEMENTS FOR FEDERAL EMPLOYEE OCCUPATIONAL SAFETY AND HEALTH PROGRAMS AND RELATED MATTERS

- Environmental: Environmental requirements vary from location to location. Most requirements and regulations trickle down from various federal requirements as provided under 40CFR subchapters with the majority of demolition related issues pertaining to hazardous materials or RCRA regulated materials. RCRA rules are promulgated under 40 CFR Subchapter I.

5.0 FRP ADMINISTRATIVE FUNCTIONS

CEHNC has identified essential criteria that must be accomplished before a project is considered ready-to-execute for the purposes of allocating funds. The items generally include the following.

- Completed DA Form 337 including
  - Environmental REC
  - HUD: McKinney-vento Act
  - Historical/Cultural Resources
  - Others per DA Form 337 requirements

NOTE

DA Form 337 is not considered ready for submittal unless all items have been fully completed in accordance with applicable requirements.

- Proper disposition code designation in IFS database

- Independent Government Estimate (IGE) including SOW

The Facility Reduction Program is funded by the Installation Management Agency through the Army Engineering and Support Center, Huntsville (CEHNC). The CEHNC FRP Managers manage the overall FRP and distribute the funds for approved projects to primarily the installation, the USACE district, or directly to a FRP contractor. In each case the funding is distributed for the designated project for local execution and management. Before a project can be approved for funding there are a series of administrative steps that must be satisfactorily accomplished. Those steps are primary administrative processes that are outlined in the remainder of this section. In addition to reviewing the required administrative steps that must be taken to obtain approval for an FRP project, this Section of the Guide will also briefly discuss the approval and funding process.

The Administrative Functions detailed in this section include real property inventory data quality and analysis, processing required documents for FRP funding approval, and the close-out of contracted services and project documents and data. There are many DoD/Army policy and procedural regulations and guidelines, as well as Federal, state, and local laws and regulations that dictate the facility disposal process. It is not the goal of this document to restate all requirements. This document is intended to provide an overview of the process.

There are generally 5 phases that the participating installation will work through to get their project approved and funded. The phases, related status codes and general activities are summarized as:

Phase 0 – Facility Removal Project Identified

1. Installations verify real property inventory data quality per facility
2. Installation submits a list of facilities planned for removal by planned fiscal year
3. Installation submits facility candidates for FRP funding consideration via approved DA Form 337 w/attachments, SOW and an Independent Government Estimate (IGE)

Phase 1 - Project Ready for Funding

1. Types of Funding
2. FRP Management reviews Installation's candidate submission

Phase 2 – Project Funded

1. FRP Management presents FRP candidates for funding consideration
2. FRP Board prioritizes FRP candidates and makes FY selection
3. FRP Management notifies Installations to available FY project funds

Phase 3 – Project in Execution

1. Installation coordinates Facility Removal contract Award
2. Installation issues NTP for removal activities and monitoring of activities
3. Installation coordinates removal activities with FRP Management

Phase 4 – Project Completed

1. Installation coordinates removal contract acceptance and closure
2. Installation coordinates real property data update and closure
3. Installation and FRP Management coordinates contract and project closure and file related documents

Overall Management Process: For a graphical depiction of the FRP Funding and Management process, click here or visit the FRP Toolbox @ https://frptoolbox.erdc.usace.army.mil/frptoolbox/ .

5.1 Phase 0: Facility Removal Project Identified

Identifying potential facility removal candidates for funding is an ongoing coordination effort between an Installation, IMA Regional, and FRP Management. This initial phase can be viewed in 3 steps: 1) Data quality assurance, 2) Facility removal planning, and 3) Application for FRP funding.

5.1.1 Documentation

Three approval documents or vouchers related to various phases in the life-cycle of each facility must be completed. Associated documents are maintained in a Real Property Voucher Register for each facility at each installation. Document requirements are

common; however the approval process varies among commands, installations and IMA Regional Offices. The four (4) key Forms in this process include the DD For 1391, DD Form 1354, DA Form 337, and DA Form 272.

5.1.2 Real Property Data Assurance

It is imperative that each facility's real property inventory data is current and accurate. Facility real property inventory data storage and management occurs at various levels from the Installation to HQDA. As each level of management reviews the proposed FRP project, they rely on the accuracy of the data in their respective facility information systems. Particular focus is made on the Integrated Facilities System (IFS), Real Property Planning and Analysis System (RPLANS), Installation Status Report (ISR), and Headquarters Executive Information System (HQEIS).

5.1.3 Installation Submits a List of Planned Removals

The Installation submits a list of Facilities Planned for Removal by Planned Fiscal Year.

5.1.4 Installation Analyzes Real Property Inventory

The Installation annually analyzes and compares the real property inventory to current and projected mission requirements. Periodic coordination with FRP Management provides the avenue for updating the FRP list of facilities planned or requiring removal.

5.1.5 FRP Demolition Candidate Identification

Each year FRP Management extracts and analyzes facility data and planning from various real property data bases. In turn, FRP Management highlights property categories considered excessive or in short supply. Excess facilities are analyzed for possible removal under the FRP and the results are communicated back to the Installations. *5.1.6 Removal Planning Costs*

For planning purposes, a budget cost estimate should be prepared for each FRP candidate facility using the FRP Best Practice Toolbox's Advanced Estimating tool. This budget estimate should be as accurate as possible to prevent future funding difficulties as the project enters the funding and execution phases. (The budgeting estimate will later be supplemented by a refined Independent Government Estimate (IGE) as the project enters the funding phase. The advanced estimation tool can be found at: https://frptoolbox.erdc.usace.army.mil/frptoolbox/index.cfm?mth=adv.step1.

5.1.7 FRP Management Makes the Request to IMA/ACSIM

FRP Management makes the request to IMA/ACSIM for the next fiscal year FRP funding based on the current facility reduction data (showing planned demolition needs) and the planned removal estimated costs (Toolbox Estimate). Accurate Installation Real Property data and open project coordination promotes clear and positive justifications which in turn encourages greater annual FRP appropriations.

5.1.8 Installation Submits Facility Candidates for Funding Consideration

Prior to the Installation's submission of facility candidates for FRP funding consideration, an analysis and evaluation are performed for each candidate as justification toward an approved DD Form 337. The majority of the evaluation is summarized as attachments to the Form 337. The application requires statements of work that delineate what the installation will remove/perform and what a FFP removal contract will remove/perform. The application also requires an Independent Government Estimate (IGE) for the contracted facility removal work. Comprehensive planning at this stage encourages FRP funding and minimal project impacts.

5.1.9 DA Form 337 – Request for Approval of Disposal of Buildings and Improvements

DA Form 337 may be used in lieu of the DD Form 1354 to change real property inventory data. This form is recommended for total removal of a facility. DA Form 337 serves as an approval document and as a cover document for various attached subject-assessments, analyses', coordination and approvals. Upon completion of each facility removal, the DA Form 337 will be annotated to represent the final data voucher for each facility's final real property data update and closeout. Attachments to the DA Form 337 may include:

- **Environmental Assessment:** An Environmental Assessment and Protection study provides a conclusion to an analysis of potential impacts on a portion of the environment during facility removal activities and steps required to protect it. Depending on the circumstances, a formal Environmental Impact and Assessment may or may not be required. In all cases the environment will be addressed and protected from material and removal hazards. In all cases the coordination with the Installation Environmental Coordinator and the Environmental Protection and Toxic Management Plans will be conducted to help assess the specific environmental conditions in and around the facility and further ensure those conditions are maintained and protected from the facility removal statement of work activities.

- **Cultural and Historical Resource Assessment**: A Cultural and Historical Resource Protection assessment provides a conclusion to an analysis of potential impacts to and steps required to protect known and potential Cultural and Historical resources during facility removal activities. In all cases the coordination with the Installation Cultural and Historical Coordinator and a review of the Cultural and Historical Management Plan will be conducted to help assess the specific conditions of the facility and its immediate surroundings. A thorough analysis will help ensure those Historical or Cultural conditions are maintained and protected from the facility removal statement of work activities. Coordination with Native Indian Tribes, and State and Local Historical Preservation Offices will be performed through the Installation Historical Officer to assure proper protocol, information distribution and potential agreements.

- **Endangered and Threatened Species Assessment:** An Endangered and Threatened Species Protection Assessment provides an analysis of potential impacts on natural resources potentially jeopardized by facility removal activities and documents steps required for protection. Natural resources include land, forest, wildlife and known or potential endangered and threatened species. In all cases the coordination with the Installation Environmental Coordinator and a review of the Natural Resource Management Plan will be conducted to help assess the specific natural conditions around the facility and further ensure those conditions are maintained and protected from the facility removal statement of work activities. Coordination with State Offices will be performed through the Installation Environmental Officer to ensure proper protocol, information distribution and potential agreements.

- **Steward B McKinney - Vento Homeless Assistance Act Title V:** Identification and Use of Surplus Federal Property provides a process status and/or conclusion to the Installation's required coordination with Department of Housing and Urban Development (HUD) relative to the facility to be removed. HUD in turn provides nonprofit organizations, states and local governments the opportunity to assist the homeless through the use of unutilized, underutilized, excess, or surplus federal real properties. Coordination of the HUD documentation can be provided to the Installation POC for signature and processing.

- **Estimate Methodology and Format Coordination/Consideration:** Preparing a facility removal IGE is unique to the methods required to perform the removal action. Removal and demolition activities differ from construction activities and in turn require different cost considerations and presentation. It is important to consider the IGE's purpose and its various relationships in the management process. Consider:
    - How an FRP IGE is constructed that best represents removal and demolition activities.
    - How the demolition industry best constructs and presents its proposals.
    - What similarity and uniformity are required to perform reasonable cost comparisons and analysis for award.
    - What solicitation guidance for bidders best achieves the cost presentations' similarity and uniformity.
    - What award and cost schedule best summarizes the award amount and easily provides a relationship between acceptable measured progress and percent of progress payment methodologies.

5.2 Code 1 Phase: Project Ready for Funding

Installation and funding administrative requirements vary for many reasons. Because they differ, FRP provides a common submission and administration process.

5.2.1 Types of Funding

- MILCON: MILCON applies to new construction or adaptive reuse construction activities that change the use and/or layout of an existing facility where costs exceed $750,000. Demolition is inclusive.

- O&M: Maintenance, repairs, renovations, and minor construction projects are funded through the O&M program. Minor construction is defined as new construction, modification, or renovation that does not exceed $750,000. O&M projects may be approved locally, depending on the level of authority delegated to the Installation.

- NAF: Represents the cash and assets other than what has been appropriated by Congress. Non-appropriated funds are used for the collective benefit of those who generate them: military personnel, family members, and other authorized civilians.

- AFH:

5.2.2 FRP Management Reviews Installation's Candidate Submission

An Installation's application for FRP funding includes the DA Form 337, SOW and an IGE. The 337 Application Package is submitted to the appropriate FRP Regional Facilitator at CEHNC-IS-FRP. The Facilitator receives the facility candidate application and performs a basic review of the material to ensure the application presents the required information clearly for the FRP Project Evaluation Board to consider. With Installation coordination and comments resolved, the FRP database is revised showing the facility candidate is ready for funding (code 1), the application is filed for the next Project Evaluation Board discussion and the Installation POC is notified of the application status.

5.3 Code 2 Phase: Project Funded

5.3.1 FRP Management Presents Candidates for Funding Consideration

In anticipation of, or subsequent to, receiving program funds, the FRP Project Evaluation Board convenes to discuss FRP funding applications. Applications will be presented by the Regional Facilitators to the Board and be ready to address comments and questions during the application's evaluation. The Board compares each application to the FRP evaluation criteria.

5.3.2 FRP Board Prioritizes FRP Candidates and Makes the FY Selection

Subsequent to the FRP Board's review and acceptance of new applications, past applications not yet funded and new applications are prioritized. Priority is based on addressing individual mission priorities in contrast current FRP funding limits. The Project Evaluation Board makes the fiscal year's candidate selections. If and when additional funds become available the FRP priority list will be revised with subsequent funding approvals.

5.3.3 FRP Management Notifies Installations to Available FY Project Funds

The Regional Facilitator revises the FRP Program Database to reflect the change in status (code 2) and informs the Candidate's Installation POC. The FRP Facilitator is always available to assist the Installation POC with follow-on contracting assistance.

5.4 Code 3 Phase: Project in Execution

5.4.1 Installation Coordinates Facility Removal Contract Award

The installation has three options for facility removal services; Installation, FRP-Huntsville or local geographical District award and contract administration. Each option has advantages and disadvantages. In all options, the Installation has the ultimate responsibility for success. The organization performing the contract action is responsible for the success of the contracted work as awarded.

5.4.2 Statement of Work and Estimates

As discussed previously it is important that statements of work be written concisely to clearly define intent, roles, and desired results. Statements of work should be reviewed and updated. Installation management should reaffirm the commitment of resources. Estimates should be updated to match revisions. At this point funding limits have been established and reserved additional funding may not be available and statements may need to be adjusted.

5.4.3 Solicitation

The RFP (Request for Proposals) should provide bidder guidance on how the bid cost is to be formatted and presented. This in intended to make the Cost Comparison and Analysis exercise less complicated by clearly establishing a format that allows the comparison of like activities to be cleanly compared even if the methods vary. This format should already take into consideration how the government and contractors estimate demolition and disposal activities. Generally, the FRP project will consist of four major components; the Environmental Abatement, the removal (demolition, deconstruction, relocation), disposal, and site restoration. Within these four project components there can be a variety of project variables depending on the type of structure, intended reuse of the site, types of disposal materials, and location of the structure, among many other factors. The solicitation bid schedule should coincide with project flow and details as much as possible. It is important to clearly define the framework for the project as well as the controls, and an accurate description of what has to be done. It is up to the contractor to determine the best means, methods, and techniques using their professional judgment and experience.

It is equally important that the Government Project Manager and the Contractor fully understand each others expectations and coordinate their efforts throughout the remainder of the project. This is especially true for Safety and Accident Prevention Planning, Quality Assurance Planning and Monitoring, Responsibility for every step of the project needs to be clearly recognized and assigned. This includes many, many activities such as work permits, utility shutoff and capping, emergency response planning, pre-approval of work plans and documents, environmental protection plans, contract schedules, etc.

5.4.4 Installation Coordinates Removal Activities with FRP Management

The Installation POC should provide periodic status reports regarding the status of project cost and schedule to FRP Management. Timely discussion on possible impacts will allow FRP managers to project the need and probably for securing additional funds as required. Lack of available funds could lead to scope reduction and/or delays, thus increasing the risk and need for future funds for project completion. It is also important for the installation to capture specific project data during the execution phase. Quantities of disposal materials, method of disposal, and other project phase documentation will assist FRP Management in assessing project efficiency and costs for use in estimating future project costs and updating the FRP Toolbox estimator database.

5.5 Code 4 Phase: Project Completed

This phase addresses the closure of contracted services, reporting requirements, closure of project activities, and documentation and revision of real property inventory data.

5.5.1 Installation Coordinates Removal Contract Acceptance and Closure

The final acceptance of the facility site condition is the responsibility of the Contracting Officer and the Installation Command as the responsible office of the real property. Subsequent to final acceptance, the Contracting Officer will ensure the contract is closed physically, administratively and fiscally. Contract documents and files will be stored as required. Certificates will be distributed and filed as required.

5.5.2 Installation Coordinates Real Property Data Update and Closure

Following the completion of facility removal requirements, the project manager will verify the information on the DA Form 337 and provide the final facility description to the Installation's Real Property Manager. The Real Property Manager will update the Facility Register and update the data in the Real Property Inventory showing the facility has been removed.

5.5.3 Installation and FRP Management Coordinates Contract and Project Closure

Subsequent to contract closure and real property data revisions, the installation and FRP POCs coordinate the settling of funding needs or returns and the closure of the project. All Project files should be retained at the installation. The FRP facilitator codes the project closed in the FRP Database. The CEHNC FRP Management may also ask for project specific data and information to update the FRP Toolbox data bases and ensure future project cost estimate accuracy.